

REGLUGERÐ

um eftirlit með þjónustu og hlutum sem geta haft hernaðarlega þýðingu.

1. gr.

Almenn ákvæði.

Með reglugerð þessari eru sett nánari ákvæði um framkvæmd laga nr. 58/2010 um eftirlit með þjónustu og hlutum sem geta haft hernaðarlega þýðingu. Reglugerðin felur í sér ákvæði um eftirlit með hlutum með tvíþætt notagildi, varnartengdum vörum og miðlun þeirra samkvæmt alþjóðlegum skuldbindingum og/eða sem íslensk stjórnvöld hafa ákveðið að framfylgja á grundvelli yfirlýsingar ríkisstjórna aðildarríkja Evrópusambandsins og Fríverslunarsamtaka Evrópu um pólitísk skoðana-skipti, sem er hluti samningsins um Evrópska efnahagssvæðið, sbr. lög nr. 2/1993.

2. gr.

Útflutningur hluta með tvíþætt notagildi.

Reglugerð ráðsins (EB) nr. 428/2009 frá 5. maí 2009 um að setja Bandalagsreglur um eftirlit með útflutningi, tilflutningi, miðlun og viðkomu hluta með tvíþætt notagildi skal öðlast gildi hér á landi, með þeirri uppfærslu sem getið er um í 2. mgr. og aðlögun sem getið er um í 4. gr. Reglugerðin er birt sem fylgiskjal 1 við reglugerð þessa ásamt I.-VI. viðauka við hana (Annex I-VI):

- a) I. viðauki (Listi sem vísað er til í 3. gr. reglugerðar þessarar);
- b) II. viðauki (Almennt útflutningsleyfi Bandalagsins nr. EU001) (sem vísað er til í 9. gr. reglugerðar þessarar);
- c) III. viðauki a (Sýnishorn eyðublaða fyrir einstakt eða heildarútflutningsleyfi) (sem vísað er til í 1. mgr. 14. gr. reglugerðar þessarar);
- d) III. viðauki b (Sýnishorn eyðublaða fyrir miðlunarþjónustuleyfi) (sem vísað er til í 1. mgr. 14. gr. reglugerðar þessarar);
- e) III. viðauki c (Sameiginleg atriði sem koma skulu fram í innlendum almennum útflutningsleyfum í innlendum Stjórnartíðindum) (sem vísað er til í b-lið 4. mgr. 9. gr. reglugerðar þessarar);
- f) IV. viðauki (Listi sem vísað er til í 1. mgr. 22. gr. reglugerðar þessarar);
- g) V. viðauki (Reglugerð sem felld er úr gildi ásamt síðari breytingum);
- h) VI. viðauki (Samsvörunartafla).

Enginn má flytja út hluti með tvíþætt notagildi án leyfis ráðherra. Listi yfir slíka hluti er birtur í I. viðauka við reglugerð ráðsins skv. 1. mgr., sem hefur verið uppfærður miðað við 27. september 2010 (COM(2010) 509 final).

3. gr.

Útflutningur varnartengdra vara.

Tilskipun Evrópuþingsins og ráðsins nr. 2009/43/EB frá 6. maí 2009 um að einfalda skilmála og skilyrði vegna tilflutnings varnartengdra vara innan Bandalagsins skal öðlast gildi hér á landi 30. júní 2012, með þeirri uppfærslu sem getið er um í 2. mgr. og aðlögun sem getið er um í 4. gr., og skal henni beitt um útflutning varnartengdra vara til aðildarríkja Evrópska efnahagssvæðisins eftir því sem við getur átt. Tilskipunin er birt sem fylgiskjal 2 við reglugerð þessa ásamt viðauka (Annex) við hana (listi yfir varnartengdar vörur).

Enginn má flytja út varnartengdar vörur án leyfis ráðherra. Listi yfir slíkar vörur er birtur í viðauka við tilskipun skv. 1. mgr., sem hefur verið uppfærður miðað við 21. febrúar 2011 (Sameiginlegur hergagnalisti Evrópusambandsins, 2011/C 86/01), og öðlast hann þegar gildi.

Ákvæði sameiginlegrar afstöðu ráðsins 2008/944/SSUÖ frá 8. desember 2008 um skilgreiningu á sameiginlegum reglum um eftirlit með útflutningi á hernaðarlegri tækni og búnaði skal eiga við um útflutning varnartengdra vara, að breyttu breytanda, þ.m.t. skilyrðin fyrir veitingu útflutningsleyfa skv. 2. gr. hennar.

Við veitingu útflutningsleyfa skv. 1. mgr. skal enn fremur taka tillit til aðgerða sem ákveðnar eru á grundvelli laga nr. 93/2008 um framkvæmd alþjóðlegra þvingunaraðgerða.

4. gr.

Aðlögun.

Gerðir skv. 2. og 3. gr. skulu aðlagðar með eftirfarandi hætti:

- a) ákvæði varðandi ríkisborgara, einstaklinga, fyrirtæki, stjórnvöld, opinberar stofnanir, tungumál, yferráðasvæði eða aðildarríki Evrópusambandsins („EB“, „ESB“, „bandalagsins“ eða „sameiginlega markaðarins“) eiga við um íslenska ríkisborgara, einstaklinga, fyrirtæki, stjórnvöld, opinberar stofnanir, tungumál, yferráðasvæði eða Ísland, eftir því sem við á;
- b) ákvæði um tilkynningar eða skýrslugerðir til aðildarríkja Evrópusambandsins eða stofnana gilda ekki. Hið sama á við um ákvæði um gildistöku eða hvenær gerðir skuli koma til framkvæmda;
- c) tilvísanir í gerðir, sem eru hluti samningsins um Evrópska efnahagssvæðið (EES-samningsins), eiga við um þau ákvæði íslensks réttar sem innleiða þær gerðir, eftir því sem við á;
- d) tilvísanir í gerðir, sem eru ekki hluti EES-samningsins, eiga við um hliðstæð ákvæði íslensks réttar, eftir því sem við á, þ.m.t. ákvæði tollalaga nr. 88/2005;
- e) vefsetur með upplýsingum um lögbær stjórnvöld á Íslandi er: www.utn.is/utflutningseftirlit.
- f) „Tilflutningur“ milli landa samsvarar „útflutningi“ hvað Ísland varðar.

5. gr.

Miðlunarþjónusta.

Enginn má stunda miðlunarþjónustu með varnartengdar vörur, án leyfis ráðherra, sem tilgreindar eru skv. 2. mgr. 3. gr.

6. gr.

Innflutningur.

Enginn má flytja inn eða láta hafa viðkomu hérlandis, án leyfis ráðherra, hluti sem geta nýst, í heild eða að hluta, í tengslum við þróun, framleiðslu, meðhöndlun, rekstur, viðhald, geymslu, greiningu, auðkenningu eða útbreiðslu efna-, sýkla- eða kjarnavopna eða annars kjarnasprengjubúnaðar eða þróun, framleiðslu, viðhald eða geymslu á flugskeytum sem geta borið slík vopn.

7. gr.

Flugskeyti.

Enginn má senda upp flugskeyti, án leyfis ráðherra, sem er 500 kg eða meira að þyngd og með 300 km fluggetu eða meira.

8. gr.

Framsal.

Framsal leyfis samkvæmt reglugerð þessari er óheimilt nema með leyfi ráðherra.

9. gr.

Undanþágur.

Utanríkisráðherra getur veitt undanþágu frá banni, sem er sett samkvæmt reglugerð þessari, þegar réttmætar ástæður eru fyrir hendi.

Eftirfarandi hlutir með tvíþætt notagildi og varnartengdar vörur eru undanþegin leyfisskyldu samkvæmt þessari reglugerð:

- a) vörur í erlendri eigu sem skilað er til útlanda eftir að hafa verið tímabundið fluttar inn í tengslum við prófun, sýningu, sýnikennslu eða opinberar æfingar;
- b) björgunartæki og búnaður sem flutt eru út í tengslum við hjálparstörf eða neyðaraðstoð;
- c) vopn sem eru háð útflutningsleyfi skv. vopnalögum nr. 16/1998;
- d) vörur sem eingöngu eru í beinni gegnumferð um íslenskt tollyferráðasvæði, þegar sendandi og móttakandi eru staðsettir utan íslensks tollyferráðasvæðis;
- e) vörur, tækni og þjónusta til notkunar um borð í skipum í íslenskri eigu sem sigla undir íslenskum fána og loftförum í íslenskri eigu í milliríkjaflugi;

- f) útflutningur íslenskra stjórnvalda, að því gefnu að eignarréttur sé ekki yfirfærður og að varan eða þjónustan sé notuð af íslenskum stjórnvöldum erlendis eða að viðtakandinn sé stjórnvald í NATO- eða ESB-ríki.

10. gr.

Viðurlög.

Hver sá sem brýtur gegn ákvæðum reglugerðar þessarar skal sæta viðurlögum skv. 13. gr. laga um eftirlit með þjónustu og hlutum sem geta haft hernaðarlega þýðingu nr. 58/2010, nema þyngri viðurlög liggja við samkvæmt öðrum lögum.

11. gr.

Gildistaka o.fl.

Reglugerð þessi, sem er sett með heimild í 14. gr. laga um eftirlit með þjónustu og hlutum sem geta haft hernaðarlega þýðingu nr. 58/2010, öðlast gildi 1. september 2011. Jafnframt fellur úr gildi reglugerð um útflutningsleyfi o.fl. nr. 70/1993, ásamt síðari breytingum.

Beita skal ákvæðum þessarar reglugerðar um umsóknir sem voru lagðar fram fyrir gildistöku hennar, en ekki afgreiddar.

Utanríkisráðuneytinu, 25. júlí 2011.

Össur Skarphéðinsson.

Einar Gunnarsson.

Fylgiskjal 1.**REGLUGERÐ RÁÐSINS (EB) NR. 428/2009**

frá 5. maí 2009

um að koma á fót Bandalagskerfi um eftirlit með útflutningi, tilflutningi, miðlun og viðkomu hluta með tvíþætt notagildi (endurútgöfin).

RÁÐ EVRÓPUSAMBANDSINS HEFUR,
með hliðsjón af stofnsáttmála Evrópubandalagsins, einkum 133. gr.,
með hliðsjón af tillögu framkvæmdastjórnarinnar,
og að teknu tilliti til eftirfarandi:

- 1) Reglugerð ráðsins (EB) nr. 1334/2000 frá 22. júní 2000 um að koma á fót Bandalagskerfi um eftirlit með útflutningi hluta og tækni með tvíþætt notagildi ⁽¹⁾ hefur verið breytt verulega nokkrum sinnum. Þar sem um frekari breytingar verður að ræða er réttast að endurútgefa hana til glöggvunar.
- 2) Hlutir með tvíþætt notagildi (þ.m.t. hugbúnaður og tækni) skulu háðir skilvirku eftirliti þegar þeir eru fluttir út frá Bandalaginu.
- 3) Þörf er á skilvirku, sameiginlegu kerfi fyrir útflutningseftirlit með hlutum með tvíþætt notagildi til að tryggja að alþjóðlegar skuldbindingar og skyldur aðildarríkjanna, einkum að því er varðar að hefta útbreiðslu, og Evrópusambandsins séu uppfylltar.
- 4) Sameiginlegt eftirlitskerfi og samræmd stefna vegna framfylgðar og vöktunar í öllum aðildarríkjunum er forsenda fyrir því að koma á frjálsum flutningi innan Bandalagsins á hlutum með tvíþætt notagildi.
- 5) Ábyrgð á því að veita einstök, heildar- eða innlend almenn útflutningsleyfi, leyfi fyrir miðlunarþjónustu, leyfi fyrir viðkomu hluta með tvíþætt notagildi frá löndum utan Bandalagsins eða leyfi fyrir tilflutningi innan Bandalagsins á þeim hlutum með tvíþætt notagildi sem tilgreindir eru í IV. viðauka er í höndum innlendra stjórnvalda. Setja ber innlend ákvæði og taka ákvarðanir í hverju ríki fyrir sig, sem hafa áhrif á útflutning

hluta með tvíþætt notagildi, innan ramma sameiginlegu viðskiptastefnunnar, einkum reglugerð ráðsins (EBE) nr. 2603/69 frá 20. desember 1969 um að setja sameiginlegar reglur um útflutning ⁽²⁾.

- 6) Ákvarðanir um að uppfæra sameiginlega listann yfir hluti með tvíþætt notagildi, sem eru háðir útflutningseftirliti, skulu vera í fullu samræmi við skyldur og skuldbindingar sem aðildarríki hafa samþykkt sem aðilar að viðkomandi alþjóðakerfum gegn útbreiðslu og að fyrirkomulagi útflutningseftirlits eða með því að fullgilda viðeigandi alþjóðasamninga.
- 7) Sameiginlegir listar yfir hluti með tvíþætt notagildi, ákvörðunarstaðir og viðmiðunarreglur eru nauðsynlegir þættir í skilvirku útflutningseftirlitskerfi.
- 8) Afhending hugbúnaðar og tækni með rafrænum miðlum, bréfsíma eða síma til ákvörðunarstaða utan Bandalagsins skal einnig háð eftirliti.
- 9) Leggja ber sérstaka áherslu á málefni er varða endurútflutning og lokanot.
- 10) Hinn 22. september 1998 undirrituðu fulltrúar aðildarríkjanna og framkvæmdastjórn Evrópubandalaganna viðbótarbókanir við viðkomandi samninga um öryggisreglur milli aðildarríkjanna, Kjarnorkubandalags Evrópu og Alþjóðakjarnorkumálastofnunarinnar sem, ásamt öðrum ráðstöfunum, skylda aðildarríkin til að veita upplýsingar um tilflutning á tilteknum búnaði og ókjarnklyfum efnum.
- 11) Bandalagið hefur samþykkt bálk tollareglna, sem er að finna í reglugerð ráðsins (EBE) nr. 2913/92 frá 12. október 1992 um setningu tollareglna Bandalagsins ⁽³⁾, hér á eftir nefndar tollareglur Bandalagsins, og reglu-

⁽¹⁾ Stjtið. EB L 159, 30.6.2000, bls. 1.

⁽²⁾ Stjtið. EB L 324, 27.12.1969, bls. 25.

⁽³⁾ Stjtið. EB L 302, 19.10.1992, bls. 1.

gerð framkvæmdastjórnarinnar (EBE) nr. 2454/93 ⁽¹⁾ um framkvæmd á reglugerð (EBE) nr. 2913/92, en í þeim er m.a. mælt fyrir um reglur um útflutning og endur-útflutning vara. Þessi reglugerð takmarkar í engu heimildir samkvæmt tollareglum Bandalagsins og framkvæmdarákvæðum þeirra.

- 12) Í samræmi við og innan marka 30. gr. sáttmálans og þar til frekari samræming hefur farið fram er aðildarríkjunum heimilt að framkvæma eftirlit með tilflutningi tiltekinnna hluta með tvíþætt notagildi innan Bandalagsins til að standa vörð um allsherjarreglu eða almannaöryggi. Ef þetta eftirlit tengist skilvirkni útflutningseftirlits Bandalagsins skal ráðið endurskoða það reglulega.
- 13) Til að tryggja að þessari reglugerð sé beitt á réttan hátt skal sérhvert aðildarríki gera ráðstafanir til að veita lögbærum stjórnvöldum víðeigandi heimildir.
- 14) Þjóðhöfðingjar eða ríkisstjórnarleiðtogar ESB samþykktu í júní 2003 Aðgerðaráætlun gegn útbreiðslu geryðingarvopna (Þessalóníku-aðgerðaráætlunina). Til viðbótar þessari aðgerðaráætlun var samþykkt Skipulagsáætlun ESB gegn útbreiðslu geryðingarvopna sem leiðtogaáætlun 12. desember 2003 (Skipulagsáætlun ESB gegn geryðingarvopnum). Samkvæmt III. kafla þessarar skipulagsáætlunar skal Evrópusambandið leita allra leiða sem það ræður yfir til að koma í veg fyrir, hindra, stöðva og, ef hægt er, uppræta útbreiðsluáætlanir sem eru áhyggjuefni á heimsvísu. Í 4. tölul. A-hluta 30. mgr. þess kafla er sérstaklega vísað til þess að styrkja stefnu og framkvæmd varðandi útflutningseftirlit.
- 15) Með ályktun öryggisráðs Sameinuðu þjóðanna nr. 1540, sem samþykkt var 28. apríl 2004, var ákveðið að öll ríki skyldu grípa til og framfylgja skilvirkum ráðstöfunum til að koma á fót innlendu eftirliti til að hindra útbreiðslu kjarnavopna, efnavopna eða sýklavopna og burðarkerfa þeirra, þ.m.t. að koma á fót víðeigandi eftirliti með tengdum efnum og í þessu skyni skal m.a. koma á fót eftirliti með viðkomu og miðlun. Tengd efni eru efni, búnaður og tækni sem falla undir viðkomandi alþjóðasamninga og fyrirkomulag eða sem eru skráð í innlenda eftirlitslista sem hægt væri að nota við hönnun, þróun,

framleiðslu eða notkun á kjarnavopnum, efnavopnum og sýklavopnum ásamt burðarkerfum þeirra.

- 16) Þessi reglugerð tekur til hluta, sem einungis fara um yfirráðasvæði Bandalagsins, þ.e. þeirra hluta sem ekki fá lögmæta tollmeðferð eða annað en ytri viðkomumeðferð eða sem einungis er komið fyrir á frísvæði eða í tollfrjálsri vörugæmslu og þar sem ekki þarf að skrá þá í samþykktu birgðaskrá. Því ætti að gera stjórnvöldum aðildarríkjanna kleift að banna, í hverju tilviki fyrir sig, viðkomu hluta með tvíþætt notagildi ef þau hafa réttmætar grunsemdir um, á grundvelli greiningarupplýsinga eða annarra heimilda, að hlutirnir séu eða kunni að vera ætlaðir, í heild sinni eða að hluta, til útbreiðslu geryðingarvopna eða burðarkerfa þeirra.
- 17) Einnig skal taka upp eftirlit með starfsemi miðlunarþjónustu þegar miðlari hefur verið upplýstur af lögbæru innlendu stjórnvaldi eða gerir sér ljóst að veiting slíkrar þjónustu gæti leitt til framleiðslu eða afhendingar á geryðingarvopnum í þriðja landi.
- 18) Æskilegt er að ná fram einsleitri og samræmdri beitingu eftirlits innan ESB í því skyni að stuðla að öryggi innan ESB og alþjóðaðryggi og til að skapa jöfn samkeppnisskilyrði fyrir útflytjendur í ESB. Því er rétt, í samræmi við tilmæli Þessalóníku-aðgerðaráætlunarinnar og Skipulagsáætlunar ESB gegn geryðingarvopnum, að auka samráð milli aðildarríkjanna áður en útflutningsleyfi er veitt. Ávinningur af þessari nálgun gæti verið, t.d., fullvissa um að grundvallaröryggishagsmunum eins aðildarríkis sé ekki ógnað vegna útflutnings frá öðru aðildarríki. Aukin samleitni skilyrða um framkvæmd innlends eftirlits með hlutum með tvíþætt notagildi, sem ekki eru tilgreindir í þessari reglugerð, og samhæfing notkunarskilyrða fyrir mismunandi tegundir leyfa, sem veita má samkvæmt þessari reglugerð, myndi koma á einsleitari og samræmdari beitingu eftirlits. Bætt skilgreining á öfnislegum tilflutningi á tækni, þannig að hún feli í sér að gera eftirlitsskylda tækni tiltæka einstaklingum, sem staðsettir eru utan ESB, myndi styðja viðleitni til að stuðla að öryggi rétt eins og frekari samræming fyrirkomulags við að skiptast á viðkvæmum upplýsingum milli aðildarríkjanna við alþjóðakerfin um útflutningseftirlit, einkum með því að gefa kost á

⁽¹⁾ Stjtið. EB L 253, 11.10.1993, bls. 1.

því að koma á fót öruggu rafrænu kerfi til að miðla upplýsingum á milli aðildarríkjanna.

- 19) Aðildarríkin skulu, hvert um sig, ákveða viðurlög sem eru skilvirk, meðalhófskennd og hafa varnaðaráhrif sem gilda skulu ef ákvæði þessarar reglugerðar eru brotin,

SAMÞYKKT REGLUGERÐ ÞESSA:

I. KAFLI

EFNI OG SKILGREININGAR

1. gr.

Með þessari reglugerð er komið á fót Bandalagskerfi um eftirlit með útflutningi, tilflutningi, miðlun og viðkomu hluta með tvíþætt notagildi.

2. gr.

Í þessari reglugerð:

1. „hlutir með tvíþætt notagildi“ merkir hlutir, þ.m.t. hugbúnaður og tækni, sem nota má bæði í borgaralegum og hernaðarlegum tilgangi, þ.m.t. allar vörur sem nota má þannig að þær springi ekki og þannig að þær nýtist við framleiðslu kjarnavopna eða annars kjarnasprengibúnaðar,
2. „útflutningur“ merkir:
 - i. útflutningsferli í skilningi 161. gr. reglugerðar (EBE) nr. 2913/92 (tolla-reglur Bandalagsins),
 - ii. endurútflutning í skilningi 182. gr. þeirra reglna en að undanskildum hlutum sem hafa viðkomu og
 - iii. afhendingu hugbúnaðar og tækni með rafrænum miðlum, þ.m.t. með bréfsíma, síma, tölvupósti eða öðrum rafrænum hætti til ákvörðunarstaða utan Evrópubandalagsins; hann tekur til þess að gera slíkan hugbúnað og tækni tiltæk á rafrænu formi fyrir einstaklinga og lögaðila og sameignarfélög utan Bandalagsins. Útflutningur á einnig við um munnlega afhendingu á tækni þegar tækninni er lýst í gegnum síma,
3. „útflytjandi“ merkir einstakling, lögaðila eða sameignarfélag:
 - i. sem gengið er frá útflutningsyfirlýsingu fyrir, þ.e. sá sem hefur samning við viðtakanda í þriðja landi þegar yfirlýsingin er viðtekin og hefur heimild til að ákveða að hluturinn sé sendur út af tollsvæði Bandalagsins; ef

ekki hefur verið gerður samningur um útflutning, eða ef handhafi samningsins kemur ekki fram fyrir eigin hönd, er útflytjandi sá sem hefur heimild til að ákvarða að hluturinn sé sendur út af tollsvæði Bandalagsins,

- ii. sem ákveður að afhenda eða gera tiltækan hugbúnað og tækni með rafrænum miðlum, þ.m.t. með bréfsíma, síma, tölvupósti eða öðrum rafrænum hætti til ákvörðunarstaða utan Bandalagsins.

Ef ávinningurinn af rétti til að ráðstafa hlut með tvíþætt notagildi tilheyrir einstaklingi eða lögaðila með staðfestu utan Bandalagsins, í samræmi við samning, sem útflutningurinn byggist á, skal útflytjandinn teljast samningsaðilinn með staðfestu í Bandalaginu,

4. „útflutningsyfirlýsing“ merkir þá aðgerð þegar einstaklingur eða lögaðili gefur til kynna, með því sniði og þeim hætti, sem mælt er fyrir um, að hann óski þess að koma hlutum með tvíþætt notagildi í útflutningsferli,
 5. „miðlunarþjónusta“ merkir:
 - að semja eða koma til leiðar viðskiptum um kaup, sölu eða afhendingu hluta með tvíþætt notagildi frá þriðja landi til annars þriðja lands eða
 - sölu eða kaup hluta með tvíþætt notagildi sem eru staðsettir í þriðja landi vegna tilflutnings til annars þriðja lands.
- Samkvæmt þessari reglugerð er það að veita eingöngu stoðþjónustu undanskilið frá þessari skilgreiningu; stoðþjónusta er flutningur, fjármálaþjónusta, tryggingar eða endurtryggingar eða almennt auglýsinga- eða kynningarstarf,
6. „miðlari“ merkir einstakling, lögaðila eða sameignarfélag með búsetu eða staðfestu í aðildarríki Bandalagsins sem veitir þjónustu, sem skilgreind er í 5. mgr., frá Bandalaginu til yfirráðasvæðis þriðja lands,
 7. „viðkoma“ merkir flutning á hlutum með tvíþætt notagildi frá löndum utan Bandalagsins sem koma inn á og fara í gegnum tollsvæði Bandalagsins á ákvörðunarstað utan Bandalagsins,

8. „einstakt útflutningsleyfi“ merkir leyfi sem veitt er einum tilgreindum útflytjanda fyrir einn lokanotanda eða viðtakanda í þriðja landi og sem nær yfir einn eða fleiri hluti með tvíþætt notagildi,
9. „almennt útflutningsleyfi Bandalagsins“ merkir útflutningsleyfi vegna útflutnings til tiltekinna viðtökuríkja sem er tiltækt öllum útflytjendum sem virða notkunarskilmála þess sem tilgreindir eru í II. viðauka,
10. „heildarleyfi til útflutnings“ merkir leyfi sem veitt er einum tilgreindum útflytjanda, að því er varðar tegund eða flokk hluta með tvíþætt notagildi, sem getur gilt fyrir útflutning til eins eða fleiri tilgreindra lokanotenda og/eða í einu eða fleirum tilgreindum þriðju löndum,
11. „innlent almennt útflutningsleyfi“ merkir útflutningsleyfi sem veitt er í samræmi við 2. mgr. 9. gr. og skilgreint í innlendra löggjöf í samræmi við 9. gr. og III. viðauka c,
12. „tollsvæði Evrópusambandsins“ merkir yfirráðasvæði í skilningi 3. gr. tollareglna Bandalagsins,
13. „hlutir með tvíþætt notagildi frá löndum utan Bandalagsins“ merkir hluti sem hafa stöðu vara frá löndum utan Bandalagsins í skilningi 8. mgr. 4. gr. tollareglna Bandalagsins.

II. KAFLI

GILDISSVIÐ

3. gr.

1. Útflutningur þeirra hluta með tvíþætt notagildi sem eru tilgreindir í I. viðauka skal leyfisskyldur.
2. Samkvæmt 4. eða 8. gr. getur útflutningur til allra eða tiltekinna ákvörðunarstaða á tilteknum hlutum með tvíþætt notagildi, sem eru ekki tilgreindir í I. viðauka, verið leyfisskyldur.

4. gr.

1. Útflutningur á hlutum með tvíþætt notagildi, sem eru ekki tilgreindir í I. viðauka, skal leyfisskyldur, ef lögbær stjórnvöld í aðildarríkinu, þar sem útflytjandinn hefur staðfestu, hafa tilkynnt honum að hlutirnir, sem um ræðir, séu eða kunni

að vera ætlaðir, í heild eða að hluta, til notkunar í tengslum við þróun, framleiðslu, meðhöndlun, rekstur, viðhald, geymslu, greiningu, auðkenningu eða útbreiðslu, efna-, sýkla- eða kjarnavopna eða annars kjarnasprengibúnaðar eða þróun, framleiðslu, viðhald eða geymslu á flugskeytum sem geta borið slík vopn.

2. Útflutningur á hlutum með tvíþætt notagildi, sem eru ekki tilgreindir í I. viðauka, skal einnig leyfisskyldur, ef sett hefur verið vopnaviðskiptabann á kaup- eða viðtökuríki, á grundvelli sameiginlegrar afstöðu eða sameiginlegra aðgerða, sem ráðið hefur samþykkt, eða ákvörðunar Öryggis- og samvinnustofnunar Evrópu (ÖSE) eða vopnaviðskiptabanns, sem lagt hefur verið á með bindandi ályktun öryggisráðs Sameinuðu þjóðanna, og ef útflytjandanum hefur verið tilkynnt af hálfu stjórnvaldanna, sem um getur í 1. mgr. að hlutirnir sem um ræðir séu eða kunni að vera, í heild eða að hluta, ætlaðir til hernaðarlegra lokanota. Samkvæmt þessari málsgrein merkir „hernaðarleg lokanot“:

- a) upptalningu meðal hluta til hernaðar sem tilgreindir eru í hergagnalista aðildarríkjanna,
- b) notkun á framleiðslu-, prófunar- eða greiningarbúnaði eða íhlutum í hann til þróunar, framleiðslu eða viðhalds á hlutum til hernaðar sem tilgreindir eru í framangreindum lista,
- c) notkun á hvers konar ófullgerðum vörum í verksmíðju sem framleiðir hluti til hernaðar sem tilgreindir eru í framangreindum lista.

3. Útflutningur á hlutum með tvíþætt notagildi, sem eru ekki tilgreindir í I. viðauka, skal einnig leyfisskyldur, ef lögbær stjórnvöldin, sem um getur í 1. mgr., hafa tilkynnt útflytjandanum að hlutirnir, sem um ræðir, séu eða kunni að vera ætlaðir, í heild eða að hluta, til notkunar sem hlutar eða íhlutir í hluti ætlaða til hernaðar, sem tilgreindir eru í innlendum hergagnalista, sem hafa verið fluttir frá yfirráðasvæði þess aðildarríkis án leyfis eða í trássi við leyfi sem mælt er fyrir um í innlendra löggjöf þess aðildarríkis.

4. Ef útflytjandi hefur vitneskju um að hlutir með tvíþætt notagildi, sem hann fyrirhugar að flytja út og eru ekki tilgreindir í I. viðauka, séu ætlaðir, í heild eða að hluta, til einhverra þeirra nota sem um getur í 1., 2. og 3. mgr. skal hann tilkynna stjórnvöldunum, sem um getur í 1. mgr.

um það sem ákveða hvort ráðlegt sé að gera útflutninginn, sem um ræðir, leyfisskyldan.

5. Aðildarríki er heimilt að samþykkja eða viðhalda innlendri löggjöf, þar sem útflutningur hluta með tvíþætt notagildi, sem eru ekki tilgreindir í I. viðauka, er gerður leyfisskyldur, ef útflytjandinn hefur ástæðu til að ætla að þessir hlutir séu eða kunni að vera ætlaðir, í heild eða að hluta, til einhverra þeirra nota sem um getur í 1. mgr.

6. Aðildarríki, sem gerir útflutning leyfisskyldan á hlut með tvíþætt notagildi, sem er ekki tilgreindur í I. viðauka, þegar það beitir ákvæðum 1. - 5. mgr., skal, eftir því sem við á, upplýsa hin aðildarríkin og framkvæmdastjórnina um það. Hin aðildarríkin skulu taka tillit til þessara upplýsinga með tilhlýðilegum hætti og gera tolyfirvöldum sínum og öðrum viðkomandi innlendum stjórnvöldum viðvart.

7. Ákvæði 1., 2. og 5. - 7. mgr. 13. gr. skulu gilda um tilvik er varða hluti með tvíþætt notagildi sem eru ekki tilgreindir í I. viðauka.

8. Þessi reglugerð er með fyrirvara um rétt aðildarríkjanna til að grípa til eigin ráðstafana skv. 11. gr. í reglugerð (EBE) nr. 2603/69.

5. gr.

1. Miðlunarþjónusta með hluti með tvíþætt notagildi, sem eru tilgreindir í I. viðauka, skal leyfisskyld, ef lögbæru stjórnvöldin í aðildarríkinu, þar sem miðlarinn er búsettur eða hefur staðfestu, hafa tilkynnt honum að hlutirnir, sem um ræðir, kunni að vera ætlaðar, í heild sinni eða að hluta, til einhverra þeirra nota sem um getur í 1. mgr. 4. gr. Ef miðlari hefur vitneskju um að hlutir með tvíþætt notagildi, sem tilgreindir eru í I. viðauka og hann fyrirhugar að veita miðlunarþjónustu fyrir, séu ætlaðir, í heild eða að hluta, til einhverra þeirra nota sem um getur í 1. mgr. 4. gr., skal hann tilkynna lögbærum stjórnvöldum um það sem munu ákveða hvort ráðlegt sé að gera miðlunarþjónustuna, sem um ræðir, leyfisskylda.

2. Aðildarríki er heimilt að útvíkka gildissvið 1. mgr. svo hún nái til hluta með tvíþætt notagildi sem eru ekki tilgreindir og ætlaðir til nota skv. 1. mgr. 4. gr. og til hluta með tvíþætt notagildi, sem ætlaðir eru til hernaðarlegra lokanota, og ákvörðunarstaða sem um getur í 2. mgr. 4. gr.

3. Aðildarríki er heimilt að samþykkja eða viðhalda innlendri löggjöf þar sem miðlun hluta með tvíþætt notagildi er leyfisskyld ef miðlarinn hefur ástæðu til að ætla að þessir hlutir séu eða kunni að vera ætlaðir til einhverra þeirra nota sem um getur í 1. mgr. 4. gr.

4. Ákvæði 2., 3. og 4. mgr. 8. gr. skulu gilda um innlendar ráðstafanir sem um getur í 2. og 3. mgr. þessarar greinar.

6. gr.

1. Lögbærum stjórnvöldum í aðildarríki, þar sem viðkoma á sér stað, er heimilt að banna viðkomu hluta með tvíþætt notagildi frá löndum utan Bandalagsins sem tilgreindir eru í I. viðauka ef hlutirnir eru eða kunna að vera ætlaðir, í heild sinni eða að hluta, til nota sem um getur í 1. mgr. 4. gr. Þegar ákvarðanir um slíkt bann eru teknar skulu aðildarríki taka tillit til þeirra skyldna og skuldbindinga sem þau hafa samþykkt sem aðilar að alþjóðasáttmálum eða sem aðilar að alþjóðakerfum gegn útbreiðslu.

2. Áður en ákveðið er hvort banna eigi viðkomu er aðildarríki heimilt að kveða á um að lögbærum stjórnvöldum þess sé heimilt að gera, í einstökum tilvikum, tiltekna viðkomu hluta með tvíþætt notagildi, sem eru tilgreindir í I. viðauka, leyfisskylda, ef hlutirnir eru eða kunna að vera ætlaðir, í heild eða að hluta, til nota sem um getur í 1. mgr. 4. gr.

3. Aðildarríki er heimilt að útvíkka gildissvið 1. mgr. svo hún nái til hluta með tvíþætt notagildi sem ekki eru tilgreindir og ætlaðir eru til nota sem um getur í 1. mgr. 4. gr., og til hluta með tvíþætt notagildi, sem ætlaðir eru til hernaðarlegra lokanota og ákvörðunarstaða sem um getur í 2. mgr. 4. gr.

4. Ákvæði 2., 3. og 4. mgr. 8. gr. skulu gilda um innlendar ráðstafanir sem um getur í 2. og 3. mgr. þessarar greinar.

7. gr.

Þessi reglugerð gildir ekki um þjónustustörf eða afhendingu á tækni ef störfin eða afhendingin felur í sér för einstaklinga yfir landamæri.

8. gr.

1. Aðildarríki er heimilt að banna útflutning á hlutum með tvíþætt notagildi, sem eru ekki til-

greindir í I. viðauka, eða gera hann leyfis skyldan, af ástæðum er varða almannaoýrggi eða mannréttindi.

2. Aðildarríkin skulu tilkynna framkvæmdastjórninni um allar ráðstafanir, sem eru samþykktar í samræmi við 1. mgr., jafnskjótt og þær eru samþykktar, og tilgreina nákvæmar ástæður fyrir þeim.

3. Aðildarríkin skulu einnig tilkynna framkvæmdastjórninni þegar í stað um allar breytingar á ráðstöfunum sem samþykktar eru skv. 1. mgr.

4. Framkvæmdastjórnin skal birta ráðstafanirnar, sem henni er tilkynnt um skv. 2. og 3. mgr., í C-deild Stjórnartíðinda Evrópusambandsins.

III. KAFLI

ÚTFLUTNINGSLEYFI OG LEYFI FYRIR MIÐLUNARÞJÓNUSTU

9. gr.

1. Með þessari reglugerð er komið á almennu útflutningsleyfi Bandalagsins fyrir tiltekinn útflutning skv. II. viðauka.

2. Að því er varðar allan annan útflutning, sem er leyfis skyldur samkvæmt þessari reglugerð, skulu lögbær stjórnvöld aðildarríkisins, þar sem útflytjandinn hefur staðfestu, veita slíkt leyfi. Með fyrirvara um takmarkanirnar, sem tilgreindar eru í 4. mgr., getur þetta leyfi verið einstakt leyfi, heildarleyfi eða almennt leyfi.

Öll leyfi skulu gilda allsstaðar í Bandalaginu.

Útflytjendur skulu veita lögbærum stjórnvöldum allar viðeigandi upplýsingar, sem krafist er vegna umsóknar þeirra um einstök leyfi og heildarleyfi til útflutnings, í því skyni að veita lögbærum innlendum stjórnvöldum fullnægjandi upplýsingar, einkum um lokanotanda, viðtökuríki og lokanotkun hlutarins sem fluttur er út. Leyfið getur verið háð, ef við á, yfirlýsingu um lokanot.

3. Aðildarríki skulu vinna úr beiðnum um einstök leyfi eða heildarleyfi innan tímamarka sem skulu ákvörðuð samkvæmt innlendum lögum eða venjum.

4. Innlend almenn útflutningsleyfi:

a) skulu undanskilja frá gildissviði sínu hlutina sem tilgreindir eru í 2. hluta II. viðauka,

b) skulu vera skilgreind samkvæmt innlendum lögum eða venjum. Öllum útflytjendum, sem eru búsettir eða hafa staðfestu í aðildarríkinu sem gefur leyfin út, er heimilt að nota þau ef þeir uppfylla kröfurnar sem settar eru fram í þessari reglugerð og viðbótar innlendra löggjöf. Þau skulu gefin út í samræmi við vísbendingar skv. III. viðauka c. Þau skulu gefin út í samræmi við innlend lög og venjur.

Aðildarríkin skulu tilkynna framkvæmdastjórninni tafarlaust um öll innlend almenn útflutningsleyfi sem gefin eru út eða þeim sem er breytt. Framkvæmdastjórnin skal birta þessar tilkynningar í C-deild Stjórnartíðinda Evrópusambandsins,

c) skulu ekki notuð ef útflytjandi hefur verið upplýstur af stjórnvöldum um það að hlutirnir, sem um er að ræða, séu eða kunni að vera ætlaðir, í heild sinni eða að hluta, til einhverra þeirra nota sem um getur í 1. og 3. mgr. 4. gr. eða 2. mgr. 4. gr., í landi, sem fellur undir vopnaviðskiptabann sem ákveðið er með sameiginlegri afstöðu eða sameiginlegum aðgerðum, sem ráðið hefur samþykkt, eða ákvörðun Öryggis- og samvinnustofnunar Evrópu eða vopnaviðskiptabann, sem lagt hefur verið á með bindandi ályktun öryggisráðs Sameinuðu þjóðanna, eða ef útflytjandi er meðvitaður um að hlutirnir séu ætlaðir til framangreindra nota.

5. Aðildarríkin skulu viðhalda eða innleiða í viðeigandi innlenda löggjöf þann kost að veita heildarleyfi til útflutnings.

6. Aðildarríkin skulu láta framkvæmdastjórninni í té lista yfir þau stjórnvöld sem hafa heimild:

a) til að veita útflutningsleyfi fyrir hluti með tvíþætt notagildi,

b) til að ákveða að banna viðkomu hluta með tvíþætt notagildi frá löndum utan Bandalagsins samkvæmt þessari reglugerð.

Framkvæmdastjórnin skal birta lista yfir þessi stjórnvöld í C-deild Stjórnartíðinda Evrópusambandsins.

10. gr.

1. Lögbær stjórnvöld í aðildarríkinu, þar sem miðlarinn er búsettur eða hefur staðfestu, skulu

veita leyfi fyrir miðlunarþjónustu samkvæmt þessari reglugerð. Þessi leyfi skulu veitt fyrir ákveðnu magni tilgreindra hluta sem fluttir eru á milli tveggja eða fleiri þriðju landa. Auðkenna verður staðsetningu hlutanna í upprunalega þriðja landinu, lokanotanda og nákvæma staðsetningu hans með skýrum hætti. Leyfin skulu gilda allsstaðar í Bandalaginu.

2. Miðlarar skulu láta lögbærum stjórnvöldum í té allar viðeigandi upplýsingar, sem krafist er vegna umsóknar þeirra um leyfi fyrir miðlunarþjónustu samkvæmt þessari reglugerð, einkum upplýsingar um staðsetningu hluta með tvíþætt notagildi í upprunalega þriðja landinu, skýra lýsingu á hlutunum og magninu sem um ræðir, þriðju aðilana, sem hlut eiga að viðskiptunum, þriðja lands viðtökuríkið, lokanotanda í því landi og nákvæma staðsetningu hans.

3. Aðildarríki skulu vinna úr beiðnum um leyfi fyrir miðlunarþjónustu innan tímamarka sem skulu ákvörðuð samkvæmt innlendum lögum eða venjum.

4. Aðildarríkin skulu láta framkvæmdastjórninni í té lista yfir þau stjórnvöld sem hafa heimild til að veita leyfi, samkvæmt þessari reglugerð, fyrir veitingu miðlunarþjónustu. Framkvæmdastjórnin skal birta listann yfir þessi stjórnvöld í C-deild Stjórnartíðinda Evrópusambandsins.

11. gr.

1. Ef þeir hlutir með tvíþætt notagildi sem sótt hefur verið um einstakt útflutningsleyfi fyrir til ákvörðunarstaðar, sem ekki er tilgreindur í II. viðauka, eða til einhvers annars ákvörðunarstaðar, ef um er að ræða hluti með tvíþætt notagildi, sem eru tilgreindir í IV. viðauka, eru eða munu verða staðsettir í einu eða fleiri aðildarríkjum, öðrum en þeim þar sem umsóknin hefur verið lögð fram, skal tilgreina það í umsókninni. Lögbær stjórnvöld í því aðildarríki, sem sótt hefur verið um leyfi til, skulu þegar í stað hafa samráð við lögbær stjórnvöld í því eða þeim aðildarríkjum sem um ræðir og veita viðeigandi upplýsingar. Aðildarríkið eða aðildarríkin, sem haft er samráð við, skulu skýra, innan 10 daga, frá öllum andmælum, sem það eða þau kunna að hafa fram að færa við því að veita slíkt leyfi, sem skulu vera bindandi fyrir aðildarríkið þar sem umsóknin var lögð fram.

Ef engin andmæli berast innan 10 virkra daga skal litið svo á að aðildarríkið eða aðildarríkin, sem samráð var haft við, andmæli ekki.

Í undantekningartilvikum er öllum aðildarríkjum, sem haft er samráð við, heimilt að fara fram á að 10 daga fresturinn sé framlengdur. Aldrei skal framlengja frest um meira en 30 virka daga.

2. Ef útflutningur gæti skaðað grundvallaröryggishagsmuni aðildarríkis getur það farið fram á að annað aðildarríki veiti ekki útflutningsleyfi eða, hafi slíkt leyfi verið veitt, farið fram á að það verði ógilt, fellt niður, því breytt eða það afturkallað. Aðildarríki, sem berst slík beiðni, skal tafarlaust eiga samráð, sem ekki er bindandi, við aðildarríkið, sem leggur fram beiðnina, og skal samráðinu lokið innan 10 virkra daga. Ef aðildarríkið, sem fær beiðnina, ákveður að veita leyfið skal tilkynna framkvæmdastjórninni og hinum aðildarríkjunum um það með því að nota rafræna kerfið sem kveðið er á um í 6. mgr. 13. gr.

12. gr.

1. Þegar aðildarríkin ákveða hvort veita eigi einstakt leyfi eða heildarleyfi til útflutnings eða veita leyfi fyrir miðlunarþjónustu, samkvæmt þessari reglugerð, skulu þau taka tillit til allra viðeigandi forsendna, þ.m.t.:

- a) skyldur og skuldbindingar sem þau hafa hvert um sig samþykkt sem aðilar að viðkomandi alþjóðakerfum gegn útbreiðslu og að fyrirkomulagi útflutningseftirlits eða með því að fullgilda viðeigandi alþjóðasamninga,
- b) skyldur þeirra sem samþykki liggur fyrir um samkvæmt sameiginlegri afstöðu eða sameiginlegum aðgerðum, sem ráðið hefur samþykkt, eða samkvæmt ákvörðun Öryggis- og samvinnustofnunar Evrópu eða bindandi ályktun öryggisráðs Sameinuðu þjóðanna,
- c) forsendur stefnu í innanríkis-, utanríkis- og varnarmálum, þ.m.t. þau sem falla undir sameiginlega afstöðu ráðsins 2008/944/SSUÖ (sameiginleg stefna í utanríkis- og öryggismálum) frá 8. desember 2008 um skilgreiningu á sameiginlegum reglum um eftirlit með útflutningi á hernáðarlegri tækni og búnaði ⁽¹⁾,
- d) forsendur varðandi fyrirhuguð lokanot og afvegaviðskipti.

2. Til viðbótar viðmiðununum, sem settar eru fram í 1. mgr., skulu aðildarríki, við mat á umsókn

⁽¹⁾ Stjtið. ESB L 335, 13. 12. 2008, bls. 99.

um heildarleyfi til útflutnings, taka tillit til beitingar útflytjandans á meðalhófskenndum og fullnægjandi úrræðum og starfsaðferðum til að tryggja að virt séu ákvæði og markmið þessarar reglugerðar og skilmálar og skilyrði leyfisins.

13. gr.

1. Lögbærum stjórnvöldum aðildarríkjanna, sem starfa í samræmi við þessa reglugerð, er heimilt að veita útflutningsleyfi og er heimilt að ógilda, fella niður tímabundið, breyta eða afturkalla útflutningsleyfi sem þau hafa þegar veitt. Ef þau synja um, ógilda, fella niður tímabundið, takmarka verulega eða afturkalla leyfi eða ef þau ákvarða að ekki skuli veita leyfi fyrir fyrirhuguðum útflutningi, skulu þau tilkynna lögbærum stjórnvöldum hinna aðildarríkjanna og framkvæmdastjórninni um það og skiptast á viðeigandi upplýsingum við þau. Ef lögbær stjórnvöld aðildarríkis hafa tímabundið fellt niður útflutningsleyfi skal tilkynna lokaákvörðun til aðildarríkjanna og framkvæmdastjórnarinnar þegar tímabilinu lýkur sem hin tímabundna niðurfelling gildir fyrir.

2. Lögbær stjórnvöld aðildarríkja skulu endurskoða synjanir um leyfi, sem tilkynntar eru skv. 1. mgr., innan þriggja ára frá tilkynningunni og afturkalla þær, breyta þeim eða endurnýja þær. Lögbær stjórnvöld aðildarríkjanna tilkynna niðurstöðu endurskoðunarinnar til lögbærra stjórnvalda hinna aðildarríkjanna og framkvæmdastjórnarinnar eins fljótt og unnt er. Synjanir sem ekki eru afturkallaðar skulu halda gildi sínu.

3. Lögbær stjórnvöld aðildarríkjanna skulu tilkynna aðildarríkjunum og framkvæmdastjórninni án tafar um ákvarðanir sínar, sem teknar eru skv. 6. gr., um að banna viðkomu hluta með tvíþætt notagildi, sem tilgreindir eru í I. viðauka. Þessar tilkynningar skulu innihalda allar viðeigandi upplýsingar, þ.m.t. flokkun á hlutum, tæknilega mæliþætti hans, viðtökuríki og loka-notanda.

4. Ákvæði 1. og 2. mgr. skulu einnig gilda um leyfi fyrir miðlunarþjónustu.

5. Áður en lögbær stjórnvöld aðildarríkis, sem starfa samkvæmt þessari reglugerð, veita leyfi fyrir útflutningi eða miðlunarþjónustu eða taka ákvörðun um viðkomu, skulu þau kanna allar gildar synjanir eða ákvarðanir um að banna viðkomu hluta með tvíþætt notagildi, sem tilgreindir eru í I. viðauka, sem teknar eru samkvæmt þessari reglu-

gerð, til að ganga úr skugga um hvort leyfi eða viðkomu hafi verið synjað af hálfu lögbærra stjórnvalda annars aðildarríkis eða annarra aðildarríkja vegna viðskipta sem eru í grundvallaratriðum eins (í merkingunni hlutur, sem hefur mæliþætti eða tæknilega eiginleika, sem eru í grundvallaratriðum eins, til sama endanlega notanda eða viðtakanda). Þau skulu fyrst hafa samráð við lögbær stjórnvöld aðildarríkisins eða aðildarríkjanna, sem gáfu út synjun eða synjanir eða ákvarðanir um að banna viðkomu, eins og kveðið er á um í 1. og 3. mgr. Ef lögbær stjórnvöld aðildarríkisins ákveða, að höfðu samráði, að veita leyfi eða heimila viðkomu, skulu þau tilkynna lögbærum stjórnvöldum hinna aðildarríkjanna og framkvæmdastjórninni um það og veita allar viðeigandi upplýsingar til skýringar á ákvörðuninni.

6. Allar tilkynningar sem krafist er samkvæmt þessari grein skulu gefnar með öruggum rafrænum aðferðum, þ.m.t. með öruggu kerfi sem setja má upp í samræmi við 4. mgr. 19. gr.

7. Allar upplýsingar, sem skipst er á í samræmi við ákvæði þessarar greinar, skulu vera í samræmi við ákvæði 3., 4. og 6. mgr. 19. gr. varðandi þá leynd sem gildir um slíkar upplýsingar.

14. gr.

1. Öll einstök leyfi og heildarleyfi til útflutnings og leyfi fyrir miðlunarþjónustu skulu gefin út skriflega eða með rafrænum hætti á eyðublöðum sem innihalda, í það minnsta, alla þættina og í þeirri röð sem sett er fram í fyrirmyndunum í III. viðauka a og b.

2. Að beiðni útflytjenda skal skipta upp heildarútflutningsleyfum sem fela í sér magntakmarkanir.

IV. KAFLI

**UPPFÆRSLA Á LISTANUM YFIR HLUTI
MEÐ TVÍÞÆTT NOTAGILDI**

15. gr.

1. Listinn yfir hluti með tvíþætt notagildi skv. I. viðauka skal uppfærður í samræmi við viðeigandi skyldur og skuldbindingar og hvers konar breytingar sem aðildarríkin hafa samþykkt sem aðilar að alþjóðakerfunum gegn útbreiðslu og að fyrirkomulagi útflutningseftirlits eða með því að fullgilda viðeigandi alþjóðasamninga.

2. Uppfæra skal IV. viðauka, sem er hlutmengi í I. viðauka, með tilliti til 30. gr. stofnsáttmála Evrópubandalagsins, nánar tiltekið hagsmuna aðildarríkjanna á sviði allsherjarreglu og almannaöryggis.

V. KAFLI TOLLMEÐFERÐ

16. gr.

1. Þegar útflytjandi gengur frá formsatriðum vegna útflutnings á hlutum með tvíþætt notagildi á þeirri tollskrifstofu sem annast meðferð útflutningsyfirlýsingarinnar skal hann færa sönnur á að nauðsynlegra útflutningsleyfa hafi verið aflað.

2. Heimilt er að gera kröfu um að útflytjandinn leggi fram þýðingu á skjölunum, sem lögð eru fram sem sönnunargögn, yfir á opinbert tungumál aðildarríkisins þar sem útflutningsyfirlýsingin er lögð fram.

3. Með fyrirvara um þær heimildir sem aðildarríki eru veittar, samkvæmt tollareglum Bandalagsins, er því einnig heimilt, tímabundið, en þó innan tímamarkanna skv. 4. mgr., að taka tímabundið fyrir útflutning frá yfirráðasvæði sínu eða, ef nauðsyn krefur, að koma, með öðrum hætti, í veg fyrir að hlutir með tvíþætt notagildi, sem tilgreindir eru í I. viðauka og falla undir gilt útflutningsleyfi, fari út úr Bandalaginu um yfirráðasvæði þess ef það hefur ástæðu til að ætla:

- a) að ekki hafi verið tekið tillit til viðeigandi upplýsinga þegar leyfið var veitt eða
- b) að aðstæður hafi breyst verulega frá því að leyfið var veitt.

4. Í þeim tilvikum sem um getur í 3. mgr. skal þegar í stað hafa samráð við lögbær stjórnvöld aðildarríkisins, sem veitti útflutningsleyfið, þannig að hægt sé að grípa til aðgerða skv. 1. mgr. 13. gr. Ef slík lögbær stjórnvöld ákveða að viðhalda leyfi skulu þau svara innan tíu virkra daga, sem, að beiðni þeirra, er heimilt að framlengja í 30 virka daga við sérstakar aðstæður. Í slíku tilviki, eða ef ekkert svar berst innan 10 eða 30 daga, eftir atvikum, skal útflutningur á hlutum með tvíþætt notagildi heimilaður án tafar. Aðildarríkið, sem veitti leyfið, tilkynnir hinum aðildarríkjunum og framkvæmdastjórninni um það.

17. gr.

1. Aðildarríkjum er heimilt að kveða á um að einungis sé heimilt að ganga frá formsatriðum vegna útflutnings á hlutum með tvíþætt notagildi á tollstöðvum sem hafa heimild til þess.

2. Aðildarríkin, sem nýta sér valkost skv. 1. mgr., skulu upplýsa framkvæmdastjórnina um þær tollstöðvar sem hafa heimild til þess. Framkvæmdastjórnin skal birta þessar upplýsingar í C-deild Stjórnartíðinda Evrópusambandsins.

18. gr.

Ákvæði 843. gr. og a- til g-liðar 912. gr. reglugerðar (EBE) nr. 2454/93 skulu gilda um takmarkanir er varða útflutning, endurútflutning og brottflutning hluta með tvíþætt notagildi frá tollsvæðinu, þ.e. hluta sem útflutningsleyfis er krafist fyrir samkvæmt þessari reglugerð.

VI. KAFLI

SAMVINNA Á SVIÐI STJÓRNSÝSLU

19. gr.

1. Aðildarríkin skulu, í samvinnu við framkvæmdastjórnina, grípa til allra viðeigandi ráðstafana til að koma á beinu samstarfi og upplýsingaskiptum milli lögbærra stjórnvalda, einkum til að útiloka hættuna á því að hugsanlegt misræmi í framkvæmd útflutningsefirlits með hlutum með tvíþætt notagildi kunni að leiða til afvegaviðskipta sem gætu valdið einu eða fleiri aðildarríkjum erfiðleikum.

2. Aðildarríkin skulu grípa til allra viðeigandi ráðstafana til að koma á beinu samstarfi og upplýsingaskiptum milli lögbærra stjórnvalda með það í huga að auka skilvirkni Bandalagskerfisins um útflutningsefirlit. Slíkar upplýsingar geta verið:

- a) upplýsingar um útflytjendur sem eru sviptir, með innlendum viðurlögum, rétti til að nota innlend almenn útflutningsleyfi eða almenn útflutningsleyfi Bandalagsins,
- b) gögn um viðkvæma lokanotendur, aðila, sem hlut eiga í grunsamlegri innkaupastarfsemi, og, ef við á, leiðir sem notaðar eru.

3. Með fyrirvara um 23. gr. þessarar reglugerðar skulu ákvæði reglugerðar ráðsins (EB) nr. 515/97 frá 13. mars 1997 um gagnkvæma aðstoð stjórnvalda í aðildarríkjunum og samvinnu

aðildarríkjanna og framkvæmdastjórnarinnar til að tryggja rétta beitingu tolla- og landbúnaðarlaga ⁽¹⁾ gilda að breyttu breytanda, einkum ákvæðin um trúnaðarupplýsingar.

4. Framkvæmdastjórninni er heimilt að koma á öruggu og dulkóðuðu kerfi fyrir upplýsingaskipti á milli aðildarríkjanna og, ef við á, framkvæmdastjórnarinnar, að höfðu samráði við samráðshóp um hluti með tvíþætt notagildi sem komið er á skv. 23. gr.

5. Veiting leiðbeininga til handa útflytjendum og miðlurum er á ábyrgð aðildarríkisins þar sem þeir eru búsettir eða hafa staðfestu. Framkvæmdastjórnin og ráðið geta einnig veitt leiðbeiningar og/eða ráðleggingar um bestu starfsvenjur á þeim sviðum sem vísað er til í þessari reglugerð.

6. Vinnsla persónuupplýsinga skal vera í samræmi við þær reglur sem mælt er fyrir um í tilskipun Evrópuþingsins og ráðsins 95/46/EB frá 24. október 1995 um vernd einstaklinga í tengslum við vinnslu persónuupplýsinga og um frjálsa miðlun slíkra upplýsinga ⁽²⁾ og í reglugerð Evrópuþingsins og ráðsins (EB) nr. 45/2001 frá 18. desember 2000 um vernd einstaklinga í tengslum við vinnslu persónuupplýsinga, sem stofnanir og aðilar Bandalagsins hafa unnið, og um frjálsa miðlun slíkra upplýsinga ⁽³⁾.

VII. KAFLI

EFTIRLITSRÁÐSTAFANIR

20. gr.

1. Útflytjendur hluta með tvíþætt notagildi skulu halda nákvæmar skrár eða skýrslur yfir útflutning sinn, í samræmi við innlend lög eða gildandi venjur í viðkomandi aðildarríkjum. Slíkar skrár eða skýrslur skulu einkum innihalda viðskiptaskjöl, s.s. reikninga, yfirlýsingar og flutnings- og önnur sendingarskjöl sem innihalda nægilegar upplýsingar til að unnt sé að sanngreina:

- lýsingu á hlutum með tvíþætt notagildi,
- magn hluta með tvíþætt notagildi,
- nafn og heimilisfang útflytjanda og viðtakanda,

⁽¹⁾ Stjtið. EB L 82, 22. 3. 1997, bls. 1.

⁽²⁾ Stjtið. EB L 281, 23.11.1995, bls. 31.

⁽³⁾ Stjtið. EB L 8, 12.1.2001, bls. 1.

- lokanot og lokanotanda hluta með tvíþætt notagildi, ef vitað er.

2. Í samræmi við innlend lög eða gildandi venjur í viðkomandi aðildarríkjum, skulu miðlarar halda skrár eða skýrslur um miðlunarþjónustu, sem fellur undir gildissvið 5. gr., í því skyni að hægt sé að sanna, sé þess óskað, lýsingu á hlutum með tvíþætt notagildi sem féllu undir miðlunarþjónustuna, þann tíma sem hlutirnir féllu undir slíka þjónustu og ákvörðunarstað þeirra og löndin sem miðlunarþjónustan náði til.

3. Skrárnar eða skýrslurnar og skjölin, sem vísað er til í 1. og 2. mgr., skulu geymd í a.m.k. þrjú ár frá lokum almanaksársins þegar útflutningurinn átti sér stað eða miðlunarþjónustan var veitt. Sé þess óskað skulu þau afhent lögberum stjórnvöldum aðildarríkisins þar sem útflytjandinn hefur staðfestu eða þar sem miðlarinn er búsettur eða hefur staðfestu.

21. gr.

Til að tryggja að þessari reglugerð sé beitt á réttan hátt skal sérhvert aðildarríki grípa til þeirra ráðstafana sem nauðsynlegar eru til að heimila lögberum stjórnvöldum:

- að safna upplýsingum um allar pantanir eða viðskipti þar sem um er að ræða hluti með tvíþætt notagildi,
- að ganga úr skugga um að eftirlitsráðstöfunum vegna útflutnings sé beitt á réttan hátt, sem getur einkum falið í sér heimild til að fara inn í húsnæði einstaklinga, sem hafa hagsmuni af útflutningsviðskiptum, eða miðlara, sem taka þátt í að veita miðlunarþjónustu, við aðstæður skv. 5. gr.

VIII. KAFLI

ÖNNUR ÁKVÆÐI

22. gr.

1. Tilflutningur innan Bandalagsins á hlutum með tvíþætt notagildi skv. IV. viðauka skal leyfisskyldur. Almennt leyfi skal ekki taka til hluta skv. 2. hluta IV. viðauka.

2. Aðildarríki er heimilt að gera tilflutning á öðrum hlutum með tvíþætt notagildi frá yfirráðsvæði þess til annars aðildarríkis leyfisskyldan ef, á þeim tíma sem tilflutningurinn á sér stað:

- rekstraraðilinn veit að lokaákvörðunarstaður þeirra hluta sem um ræðir er utan Bandalagsins,
- útflutningurinn á þessum hlutum til fyrrnefnds lokaákvörðunarstaðar er leyfisskyldur skv. 3., 4. eða 8. gr. í aðildarríkinu þaðan sem til stendur að flytja hlutina og slíkur útflutningur, beint frá yfirráðasvæði þess, er ekki leyfður samkvæmt almennu leyfi eða heildarleyfi,
- engin vinnsla eða vinna, eins og skilgreint er í 24. gr. tollareglna Bandalagsins, fer fram á þessum hlutum í aðildarríkinu sem flytja á þá til.

3. Sækja verður um tilflutningsleyfið í aðildarríkinu þaðan sem flytja á hlutina með tvíþætt notagildi.

4. Í þeim tilvikum þar sem aðildarríkið, þaðan sem flytja á hlutina með tvíþætt notagildi, hefur þegar samþykkt eftir á útflutning þeirra, í samráðsferlinu skv. 11. gr., skal veita rekstraradilann tilflutningsleyfið án tafar, nema aðstæður hafi breyst verulega.

5. Aðildarríki, sem samþykkir lög sem kveða á um slíka kröfu, skal tilkynna framkvæmdastjórninni og hinum aðildarríkjunum um þær ráðstafanir sem það hefur gert. Framkvæmdastjórnin skal birta þessar upplýsingar í C-deild Stjórnartíðinda Evrópusambandsins.

6. Ráðstafanirnar skv. 1. og 2. mgr. skulu ekki fela í sér að framkvæmt sé eftirlit á innri landamærum innan Bandalagsins heldur einungis eftirlit, sem fer fram sem hluti af venjulegri eftirlitsmeðferð, sem beitt er án mismununar á gervöllu yfirráðasvæði Bandalagsins.

7. Beiting ráðstafananna skv. 1. og 2. mgr. má ekki í neinu tilviki leiða til þess að tilflutningur frá einu aðildarríki til annars sé háður strangari skilyrðum en þeim sem sett eru vegna útflutnings á sömu hlutum til þriðju landa.

8. Skjöl og skýrslur um tilflutning innan Bandalagsins á hlutum með tvíþætt notagildi, sem tilgreindir eru í I. viðauka, skulu geymd í a.m.k. þrjú ár frá lokum almanaksársins þegar tilflutningurinn átti sér stað og skulu lögð fyrir lögbær stjórnvöld aðildarríkjanna þaðan sem þessir hlutir voru fluttir sé þess óskað.

9. Aðildarríki er heimilt að gera kröfu, í krafti innlestrar löggjafar, um að allur tilflutningur innan Bandalagsins, frá því aðildarríki, á hlutum, sem tilgreindir eru skv. 5. flokki 2. hluta I. viðauka og eru ekki tilgreindir í IV. viðauka, sé háður því að lögbærum stjórnvöldum í því aðildarríki séu veittar viðbótarupplýsingar um þá hluti.

10. Viðeigandi viðskiptaskjöl um tilflutning innan Bandalagsins á hlutum með tvíþætt notagildi, sem eru tilgreindir í I. viðauka, skulu gefa skýrt til kynna að þessir hlutir skuli háðir eftirliti ef flytja á þá út úr Bandalaginu. Til viðeigandi viðskiptaskjala teljast m.a. allir sölusamningar, staðfestingar á pöntunum, reikningar eða tilkynningar um sendingar.

23. gr.

1. Koma skal á fót samræmingarhópi um tvíþætt notagildi sem fulltrúi framkvæmdastjórnarinnar leiðir. Sérhvert aðildarríki skal tilnefna fulltrúa sinn í hópinn.

Hann skal kanna öll vafaatriði varðandi beitingu þessarar reglugerðar sem formaðurinn eða fulltrúi aðildarríkis kann að vekja athygli á.

2. Formaður samræmingarhópsins um tvíþætt notagildi eða samræmingarhópurinn skal, hvenær sem hann telur nauðsyn á, hafa samráð við útflytjendur, miðlara og aðra hlutaðeigandi hagsmunaaðila sem þessi reglugerð varðar.

24. gr.

Sérhvert aðildarríki skal gera nauðsynlegar ráðstafanir til að tryggja að öll ákvæði þessarar reglugerðar komi til framkvæmdar með réttum hætti. Þau skulu einkum mæla fyrir um viðurlög við brotum á ákvæðum þessarar reglugerðar eða ákvæðum til innleiðingar hennar. Þessi viðurlög skulu vera skilvirk, meðalhófskennd og hafa varnaðaráhrif.

25. gr.

Sérhvert aðildarríki skal tilkynna framkvæmdastjórninni um lög, reglugerðir og stjórnsýslufyrirmæli sem eru samþykkt til innleiðingar hennar, þ.m.t. ráðstafanirnar sem um getur í 24. gr. Framkvæmdastjórnin skal senda þessar upplýsingar áfram til hinna aðildarríkjanna.

Á þriggja ára fresti skal framkvæmdastjórnin endurskoða framkvæmd þessarar reglugerðar og

leggja skýrslu fyrir Evrópuþingið og ráðið um beitingu hennar sem getur falið í sér tillögu um breytingar á henni. Aðildarríkin skulu láta framkvæmdastjórninni í té allar viðeigandi upplýsingar til að unnt sé að taka skýrsluna saman.

26. gr.

Þessi reglugerð hefur ekki áhrif:

- á framkvæmd 296. gr. stofnsáttmála Evrópu-
bandalagsins,
- á framkvæmd stofnsáttmála Kjarnorku-
bandalags Evrópu.

27. gr.

Reglugerð (EB) nr. 1334/2000 er felld úr gildi frá og með 27. ágúst 2009.

Hins vegar, að því er varðar umsóknir um útflutningsleyfi sem lagðar hafa verið fram fyrir 27. ágúst 2009, skulu viðeigandi ákvæði reglugerðar (EB) nr. 1334/2000 gilda áfram.

Líta ber á tilvísanir í niðurfelldu reglugerðina sem tilvísanir í þessa reglugerð og skulu þær lesnar með hliðsjón af samsvörunartöflunni í VI. viðauka.

28. gr.

Reglugerð þessi öðlast gildi 90 dögum eftir að hún birtist í *Stjórnartíðindum Evrópusambandsins*.

Reglugerð þessi er bindandi í heild sinni og gildir í öllum aðildarríkjunum án frekari lögfestingar.

Gjört í Brussel 5. maí 2009.

Fyrir hönd ráðsins,
M. KALOUSEK
forseti.

'ANNEX I

List referred to in Article 3 of Council Regulation (EC) No 428/2009

LIST OF DUAL-USE ITEMS

This list implements internationally agreed dual-use controls including the Wassenaar Arrangement, the Missile Technology Control Regime (MTCR), the Nuclear Suppliers' Group (NSG), the Australia Group and the Chemical Weapons Convention (CWC).

CONTENTS

Notes

Definitions

Acronyms and abbreviations

Category 0 Nuclear materials, facilities and equipment

Category 1 Special materials and related equipment

Category 2 Materials Processing

Category 3 Electronics

Category 4 Computers

Category 5 Telecommunications and "information security"

Category 6 Sensors and lasers

Category 7 Navigation and avionics

Category 8 Marine

Category 9 Aerospace and Propulsion

GENERAL NOTES TO ANNEX I

1. For control of goods which are designed or modified for military use, see the relevant list(s) of controls on military goods maintained by individual Member States. References in this Annex that state "SEE ALSO MILITARY GOODS CONTROLS" refer to the same lists.
2. The object of the controls contained in this Annex should not be defeated by the export of any non-controlled goods (including plant) containing one or more controlled components when the controlled component or components are the principal element of the goods and can feasibly be removed or used for other purposes.

N.B.: In judging whether the controlled component or components are to be considered the principal element, it is necessary to weigh the factors of quantity, value and technological know-how involved and other special circumstances which might establish the controlled component or components as the principal element of the goods being procured.
3. Goods specified in this Annex include both new and used goods.
4. In some instances chemicals are listed by name and CAS number. The list applies to chemicals of the same structural formula (including hydrates) regardless of name or CAS number. CAS numbers are shown to assist in identifying a particular chemical or mixture, irrespective of nomenclature. CAS numbers cannot be used as unique identifiers because some forms of the listed chemical have different CAS numbers, and mixtures containing a listed chemical may also have different CAS numbers.

NUCLEAR TECHNOLOGY NOTE (NTN)

(To be read in conjunction with section E of Category 0.)

The "technology" directly associated with any goods controlled in Category 0 is controlled according to the provisions of Category 0.

"Technology" for the "development", "production" or "use" of goods under control remains under control even when applicable to non-controlled goods.

The approval of goods for export also authorizes the export to the same end-user of the minimum "technology" required for the installation, operation, maintenance and repair of the goods.

Controls on "technology" transfer do not apply to information "in the public domain" or to "basic scientific research".

GENERAL TECHNOLOGY NOTE (GTN)

(To be read in conjunction with section E of Categories 1 to 9.)

The export of "technology" which is "required" for the "development", "production" or "use" of goods controlled in Categories 1 to 9, is controlled according to the provisions of Categories 1 to 9.

"Technology" "required" for the "development", "production" or "use" of goods under control remains under control even when applicable to non-controlled goods.

Controls do not apply to that "technology" which is the minimum necessary for the installation, operation, maintenance (checking) and repair of those goods which are not controlled or whose export has been authorised.

N.B.: This does not release such "technology" specified in 1E002.e., 1E002.f., 8E002.a. and 8E002.b.

Controls on "technology" transfer do not apply to information "in the public domain", to "basic scientific research" or to the minimum necessary information for patent applications.

GENERAL SOFTWARE NOTE (GSN)

(This note overrides any control within section D of Categories 0 to 9.)

Categories 0 to 9 of this list do not control "software" which is either:

- a. Generally available to the public by being:
 1. Sold from stock at retail selling points, without restriction, by means of:
 - a. Over-the-counter transactions;
 - b. Mail order transactions;
 - c. Electronic transactions; or
 - d. Telephone order transactions; and
 2. Designed for installation by the user without further substantial support by the supplier; or
- N.B. Entry a. of the General Software Note does not release "software" specified in Category 5 - Part 2 ("Information Security").*
- b. "In the public domain".

1. EDITORIAL PRACTICES IN THE OFFICIAL JOURNAL OF THE EC

In accordance with the rules set out in paragraph 101 on page 86 of the Interinstitutional style guide (1997 edition), for texts in English published in the Official Journal of the European Communities:

- a comma is used to separate the whole number from the decimals,
- whole numbers are presented in series of three, each series being separated by a thin space.

DEFINITIONS OF TERMS USED IN THIS ANNEX

Definitions of terms between 'single quotation marks' are given in a Technical Note to the relevant item.

Definitions of terms between "double quotation marks" are as follows:

N.B. : Category references are given in brackets after the defined term.

"Accuracy" (2 6), usually measured in terms of inaccuracy, means the maximum deviation, positive or negative, of an indicated value from an accepted standard or true value.

"Active flight control systems" (7) are systems that function to prevent undesirable "aircraft" and missile motions or structural loads by autonomously processing outputs from multiple sensors and then providing necessary preventive commands to effect automatic control.

"Active pixel" (6 8) is a minimum (single) element of the solid state array which has a photoelectric transfer function when exposed to light (electromagnetic) radiation.

"Adapted for use in war" (1) means any modification or selection (such as altering purity, shelf life, virulence, dissemination characteristics, or resistance to UV radiation) designed to increase the effectiveness in producing casualties in humans or animals, degrading equipment or damaging crops or the environment.

"Adjusted Peak Performance" (4) is an adjusted peak rate at which "digital computers" perform 64-bit or larger floating point additions and multiplications, and is expressed in Weighted TeraFLOPS (WT) with units of 10^{12} adjusted floating point operations per second.

N.B.: See Category 4, Technical Note.

"Aircraft" (1 7 9) means a fixed wing, swivel wing, rotary wing (helicopter), tilt rotor or tilt-wing airborne vehicle.

N.B.: See also "civil aircraft".

"All compensations available" (2) means after all feasible measures available to the manufacturer to minimise all systematic positioning errors for the particular machine-tool model or measuring errors for the particular coordinate measuring machine are considered.

"Allocated by the ITU" (3 5) means the allocation of frequency bands according to the current edition of the ITU Radio Regulations for primary, permitted and secondary services.

N.B.: Additional and alternative allocations are not included.

"Angle random walk" (7) means the angular error build up with time that is due to white noise in angular rate. (IEEE STD 528-2001)

"Angular position deviation" (2) means the maximum difference between angular position and the actual, very accurately measured angular position after the workpiece mount of the table has been turned out of its initial position (ref. VDI/VDE 2617, Draft: 'Rotary tables on coordinate measuring machines').

"APP" (4) is equivalent to "Adjusted Peak Performance".

"Asymmetric algorithm" (5) means a cryptographic algorithm using different, mathematically-related keys for encryption and decryption.

N.B.: A common use of "asymmetric algorithms" is key management.

"Automatic target tracking" (6) means a processing technique that automatically determines and provides as output an extrapolated value of the most probable position of the target in real time.

"Average output power" (6) means the total "laser" output energy in joules divided by the "laser duration" in seconds.

"Basic gate propagation delay time" (3) means the propagation delay time value corresponding to the basic gate used in a "monolithic integrated circuit". For a 'family' of "monolithic integrated circuits", this may be specified either as the propagation delay time per typical gate within the given 'family' or as the typical propagation delay time per gate within the given 'family'.

N.B. 1: "Basic gate propagation delay time" is not to be confused with the input/output delay time of a complex "monolithic integrated circuit".

N.B. 2: 'Family' consists of all integrated circuits to which all of the following are applied as their manufacturing methodology and specifications except their respective functions:

- a. The common hardware and software architecture;*
- b. The common design and process technology; and*
- c. The common basic characteristics.*

"Basic scientific research" (GTN NTN) means experimental or theoretical work undertaken principally to acquire new knowledge of the fundamental principles of phenomena or observable facts, not primarily directed towards a specific practical aim or objective.

"Bias" (accelerometer) (7) means the average over a specified time of accelerometer output, measured at specified operating conditions, that has no correlation with input acceleration or rotation. "Bias" is expressed in g or in metres per second squared (g or m/s²). (IEEE Std 528-2001) (Micro g equals 1x10⁻⁶ g).

"Bias" (gyro) (7) means the average over a specified time of gyro output measured at specified operating conditions that has no correlation with input rotation or acceleration. "Bias" is typically expressed in degrees per hour (deg/hr). (IEEE Std 528-2001).

"Camming" (2) means axial displacement in one revolution of the main spindle measured in a plane perpendicular to the spindle faceplate, at a point next to the circumference of the spindle faceplate (Reference: ISO 230/1 1986, paragraph 5.63).

"Carbon fibre preforms" (1) means an ordered arrangement of uncoated or coated fibres intended to constitute a framework of a part before the "matrix" is introduced to form a "composite".

"CEP" (circle of equal probability) (7) is a measure of accuracy; the radius of the circle centred at the target, at a specific range, in which 50% of the payloads impact.

"Chemical laser" (6) means a "laser" in which the excited species is produced by the output energy from a chemical reaction.

"Chemical mixture" (1) means a solid, liquid or gaseous product made up of two or more components which do not react together under the conditions under which the mixture is stored.

"Circulation-controlled anti-torque or circulation controlled direction control systems" (7) are systems that use air blown over aerodynamic surfaces to increase or control the forces generated by the surfaces.

"Civil aircraft" (1 3 7) means those "aircraft" listed by designation in published airworthiness certification lists by the civil aviation authorities to fly commercial civil internal and external routes or for legitimate civil, private or business use.

N.B.: See also "aircraft".

"Commingled" (1) means filament to filament blending of thermoplastic fibres and reinforcement fibres in order to produce a fibre reinforcement "matrix" mix in total fibre form.

"Comminution" (1) means a process to reduce a material to particles by crushing or grinding.

"Common channel signalling" (5) is a signalling method in which a single channel between exchanges conveys, by means of labelled messages, signalling information relating to a multiplicity of circuits or calls and other information such as that used for network management.

"Communications channel controller" (4) means the physical interface which controls the flow of synchronous or asynchronous digital information. It is an assembly that can be integrated into computer or telecommunications equipment to provide communications access.

"Compensation systems" (6) consist of the primary scalar sensor, one or more reference sensors (e.g., vector magnetometers) together with software that permit reduction of rigid body rotation noise of the platform.

"Composite" (1 2 6 8 9) means a "matrix" and an additional phase or additional phases consisting of particles, whiskers, fibres or any combination thereof, present for a specific purpose or purposes.

"Compound rotary table" (2) means a table allowing the workpiece to rotate and tilt about two non-parallel axes, which can be coordinated simultaneously for "contouring control".

"III/V compounds" (3 6) means polycrystalline or binary or complex monocrystalline products consisting of elements of groups IIIA and VA of Mendeleev's periodic classification table (e.g., gallium arsenide, gallium-aluminium arsenide, indium phosphide).

"Contouring control" (2) means two or more "numerically controlled" motions operating in accordance with instructions that specify the next required position and the required feed rates to that position. These feed rates are varied in relation to each other so that a desired contour is generated (ref. ISO/DIS 2806 - 1980).

"Critical temperature" (1 3 5) (sometimes referred to as the transition temperature) of a specific "superconductive" material means the temperature at which the material loses all resistance to the flow of direct electrical current.

"Cryptography" (5) means the discipline which embodies principles, means and methods for the transformation of data in order to hide its information content, prevent its undetected modification or prevent its unauthorized use.

"Cryptography" is limited to the transformation of information using one or more 'secret parameters' (e.g., crypto variables) or associated key management.

N.B.: 'Secret parameter': a constant or key kept from the knowledge of others or shared only within a group.

"CW laser" (6) means a "laser" that produces a nominally constant output energy for greater than 0.25 seconds.

"Data-Based Referenced Navigation" ("DBRN") (7) Systems means systems which use various sources of previously measured geo-mapping data integrated to provide accurate navigation information under dynamic conditions. Data sources include bathymetric maps, stellar maps, gravity maps, magnetic maps or 3-D digital terrain maps.

"Deformable mirrors" (6) (also known as adaptive optic mirrors) means mirrors having:

- a. A single continuous optical reflecting surface which is dynamically deformed by the application of individual torques or forces to compensate for distortions in the optical waveform incident upon the mirror; or
- b. Multiple optical reflecting elements that can be individually and dynamically repositioned by the application of torques or forces to compensate for distortions in the optical waveform incident upon the mirror.

"Depleted uranium" (0) means uranium depleted in the isotope 235 below that occurring in nature.

"Development" (GTN NTN All) is related to all phases prior to serial production, such as: design, design research, design analyses, design concepts, assembly and testing of prototypes, pilot production schemes, design data, process of transforming design data into a product, configuration design, integration design, layouts.

"Diffusion bonding" (1 2 9) means a solid state molecular joining of at least two separate metals into a single piece with a joint strength equivalent to that of the weakest material.

"Digital computer" (4 5) means equipment which can, in the form of one or more discrete variables, perform all of the following:

- a. Accept data;
- b. Store data or instructions in fixed or alterable (writable) storage devices;
- c. Process data by means of a stored sequence of instructions which is modifiable; and
- d. Provide output of data.

N.B.: Modifications of a stored sequence of instructions include replacement of fixed storage devices, but not a physical change in wiring or interconnections.

"Digital transfer rate" (def) means the total bit rate of the information that is directly transferred on any type of medium.

N.B.: See also "total digital transfer rate".

"Direct-acting hydraulic pressing" (2) means a deformation process which uses a fluid-filled flexible bladder in direct contact with the workpiece.

"Drift rate" (gyro) (7) means the component of gyro output that is functionally independent of input rotation. It is expressed as an angular rate. (IEEE STD 528-2001).

"Dynamic signal analysers" (3) means "signal analysers" which use digital sampling and transformation techniques to form a Fourier spectrum display of the given waveform including amplitude and phase information.

N.B.: See also "signal analysers".

"Effective gramme" (0 1) of "special fissile material" means:

- a. For plutonium isotopes and uranium-233, the isotope weight in grammes;
- b. For uranium enriched 1 per cent or greater in the isotope uranium-235, the element weight in grammes multiplied by the square of its enrichment expressed as a decimal weight fraction;
- c. For uranium enriched below 1 per cent in the isotope uranium-235, the element weight in grammes multiplied by 0.0001;

"Electronic assembly" (2 3 4 5) means a number of electronic components (i.e., 'circuit elements', 'discrete components', integrated circuits, etc.) connected together to perform (a) specific function(s), replaceable as an entity and normally capable of being disassembled.

N.B. 1: 'Circuit element': a single active or passive functional part of an electronic circuit, such as one diode, one transistor, one resistor, one capacitor, etc.

N.B. 2: 'Discrete component': a separately packaged 'circuit element' with its own external connections.

"Electronically steerable phased array antenna" (5 6) means an antenna which forms a beam by means of phase coupling, i.e., the beam direction is controlled by the complex excitation coefficients of the radiating elements and the direction of that beam can be varied in azimuth or in elevation, or both, by application, both in transmission and reception, of an electrical signal.

"Energetic materials" (1) means substances or mixtures that react chemically to release energy required for their intended application. "Explosives", "pyrotechnics" and "propellants" are subclasses of energetic materials.

"End-effectors" (2) means grippers, 'active tooling units' and any other tooling that is attached to the baseplate on the end of a "robot" manipulator arm.

N.B.: 'Active tooling unit' means a device for applying motive power, process energy or sensing to the workpiece.

"Equivalent Density" (6) means the mass of an optic per unit optical area projected onto the optical surface.

"Expert systems" (7) mean systems providing results by application of rules to data which are stored independently of the "programme" and capable of any of the following:

- a. Modifying automatically the "source code" introduced by the user;
- b. Providing knowledge linked to a class of problems in quasi-natural language; or
- c. Acquiring the knowledge required for their development (symbolic training).

"Explosives" (1) means solid, liquid or gaseous substances or mixtures of substances which, in their application as primary, booster, or main charges in warheads, demolition and other applications, are required to detonate.

"FADEC Systems" (7 9) means Full Authority Digital Engine Control Systems – A digital electronic control system for a gas turbine engine that is able to autonomously control the engine throughout its whole operating range from demanded engine start until demanded engine shut-down, in both normal and fault conditions.

"Fault tolerance" (4) is the capability of a computer system, after any malfunction of any of its hardware or "software" components, to continue to operate without human intervention, at a given level of service that provides: continuity of operation, data integrity and recovery of service within a given time.

"Fibrous or filamentary materials" (0 1 8) include:

- a. Continuous "monofilaments";
- b. Continuous "yarns" and "rovings";
- c. "Tapes", fabrics, random mats and braids;
- d. Chopped fibres, staple fibres and coherent fibre blankets;
- e. Whiskers, either monocrystalline or polycrystalline, of any length;
- f. Aromatic polyamide pulp.

"Film type integrated circuit" (3) means an array of 'circuit elements' and metallic interconnections formed by deposition of a thick or thin film on an insulating "substrate".

N.B.: 'Circuit element' is a single active or passive functional part of an electronic circuit, such as one diode, one transistor, one resistor, one capacitor, etc.

"Fixed" (5) means that the coding or compression algorithm cannot accept externally supplied parameters (e.g., cryptographic or key variables) and cannot be modified by the user.

"Flight control optical sensor array" (7) is a network of distributed optical sensors, using "laser" beams, to provide real-time flight control data for on-board processing.

"Flight path optimisation" (7) is a procedure that minimizes deviations from a four-dimensional (space and time) desired trajectory based on maximizing performance or effectiveness for mission tasks.

"Focal plane array" (6 8) means a linear or two-dimensional planar layer, or combination of planar layers, of individual detector elements, with or without readout electronics, which work in the focal plane.

N.B.: This is not intended to include a stack of single detector elements or any two, three or four element detectors provided time delay and integration is not performed within the element.

"Fractional bandwidth" (3 5) means the "instantaneous bandwidth" divided by the centre frequency, expressed as a percentage.

"Frequency hopping" (5) means a form of "spread spectrum" in which the transmission frequency of a single communication channel is made to change by a random or pseudo-random sequence of discrete steps.

"Frequency switching time" (3 5) means the maximum time (i.e., delay), taken by a signal, when switched from one selected output frequency to another selected output frequency, to reach:

- a. A frequency within 100 Hz of the final frequency; or
- b. An output level within 1 dB of the final output level.

"Frequency synthesiser" (3) means any kind of frequency source or signal generator, regardless of the actual technique used, providing a multiplicity of simultaneous or alternative output frequencies, from one or more outputs, controlled by, derived from or disciplined by a lesser number of standard (or master) frequencies.

"Fuel cell" (8) is an electrochemical device that converts chemical energy directly into Direct Current (DC) electricity by consuming fuel from an external source.

"Fusible" (1) means capable of being cross-linked or polymerized further (cured) by the use of heat, radiation, catalysts, etc., or that can be melted without pyrolysis (charring).

"Gas Atomisation" (1) means a process to reduce a molten stream of metal alloy to droplets of 500 micrometre diameter or less by a high pressure gas stream.

"Geographically dispersed" (6) is where each location is distant from any other more than 1,500 m in any direction. Mobile sensors are always considered "geographically dispersed".

"Guidance set" (7) means systems that integrate the process of measuring and computing a vehicles position and velocity (i.e. navigation) with that of computing and sending commands to the vehicles flight control systems to correct the trajectory.

"Hot isostatic densification" (2) means the process of pressurising a casting at temperatures exceeding 375 K (102 °C) in a closed cavity through various media (gas, liquid, solid particles, etc.) to create equal force in all directions to reduce or eliminate internal voids in the casting.

"Hybrid integrated circuit" (3) means any combination of integrated circuit(s), or integrated circuit with 'circuit elements' or 'discrete components' connected together to perform (a) specific function(s), and having all of the following characteristics:

- a. Containing at least one unencapsulated device;
- b. Connected together using typical IC production methods;
- c. Replaceable as an entity; and
- d. Not normally capable of being disassembled.

N.B. 1: 'Circuit element': a single active or passive functional part of an electronic circuit, such as one diode, one transistor, one resistor, one capacitor, etc.

N.B. 2: 'Discrete component': a separately packaged 'circuit element' with its own external connections.

"Image enhancement" (4) means the processing of externally derived information-bearing images by algorithms such as time compression, filtering, extraction, selection, correlation, convolution or transformations between domains (e.g., fast Fourier transform or Walsh transform). This does not include algorithms using only linear or rotational transformation of a single image, such as translation, feature extraction, registration or false coloration.

"Immunotoxin" (1) is a conjugate of one cell specific monoclonal antibody and a "toxin" or "sub-unit of toxin", that selectively affects diseased cells.

"In the public domain" (GTN NTN GSN), as it applies herein, means "technology" or "software" which has been made available without restrictions upon its further dissemination (copyright restrictions do not remove "technology" or "software" from being "in the public domain").

"Information security" (4 5) is all the means and functions ensuring the accessibility, confidentiality or integrity of information or communications, excluding the means and functions intended to safeguard against malfunctions. This includes "cryptography", 'cryptanalysis', protection against compromising emanations and computer security.

N.B.: 'Cryptanalysis': analysis of a cryptographic system or its inputs and outputs to derive confidential variables or sensitive data, including clear text.

"Instantaneous bandwidth" (3 5 7) means the bandwidth over which output power remains constant within 3 dB without adjustment of other operating parameters.

"Instrumented range" (6) means the specified unambiguous display range of a radar.

"Insulation" (9) is applied to the components of a rocket motor, i.e. the case, nozzle, inlets, case closures, and includes cured or semi-cured compounded rubber sheet stock containing an insulating or refractory material. It may also be incorporated as stress relief boots or flaps.

"Interior lining" (9) is suited for the bond interface between the solid propellant and the case or insulating liner. Usually a liquid polymer based dispersion of refractory or insulating materials, e.g. carbon filled hydroxyl terminated polybutadiene (HTPB) or other polymer with added curing agents sprayed or screeded over a case interior.

"Intrinsic Magnetic Gradiometer" (6) is a single magnetic field gradient sensing element and associated electronics the output of which is a measure of magnetic field gradient.

N.B.: See also "magnetic gradiometer".

"Isolated live cultures" (1) includes live cultures in dormant form and in dried preparations.

"Isostatic presses" (2) mean equipment capable of pressurising a closed cavity through various media (gas, liquid, solid particles, etc.) to create equal pressure in all directions within the cavity upon a workpiece or material.

"Laser" (0 2 3 5 6 7 8 9) is an assembly of components which produce both spatially and temporally coherent light that is amplified by stimulated emission of radiation.

*N.B.: See also: "Chemical laser";
"Super High Power Laser";
"Transfer laser".*

"Laser duration" (def) means the time over which a "laser" emits "laser" radiation, which for "pulsed lasers" corresponds to the time over which a single pulse or series of consecutive pulses is emitted.

"Lighter-than-air vehicles" (9) means balloons and airships that rely on hot air or other lighter-than-air gases such as helium or hydrogen for their lift.

"Linearity" (2) (usually measured in terms of non-linearity) means the maximum deviation of the actual characteristic (average of upscale and downscale readings), positive or negative, from a straight line so positioned as to equalise and minimise the maximum deviations.

"Local area network" (4 5) is a data communication system having all of the following characteristics:

- a. Allows an arbitrary number of independent 'data devices' to communicate directly with each other;
and
 - b. Is confined to a geographical area of moderate size (e.g., office building, plant, campus, warehouse).
- N.B.: 'Data device' means equipment capable of transmitting or receiving sequences of digital information.*

"Magnetic Gradiometers" (6) are instruments designed to detect the spatial variation of magnetic fields from sources external to the instrument. They consist of multiple "magnetometers" and associated electronics the output of which is a measure of magnetic field gradient.

N.B.: See also "intrinsic magnetic gradiometer".

"Magnetometers" (6) are instruments designed to detect magnetic fields from sources external to the instrument. They consist of a single magnetic field sensing element and associated electronics the output of which is a measure of the magnetic field.

"Main storage" (4) means the primary storage for data or instructions for rapid access by a central processing unit. It consists of the internal storage of a "digital computer" and any hierarchical extension thereto, such as cache storage or non-sequentially accessed extended storage.

"Materials resistant to corrosion by UF₆" (0) may be copper, stainless steel, aluminium, aluminium oxide, aluminium alloys, nickel or alloy containing 60 weight percent or more nickel and UF₆-resistant fluorinated hydrocarbon polymers, as appropriate for the type of separation process.

"Matrix" (1 2 8 9) means a substantially continuous phase that fills the space between particles, whiskers or fibres.

"Measurement uncertainty" (2) is the characteristic parameter which specifies in what range around the output value the correct value of the measurable variable lies with a confidence level of 95 %. It includes the uncorrected systematic deviations, the uncorrected backlash and the random deviations (ref. ISO 10360-2, or VDI/VDE 2617).

"Mechanical Alloying" (1) means an alloying process resulting from the bonding, fracturing and rebonding of elemental and master alloy powders by mechanical impact. Non-metallic particles may be incorporated in the alloy by addition of the appropriate powders.

"Melt Extraction" (1) means a process to 'solidify rapidly' and extract a ribbon-like alloy product by the insertion of a short segment of a rotating chilled block into a bath of a molten metal alloy.

N.B.: 'Solidify rapidly': solidification of molten material at cooling rates exceeding 1,000 K/s.

"Melt Spinning" (1) means a process to 'solidify rapidly' a molten metal stream impinging upon a rotating chilled block, forming a flake, ribbon or rod-like product.

N.B.: 'Solidify rapidly': solidification of molten material at cooling rates exceeding 1,000 K/s.

"Microcomputer microcircuit" (3) means a "monolithic integrated circuit" or "multichip integrated circuit" containing an arithmetic logic unit (ALU) capable of executing general purpose instructions from an internal storage, on data contained in the internal storage.

N.B.: The internal storage may be augmented by an external storage.

"Microprocessor microcircuit" (3) means a "monolithic integrated circuit" or "multichip integrated circuit" containing an arithmetic logic unit (ALU) capable of executing a series of general purpose instructions from an external storage.

N.B. 1: The "microprocessor microcircuit" normally does not contain integral user-accessible storage, although storage present on-the-chip may be used in performing its logic function.

N.B. 2: This includes chip sets which are designed to operate together to provide the function of a "microprocessor microcircuit".

"Microorganisms" (1 2) means bacteria, viruses, mycoplasmas, rickettsiae, chlamydiae or fungi, whether natural, enhanced or modified, either in the form of "isolated live cultures" or as material including living material which has been deliberately inoculated or contaminated with such cultures.

"Missiles" (1 3 6 7 9) means complete rocket systems and unmanned aerial vehicle systems, capable of delivering at least 500 kg payload to a range of at least 300 km.

"Monofilament" (1) or filament is the smallest increment of fibre, usually several micrometres in diameter.

"Monolithic integrated circuit" (3) means a combination of passive or active 'circuit elements' or both which:

- a. Are formed by means of diffusion processes, implantation processes or deposition processes in or on a single semiconducting piece of material, a so-called 'chip';
- b. Can be considered as indivisibly associated; and
- c. Perform the function(s) of a circuit.

N.B.: 'Circuit element' is a single active or passive functional part of an electronic circuit, such as one diode, one transistor, one resistor, one capacitor, etc.

"Monospectral imaging sensors" (6) are capable of acquisition of imaging data from one discrete spectral band.

"Multichip integrated circuit" (3) means two or more "monolithic integrated circuits" bonded to a common "substrate".

"Multispectral imaging sensors" (6) are capable of simultaneous or serial acquisition of imaging data from two or more discrete spectral bands. Sensors having more than twenty discrete spectral bands are sometimes referred to as hyperspectral imaging sensors.

"Natural uranium" (0) means uranium containing the mixtures of isotopes occurring in nature.

"Network access controller" (4) means a physical interface to a distributed switching network. It uses a common medium which operates throughout at the same "digital transfer rate" using arbitration (e.g., token or carrier sense) for transmission. Independently from any other, it selects data packets or data groups (e.g., IEEE 802) addressed to it. It is an assembly that can be integrated into computer or telecommunications equipment to provide communications access.

"Neural computer" (4) means a computational device designed or modified to mimic the behaviour of a neuron or a collection of neurons, i.e., a computational device which is distinguished by its hardware capability to modulate the weights and numbers of the interconnections of a multiplicity of computational components based on previous data.

"Nuclear reactor" (0) means a complete reactor capable of operation so as to maintain a controlled self-sustaining fission chain reaction. A "nuclear reactor" includes all the items within or attached directly to the reactor vessel, the equipment which controls the level of power in the core, and the components which normally contain, come into direct contact with or control the primary coolant of the reactor core.

"Numerical control" (2) means the automatic control of a process performed by a device that makes use of numeric data usually introduced as the operation is in progress (ref. ISO 2382).

"Object code" (9) means an equipment executable form of a convenient expression of one or more processes ("source code" (source language)) which has been converted by programming system.

"Optical amplification" (5), in optical communications, means an amplification technique that introduces a gain of optical signals that have been generated by a separate optical source, without conversion to electrical signals, i.e., using semiconductor optical amplifiers, optical fibre luminescent amplifiers.

"Optical computer" (4) means a computer designed or modified to use light to represent data and whose computational logic elements are based on directly coupled optical devices.

"Optical integrated circuit" (3) means a "monolithic integrated circuit" or a "hybrid integrated circuit", containing one or more parts designed to function as a photosensor or photoemitter or to perform (an) optical or (an) electro-optical function(s).

"Optical switching" (5) means the routing of or switching of signals in optical form without conversion to electrical signals.

"Overall current density" (3) means the total number of ampere-turns in the coil (i.e., the sum of the number of turns multiplied by the maximum current carried by each turn) divided by the total cross-section of the coil (comprising the superconducting filaments, the metallic matrix in which the superconducting filaments are embedded, the encapsulating material, any cooling channels, etc.).

"Participating state" (7 9) is a state participating in the Wassenaar Arrangement. (See www.wassenaar.org)

"Peak power" (6), means the highest level of power attained in the "laser duration".

"Personal area network" (5) means a data communication system having all of the following characteristics:

- a. Allows an arbitrary number of independent or interconnected 'data devices' to communicate directly with each other; and
- b. Is confined to the communication between devices within the immediate vicinity of an individual person or device controller (e.g., single room, office, or automobile).

Technical Note:

'Data device' means equipment capable of transmitting or receiving sequences of digital information.

"Power management" (7) means changing the transmitted power of the altimeter signal so that received power at the "aircraft" altitude is always at the minimum necessary to determine the altitude.

"Pressure transducers" (2) are devices that convert pressure measurements into an electrical signal.

"Previously separated" (0 1) means the application of any process intended to increase the concentration of the controlled isotope.

"Primary flight control" (7) means an "aircraft" stability or manoeuvring control using force/moment generators, i.e., aerodynamic control surfaces or propulsive thrust vectoring.

"Principal element" (4), as it applies in Category 4, is a "principal element" when its replacement value is more than 35% of the total value of the system of which it is an element. Element value is the price paid for the element by the manufacturer of the system, or by the system integrator. Total value is the normal international selling price to unrelated parties at the point of manufacture or consolidation of shipment.

"Production" (GTN NTN All) means all production phases, such as: construction, production engineering, manufacture, integration, assembly (mounting), inspection, testing, quality assurance.

"Production equipment" (1 7 9) means tooling, templates, jigs, mandrels, moulds, dies, fixtures, alignment mechanisms, test equipment, other machinery and components therefor, limited to those specially designed or modified for "development" or for one or more phases of "production".

"Production facilities" (7 9) means "production equipment" and specially designed software therefor integrated into installations for "development" or for one or more phases of "production".

"Programme" (2 6) means a sequence of instructions to carry out a process in, or convertible into, a form executable by an electronic computer.

"Pulse compression" (6) means the coding and processing of a radar signal pulse of long time duration to one of short time duration, while maintaining the benefits of high pulse energy.

"Pulse duration" (6) is the duration of a "laser" pulse measured at Full Width Half Intensity (FWHI) levels.

"Pulsed laser" (6) means a "laser" having a "pulse duration" that is less than or equal to 0.25 seconds.

"Quantum cryptography" (5) means a family of techniques for the establishment of shared key for "cryptography" by measuring the quantum-mechanical properties of a physical system (including those physical properties explicitly governed by quantum optics, quantum field theory or quantum electrodynamics).

"Radar frequency agility" (6) means any technique which changes, in a pseudo-random sequence, the carrier frequency of a pulsed radar transmitter between pulses or between groups of pulses by an amount equal to or larger than the pulse bandwidth.

"Radar spread spectrum" (6) means any modulation technique for spreading energy originating from a signal with a relatively narrow frequency band, over a much wider band of frequencies, by using random or pseudo-random coding.

"Real-time bandwidth" (3) for "dynamic signal analysers" is the widest frequency range which the analyser can output to display or mass storage without causing any discontinuity in the analysis of the input data. For analysers with more than one channel, the channel configuration yielding the widest "real-time bandwidth" shall be used to make the calculation.

"Real time processing" (2 6 7) means the processing of data by a computer system providing a required level of service, as a function of available resources, within a guaranteed response time, regardless of the load of the system, when stimulated by an external event.

"Repeatability" (7) means the closeness of agreement among repeated measurements of the same variable under the same operating conditions when changes in conditions or non-operating periods occur between measurements. (Reference: IEEE STD 528-2001 (one sigma standard deviation))

"Required" (GTN 1-9), as applied to "technology", refers to only that portion of "technology" which is peculiarly responsible for achieving or extending the controlled performance levels, characteristics or functions. Such "required" "technology" may be shared by different goods.

"Resolution" (2) means the least increment of a measuring device; on digital instruments, the least significant bit (ref. ANSI B-89.1.12).

"Riot control agent" (1) means substances which, under the expected conditions of use for riot control purposes, produce rapidly in humans sensory irritation or disabling physical effects which disappear within a short time following termination of exposure.

Technical Note:

Tear gases are a subset of "riot control agents".

"Robot" (2 8) means a manipulation mechanism, which may be of the continuous path or of the point-to-point variety, may use sensors, and has all the following characteristics:

- a. Is multifunctional;
- b. Is capable of positioning or orienting material, parts, tools or special devices through variable movements in three dimensional space;
- c. Incorporates three or more closed or open loop servo-devices which may include stepping motors;
- d. Has "user accessible programmability" by means of teach/playback method or by means of an electronic computer which may be a programmable logic controller, i.e., without mechanical intervention.

N.B.: The above definition does not include the following devices:

1. *Manipulation mechanisms which are only manually/ teleoperator controllable;*
2. *Fixed sequence manipulation mechanisms which are automated moving devices, operating according to mechanically fixed programmed motions. The programme is mechanically limited by fixed stops, such as pins or cams. The sequence of motions and the selection of paths or angles are not variable or changeable by mechanical, electronic or electrical means;*
3. *Mechanically controlled variable sequence manipulation mechanisms which are automated moving devices, operating according to mechanically fixed programmed motions. The programme is mechanically limited by fixed, but adjustable stops, such as pins or cams. The sequence of motions and the selection of paths or angles are variable within the fixed programme pattern. Variations or modifications of the programme pattern (e.g., changes of pins or exchanges of cams) in one or more motion axes are accomplished only through mechanical operations;*

4. *Non-servo-controlled variable sequence manipulation mechanisms which are automated moving devices, operating according to mechanically fixed programmed motions. The programme is variable but the sequence proceeds only by the binary signal from mechanically fixed electrical binary devices or adjustable stops;*
5. *Stacker cranes defined as Cartesian coordinate manipulator systems manufactured as an integral part of a vertical array of storage bins and designed to access the contents of those bins for storage or retrieval.*

"Rotary atomisation" (1) means a process to reduce a stream or pool of molten metal to droplets to a diameter of 500 micrometre or less by centrifugal force.

"Roving" (1) is a bundle (typically 12-120) of approximately parallel 'strands'.

N.B.: 'Strand' is a bundle of "monofilaments" (typically over 200) arranged approximately parallel.

"Run-out" (2) (out-of-true running) means radial displacement in one revolution of the main spindle measured in a plane perpendicular to the spindle axis at a point on the external or internal revolving surface to be tested (Reference: ISO 230/1 1986, paragraph 5.61).

"Scale factor" (gyro or accelerometer) (7) means the ratio of change in output to a change in the input intended to be measured. Scale factor is generally evaluated as the slope of the straight line that can be fitted by the method of least squares to input-output data obtained by varying the input cyclically over the input range.

"Settling time" (3) means the time required for the output to come within one-half bit of the final value when switching between any two levels of the converter.

"SHPL" is equivalent to "super high power laser".

"Signal analysers" (3) means apparatus capable of measuring and displaying basic properties of the single-frequency components of multi-frequency signals.

"Signal processing" (3 4 5 6) means the processing of externally derived information-bearing signals by algorithms such as time compression, filtering, extraction, selection, correlation, convolution or transformations between domains (e.g., fast Fourier transform or Walsh transform).

"Software" (GSN All) means a collection of one or more "programmes" or 'microprogrammes' fixed in any tangible medium of expression.

N.B.: 'Microprogramme' means a sequence of elementary instructions, maintained in a special storage, the execution of which is initiated by the introduction of its reference instruction into an instruction register.

"Source code" (or source language) (6 7 9) is a convenient expression of one or more processes which may be turned by a programming system into equipment executable form ("object code" (or object language)).

"Spacecraft" (7 9) means active and passive satellites and space probes.

"Space-qualified" (3 6 8) refers to products designed, manufactured and tested to meet the special electrical, mechanical or environmental requirements for use in the launch and deployment of satellites or high altitude flight systems operating at altitudes of 100 km or higher.

"Special fissile material" (0) means plutonium-239, uranium-233, "uranium enriched in the isotopes 235 or 233", and any material containing the foregoing.

"Specific modulus" (0 1 9) is Young's modulus in pascals, equivalent to N/m^2 divided by specific weight in N/m^3 , measured at a temperature of (296 ± 2) K ($(23 \pm 2)^\circ C$) and a relative humidity of $(50 \pm 5)\%$.

"Specific tensile strength" (0 1 9) is ultimate tensile strength in pascals, equivalent to N/m^2 divided by specific weight in N/m^3 , measured at a temperature of (296 ± 2) K ($(23 \pm 2)^\circ C$) and a relative humidity of $(50 \pm 5)\%$.

"Splat Quenching" (1) means a process to 'solidify rapidly' a molten metal stream impinging upon a chilled block, forming a flake-like product.

N.B.: 'Solidify rapidly' solidification of molten material at cooling rates exceeding 1,000 K/s.

"Spread spectrum" (5) means the technique whereby energy in a relatively narrow-band communication channel is spread over a much wider energy spectrum.

"Spread spectrum" radar (6) - see "Radar spread spectrum"

"Stability" (7) means the standard deviation (1 sigma) of the variation of a particular parameter from its calibrated value measured under stable temperature conditions. This can be expressed as a function of time.

"States (not) Party to the Chemical Weapon Convention" (1) are those states for which the Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons has (not) entered into force. (See www.opcw.org)

"Substrate" (3) means a sheet of base material with or without an interconnection pattern and on which or within which 'discrete components' or integrated circuits or both can be located.

N.B. 1: 'Discrete component': a separately packaged 'circuit element' with its own external connections.

N.B. 2: 'Circuit element': a single active or passive functional part of an electronic circuit, such as one diode, one transistor, one resistor, one capacitor, etc.

"Substrate blanks" (6) means monolithic compounds with dimensions suitable for the production of optical elements such as mirrors or optical windows.

"Sub-unit of toxin" (1) is a structurally and functionally discrete component of a whole "toxin".

"Superalloys" (2 9) means nickel-, cobalt- or iron-base alloys having strengths superior to any alloys in the AISI 300 series at temperatures over 922 K (649°C) under severe environmental and operating conditions.

"Superconductive" (1 3 5 6 8) means materials, i.e., metals, alloys or compounds, which can lose all electrical resistance, i.e., which can attain infinite electrical conductivity and carry very large electrical currents without Joule heating.

N.B.: The "superconductive" state of a material is individually characterised by a "critical temperature", a critical magnetic field, which is a function of temperature, and a critical current density which is, however, a function of both magnetic field and temperature.

"Super High Power Laser" ("SHPL") (6) means a "laser" capable of delivering (the total or any portion of) the output energy exceeding 1 kJ within 50 ms or having an average or CW power exceeding 20 kW.

"Superplastic forming" (1 2) means a deformation process using heat for metals that are normally characterised by low values of elongation (less than 20%) at the breaking point as determined at room temperature by conventional tensile strength testing, in order to achieve elongations during processing which are at least 2 times those values.

"Symmetric algorithm" (5) means a cryptographic algorithm using an identical key for both encryption and decryption.

N.B. A common use of "symmetric algorithms" is confidentiality of data.

"System tracks" (6) means processed, correlated (fusion of radar target data to flight plan position) and updated aircraft flight position report available to the Air Traffic Control centre controllers.

"Systolic array computer" (4) means a computer where the flow and modification of the data is dynamically controllable at the logic gate level by the user.

"Tape" (1) is a material constructed of interlaced or unidirectional "monofilaments", 'strands', "rovings", "tows", or "yarns", etc., usually preimpregnated with resin.

N.B.: 'Strand' is a bundle of "monofilaments" (typically over 200) arranged approximately parallel.

"Technology" (GTN NTN All) means specific information necessary for the "development", "production" or "use" of goods. This information takes the form of 'technical data' or 'technical assistance'.

N.B.: 1: 'Technical assistance' may take forms such as instructions, skills, training, working knowledge and consulting services and may involve the transfer of 'technical data'.

N.B.: 2: 'Technical data' may take forms such as blueprints, plans, diagrams, models, formulae, tables, engineering designs and specifications, manuals and instructions written or recorded on other media or devices such as disk, tape, read-only memories.

"Tilting spindle" (2) means a tool-holding spindle which alters, during the machining process, the angular position of its centre line with respect to any other axis.

"Time constant" (6) is the time taken from the application of a light stimulus for the current increment to reach a value of $1-1/e$ times the final value (i.e., 63% of the final value).

"Total control of flight" (7) means an automated control of "aircraft" state variables and flight path to meet mission objectives responding to real time changes in data regarding objectives, hazards or other "aircraft".

"Total digital transfer rate" (5) means the number of bits, including line coding, overhead and so forth per unit time passing between corresponding equipment in a digital transmission system.

N.B.: See also "digital transfer rate".

"Tow" (1) is a bundle of "monofilaments", usually approximately parallel.

"Toxins" (1 2) means toxins in the form of deliberately isolated preparations or mixtures, no matter how produced, other than toxins present as contaminants of other materials such as pathological specimens, crops, foodstuffs or seed stocks of "microorganisms".

"Transfer laser" (6) means a "laser" in which the lasing species is excited through the transfer of energy by collision of a non-lasing atom or molecule with a lasing atom or molecule species.

"Tunable" (6) means the ability of a "laser" to produce a continuous output at all wavelengths over a range of several "laser" transitions. A line selectable "laser" produces discrete wavelengths within one "laser" transition and is not considered "tunable".

"Unmanned Aerial Vehicle" ("UAV") (9) means any aircraft capable of initiating flight and sustaining controlled flight and navigation without any human presence on board.

"Uranium enriched in the isotopes 235 or 233" (0) means uranium containing the isotopes 235 or 233, or both, in an amount such that the abundance ratio of the sum of these isotopes to the isotope 238 is more than the ratio of the isotope 235 to the isotope 238 occurring in nature (isotopic ratio 0.71 per cent).

"Use" (GTN NTN All) means operation, installation (including on-site installation), maintenance (checking), repair, overhaul and refurbishing.

"User accessible programmability" (6) means the facility allowing a user to insert, modify or replace "programmes" by means other than:

- a. A physical change in wiring or interconnections; or
- b. The setting of function controls including entry of parameters.

"Vaccine" (1) is a medicinal product in a pharmaceutical formulation licensed by, or having marketing or clinical trial authorisation from, the regulatory authorities of either the country of manufacture or of use, which is intended to stimulate a protective immunological response in humans or animals in order to prevent disease in those to whom or to which it is administered.

"Vacuum Atomisation" (1) means a process to reduce a molten stream of metal to droplets of a diameter of 500 micrometre or less by the rapid evolution of a dissolved gas upon exposure to a vacuum.

"Variable geometry airfoils" (7) means the use of trailing edge flaps or tabs, or leading edge slats or pivoted nose droop, the position of which can be controlled in flight.

"Yarn" (1) is a bundle of twisted 'strands'.

N.B.: 'Strand' is a bundle of "monofilaments" (typically over 200) arranged approximately parallel.

ACRONYMS AND ABBREVIATIONS USED IN THIS ANNEX

An acronym or abbreviation, when used as a defined term, will be found in 'Definitions of Terms used in this Annex'.

| ACRONYM OR ABBREVIATION | MEANING |
|--------------------------------|--|
| ABEC | Annular Bearing Engineers Committee |
| AGMA | American Gear Manufacturers' Association |
| AHRS | attitude and heading reference systems |
| AISI | American Iron and Steel Institute |
| ALU | arithmetic logic unit |
| ANSI | American National Standards Institute |
| ASTM | the American Society for Testing and Materials |
| ATC | air traffic control |
| AVLIS | atomic vapour laser isotope separation |
| CAD | computer-aided-design |
| CAS | Chemical Abstracts Service |
| CCITT | International Telegraph and Telephone Consultative Committee |
| CDU | control and display unit |
| CEP | circular error probable |
| CNTD | controlled nucleation thermal deposition |
| CRISLA | chemical reaction by isotope selective laser activation. |
| CVD | chemical vapour deposition |
| CW | chemical warfare |
| CW (for lasers) | continuous wave |
| DME | distance measuring equipment |
| DS | directionally solidified |
| EB-PVD | electron beam physical vapour deposition |
| EBU | European Broadcasting Union |
| ECM | electro-chemical machining |
| ECR | electron cyclotron resonance |
| EDM | electrical discharge machines |
| EEPROMS | electrically erasable programmable read only memory |
| EIA | Electronic Industries Association |
| EMC | electromagnetic compatibility |
| ETSI | European Telecommunications Standards Institute |
| FFT | Fast Fourier Transform |
| GLONASS | global navigation satellite system |
| GPS | global positioning system |
| HBT | hetero-bipolar transistors |
| HDDR | high density digital recording |
| HEMT | high electron mobility transistors |
| ICAO | International Civil Aviation Organisation |
| IEC | International Electro-technical Commission |
| IEEE | Institute of Electrical and Electronic Engineers |
| IFOV | instantaneous-field-of-view |
| ILS | instrument landing system |
| IRIG | inter-range instrumentation group |
| ISA | international standard atmosphere |
| ISAR | inverse synthetic aperture radar |

| ACRONYM OR ABBREVIATION | MEANING |
|------------------------------------|--|
| ISO | International Organization for Standardization |
| ITU | International Telecommunication Union |
| JIS | Japanese Industrial Standard |
| JT | Joule-Thomson |
| LIDAR | light detection and ranging |
| LRU | line replaceable unit |
| MAC | message authentication code |
| Mach | ratio of speed of an object to speed of sound (after Ernst Mach) |
| MLIS | molecular laser isotopic separation |
| MLS | microwave landing systems |
| MOCVD | metal organic chemical vapour deposition |
| MRI | magnetic resonance imaging |
| MTBF | mean-time-between-failures |
| Mtops | million theoretical operations per second |
| MTTF | mean-time-to-failure |
| NBC | Nuclear, Biological and Chemical |
| NDT | non-destructive test |
| PAR | precision approach radar |
| PIN | personal identification number |
| ppm | parts per million |
| PSD | power spectral density |
| QAM | quadrature-amplitude-modulation |
| RF | radio frequency |
| SACMA | Suppliers of Advanced Composite Materials Association |
| SAR | synthetic aperture radar |
| SC | single crystal |
| SLAR | sidelooking airborne radar |
| SMPTE | Society of Motion Picture and Television Engineers |
| SRA | shop replaceable assembly |
| SRAM | static random access memory |
| SRM | SACMA Recommended Methods |
| SSB | single sideband |
| SSR | secondary surveillance radar |
| TCSEC | trusted computer system evaluation criteria |
| TIR | total indicated reading |
| UV | ultraviolet |
| UTS | ultimate tensile strength |
| VOR | very high frequency omni-directional range |
| YAG | yttrium/aluminum garnet |

CATEGORY 0 - NUCLEAR MATERIALS, FACILITIES, AND EQUIPMENT**0A Systems, Equipment and Components**

0A001 "Nuclear reactors" and specially designed or prepared equipment and components therefor, as follows:

-]
- a. "Nuclear reactors";
 - b. Metal vessels, or major shop-fabricated parts therefor, including the reactor vessel head for a reactor pressure vessel, specially designed or prepared to contain the core of a "nuclear reactor";
 - c. Manipulative equipment specially designed or prepared for inserting or removing fuel in a "nuclear reactor";
 - d. Control rods specially designed or prepared for the control of the fission process in a "nuclear reactor", support or suspension structures therefor, rod drive mechanisms and rod guide tubes;
 - e. Pressure tubes specially designed or prepared to contain fuel elements and the primary coolant in a "nuclear reactor" at an operating pressure in excess of 5.1 MPa;
 - f. Zirconium metal and alloys in the form of tubes or assemblies of tubes in which the ratio of hafnium to zirconium is less than 1:500 parts by weight, specially designed or prepared for use in a "nuclear reactor";
 - g. Coolant pumps specially designed or prepared for circulating the primary coolant of "nuclear reactors";
 - h. 'Nuclear reactor internals' specially designed or prepared for use in a "nuclear reactor", including support columns for the core, fuel channels, thermal shields, baffles, core grid plates, and diffuser plates;
Note: In 0A001.h. 'nuclear reactor internals' means any major structure within a reactor vessel which has one or more functions such as supporting the core, maintaining fuel alignment, directing primary coolant flow, providing radiation shields for the reactor vessel, and guiding in-core instrumentation.
 - i. Heat exchangers (steam generators) specially designed or prepared for use in the primary coolant circuit of a "nuclear reactor";
 - j. Neutron detection and measuring instruments specially designed or prepared for determining neutron flux levels within the core of a "nuclear reactor".

0B Test, Inspection and Production Equipment

0B001 Plant for the separation of isotopes of "natural uranium", "depleted uranium" and "special fissile materials", and specially designed or prepared equipment and components therefor, as follows:

- a. Plant specially designed for separating isotopes of "natural uranium", "depleted uranium", and "special fissile materials", as follows:
 1. Gas centrifuge separation plant;
 2. Gaseous diffusion separation plant;
 3. Aerodynamic separation plant;
 4. Chemical exchange separation plant;
 5. Ion-exchange separation plant;
 6. Atomic vapour "laser" isotope separation (AVLIS) plant;
 7. Molecular "laser" isotope separation (MLIS) plant;
 8. Plasma separation plant;
 9. Electro magnetic separation plant;
- b. Gas centrifuges and assemblies and components, specially designed or prepared for gas centrifuge separation process, as follows:

Note: In 0B001.b. 'high strength-to-density ratio material' means any of the following:

- a. Maraging steel capable of an ultimate tensile strength of 2,050 MPa or more;
- b. Aluminium alloys capable of an ultimate tensile strength of 460 MPa or more; *or*
- c. "Fibrous or filamentary materials" with a "specific modulus" of more than 3.18×10^6 m and a "specific tensile strength" greater than 76.2×10^3 m;

1. Gas centrifuges;
2. Complete rotor assemblies;
3. Rotor tube cylinders with a wall thickness of 12 mm or less, a diameter of between 75 mm and 400 mm, made from 'high strength-to-density ratio materials';
4. Rings or bellows with a wall thickness of 3 mm or less and a diameter of between 75 mm and 400 mm and designed to give local support to a rotor tube or to join a number together, made from 'high strength-to-density ratio materials';
5. Baffles of between 75 mm and 400 mm diameter for mounting inside a rotor tube, made from 'high strength-to-density ratio materials'.
6. Top or bottom caps of between 75 mm and 400 mm diameter to fit the ends of a rotor tube, made from 'high strength-to-density ratio materials';
7. Magnetic suspension bearings consisting of an annular magnet suspended within a housing made of or protected by "materials resistant to corrosion by UF₆" containing a damping medium and having the magnet coupling with a pole piece or second magnet fitted to the top cap of the rotor;

- 0B001 b. continued
8. Specially prepared bearings comprising a pivot-cup assembly mounted on a damper;
 9. Molecular pumps comprised of cylinders having internally machined or extruded helical grooves and internally machined bores;
 10. Ring-shaped motor stators for multiphase AC hysteresis (or reluctance) motors for synchronous operation within a vacuum in the frequency range of 600 to 2,000 Hz and a power range of 50 to 1,000 Volt-Amps;
 11. Centrifuge housing/recipients to contain the rotor tube assembly of a gas centrifuge, consisting of a rigid cylinder of wall thickness up to 30 mm with precision machined ends and made of or protected by "materials resistant to corrosion by UF₆";
 12. Scoops consisting of tubes of up to 12 mm internal diameter for the extraction of UF₆ gas from within a centrifuge rotor tube by a Pitot tube action, made of or protected by "materials resistant to corrosion by UF₆";
 13. Frequency changers (converters or inverters) specially designed or prepared to supply motor stators for gas centrifuge enrichment, having all of the following characteristics, and specially designed components therefor:
 - a. Multiphase output of 600 to 2,000 Hz;
 - b. Frequency control better than 0.1%;
 - c. Harmonic distortion of less than 2%; and
 - d. An efficiency greater than 80%;
 14. Bellows valves made of or protected by "materials resistant to corrosion by UF₆", with a diameter of 10 mm to 160 mm;
- c. Equipment and components, specially designed or prepared for gaseous diffusion separation process, as follows:
1. Gaseous diffusion barriers made of porous metallic, polymer or ceramic "materials resistant to corrosion by UF₆" with a pore size of 10 to 100 nm, a thickness of 5 mm or less, and, for tubular forms, a diameter of 25 mm or less;
 2. Gaseous diffuser housings made of or protected by "materials resistant to corrosion by UF₆";
 3. Compressors (positive displacement, centrifugal and axial flow types) or gas blowers with a suction volume capacity of 1 m³/min or more of UF₆, and discharge pressure up to 666.7 kPa, made of or protected by "materials resistant to corrosion by UF₆";
 4. Rotary shaft seals for compressors or blowers specified in 0B001.c.3. and designed for a buffer gas in-leakage rate of less than 1,000 cm³/min.;
 5. Heat exchangers made of aluminium, copper, nickel, or alloys containing more than 60 per cent nickel, or combinations of these metals as clad tubes, designed to operate at sub-atmospheric pressure with a leak rate that limits the pressure rise to less than 10 Pa per hour under a pressure differential of 100 kPa;
 6. Bellow valves made of or protected by "materials resistant to corrosion by UF₆", with a diameter of 40 mm to 1,500 mm;

0B001 continued

- d. Equipment and components, specially designed or prepared for aerodynamic separation process, as follows:
1. Separation nozzles consisting of slit-shaped, curved channels having a radius of curvature less than 1 mm, resistant to corrosion by UF_6 , and having a knife-edge contained within the nozzle which separates the gas flowing through the nozzle into two streams;
 2. Tangential inlet flow-driven cylindrical or conical tubes, (vortex tubes), made of or protected by "materials resistant to corrosion by UF_6 " with a diameter of between 0.5 cm and 4 cm and a length to diameter ratio of 20:1 or less and with one or more tangential inlets;
 3. Compressors (positive displacement, centrifugal and axial flow types) or gas blowers with a suction volume capacity of 2 m³/min or more, made of or protected by "materials resistant to corrosion by UF_6 ", and rotary shaft seals therefor;
 4. Heat exchangers made of or protected by "materials resistant to corrosion by UF_6 ";
 5. Aerodynamic separation element housings, made of or protected by "materials resistant to corrosion by UF_6 " to contain vortex tubes or separation nozzles;
 6. Bellows valves made of or protected by "materials resistant to corrosion by UF_6 ", with a diameter of 40 to 1,500 mm;
 7. Process systems for separating UF_6 from carrier gas (hydrogen or helium) to 1 ppm UF_6 content or less, including:
 - a. Cryogenic heat exchangers and cryoseparators capable of temperatures of 153K (-120⁰C) or less;
 - b. Cryogenic refrigeration units capable of temperatures of 153 K (-120⁰C) or less;
 - c. Separation nozzle or vortex tube units for the separation of UF_6 from carrier gas;
 - d. UF_6 cold traps capable of temperatures of 253 K (-20⁰C) or less;
- e. Equipment and components, specially designed or prepared for chemical exchange separation process, as follows:
1. Fast-exchange liquid-liquid pulse columns with stage residence time of 30 seconds or less and resistant to concentrated hydrochloric acid (e.g. made of or protected by suitable plastic materials such as fluorocarbon polymers or glass);
 2. Fast-exchange liquid-liquid centrifugal contactors with stage residence time of 30 seconds or less and resistant to concentrated hydrochloric acid (e.g. made of or protected by suitable plastic materials such as fluorocarbon polymers or glass);
 3. Electrochemical reduction cells resistant to concentrated hydrochloric acid solutions, for reduction of uranium from one valence state to another;

- 0B001 e. continued
4. Electrochemical reduction cells feed equipment to take U^{+4} from the organic stream and, for those parts in contact with the process stream, made of or protected by suitable materials (e.g. glass, fluorocarbon polymers, polyphenyl sulphate, polyether sulfone and resin-impregnated graphite);
 5. Feed preparation systems for producing high purity uranium chloride solution consisting of dissolution, solvent extraction and/or ion exchange equipment for purification and electrolytic cells for reducing the uranium U^{+6} or U^{+4} to U^{+3} ;
 6. Uranium oxidation systems for oxidation of U^{+3} to U^{+4} ;
- f. Equipment and components, specially designed or prepared for ion-exchange separation process, as follows:
1. Fast reacting ion-exchange resins, pellicular or porous macro-reticulated resins in which the active chemical exchange groups are limited to a coating on the surface of an inactive porous support structure, and other composite structures in any suitable form, including particles or fibres, with diameters of 0.2 mm or less, resistant to concentrated hydrochloric acid and designed to have an exchange rate half-time of less than 10 seconds and capable of operating at temperatures in the range of 373 K (100°C) to 473 K (200°C);
 2. Ion exchange columns (cylindrical) with a diameter greater than 1,000 mm, made of or protected by materials resistant to concentrated hydrochloric acid (e.g. titanium or fluorocarbon plastics) and capable of operating at temperatures in the range of 373 K (100°C) to 473 K (200°C) and pressures above 0.7 MPa;
 3. Ion exchange reflux systems (chemical or electrochemical oxidation or reduction systems) for regeneration of the chemical reducing or oxidizing agents used in ion exchange enrichment cascades;
- g. Equipment and components, specially designed or prepared for atomic vapour "laser" isotope separation process (AVLIS), as follows:
1. High power strip or scanning electron beam guns with a delivered power of more than 2.5 kW/cm for use in uranium vaporization systems;
 2. Liquid uranium metal handling systems for molten uranium or uranium alloys, consisting of crucibles, made of or protected by suitable corrosion and heat resistant materials (e.g. tantalum, yttria-coated graphite, graphite coated with other rare earth oxides or mixtures thereof), and cooling equipment for the crucibles;
N.B.: SEE ALSO 2A225.
 3. Product and tails collector systems made of or lined with materials resistant to the heat and corrosion of uranium metal vapour or liquid, such as yttria-coated graphite or tantalum;
 4. Separator module housings (cylindrical or rectangular vessels) for containing the uranium metal vapour source, the electron beam gun and the product and tails collectors;

- 0B001 g. continued
5. "Lasers" or "laser" systems for the separation of uranium isotopes with a spectrum frequency stabiliser for operation over extended periods of time;
N.B.: SEE ALSO 6A005 AND 6A205.
 - h. Equipment and components, specially designed or prepared for molecular "laser" isotope separation process (MLIS) or chemical reaction by isotope selective laser activation (CRISLA), as follows:
 1. Supersonic expansion nozzles for cooling mixtures of UF_6 and carrier gas to 150 K (-123°C) or less and made from "materials resistant to corrosion by UF_6 ";
 2. Uranium pentafluoride (UF_5) product collectors consisting of filter, impact, or cyclone-type collectors or combinations thereof, and made of "materials resistant to corrosion by UF_5/UF_6 ";
 3. Compressors made of or protected by "materials resistant to corrosion by UF_6 ", and rotary shaft seals therefor;
 4. Equipment for fluorinating UF_5 (solid) to UF_6 (gas);
 5. Process systems for separating UF_6 from carrier gas (e.g. nitrogen or argon) including:
 - a. Cryogenic heat exchangers and cryoseparators capable of temperatures of 153 K (-120°C) or less;
 - b. Cryogenic refrigeration units capable of temperatures of 153 K (-120°C) or less;
 - c. UF_6 cold traps capable of temperatures of 253 K (-20°C) or less;
 6. "Lasers" or "laser" systems for the separation of uranium isotopes with a spectrum frequency stabiliser for operation over extended periods of time;
N.B.: SEE ALSO 6A005 AND 6A205.
 - i. Equipment and components, specially designed or prepared for plasma separation process, as follows:
 1. Microwave power sources and antennae for producing or accelerating ions, with an output frequency greater than 30 GHz and mean power output greater than 50 kW;
 2. Radio frequency ion excitation coils for frequencies of more than 100 kHz and capable of handling more than 40 kW mean power;
 3. Uranium plasma generation systems;
 4. Liquid metal handling systems for molten uranium or uranium alloys, consisting of crucibles, made of or protected by suitable corrosion and heat resistant materials (e.g. tantalum, yttria-coated graphite, graphite coated with other rare earth oxides or mixtures thereof), and cooling equipment for the crucibles;
N.B.: SEE ALSO 2A225.

- 0B001
- i. continued
 5. Product and tails collectors made of or protected by materials resistant to the heat and corrosion of uranium vapour such as yttria-coated graphite or tantalum;
 6. Separator module housings (cylindrical) for containing the uranium plasma source, radio-frequency drive coil and the product and tails collectors and made of a suitable non-magnetic material (e.g. stainless steel);
 - j. Equipment and components, specially designed or prepared for electromagnetic separation process, as follows:
 1. Ion sources, single or multiple, consisting of a vapour source, ioniser, and beam accelerator made of suitable non-magnetic materials (e.g. graphite, stainless steel, or copper) and capable of providing a total ion beam current of 50 mA or greater;
 2. Ion collector plates for collection of enriched or depleted uranium ion beams, consisting of two or more slits and pockets and made of suitable non-magnetic materials (e.g. graphite or stainless steel);
 3. Vacuum housings for uranium electromagnetic separators made of non-magnetic materials (e.g. stainless steel) and designed to operate at pressures of 0.1 Pa or lower;
 4. Magnet pole pieces with a diameter greater than 2 m;
 5. High voltage power supplies for ion sources, having all of the following characteristics:
 - a. Capable of continuous operation;
 - b. Output voltage of 20,000 V or greater;
 - c. Output current of 1 A or greater; and
 - d. Voltage regulation of better than 0.01% over a period of 8 hours;**N.B.: SEE ALSO 3A227.**
 6. Magnet power supplies (high power, direct current) having all of the following characteristics:
 - a. Capable of continuous operation with a current output of 500 A or greater at a voltage of 100 V or greater; and
 - b. Current or voltage regulation better than 0.01% over a period of 8 hours.**N.B.: SEE ALSO 3A226.**
- 0B002
- Specially designed or prepared auxiliary systems, equipment and components, as follows, for isotope separation plant specified in 0B001, made of or protected by "materials resistant to corrosion by UF₆":
- a. Feed autoclaves, ovens or systems used for passing UF₆ to the enrichment process;
 - b. Desublimers or cold traps, used to remove UF₆ from the enrichment process for subsequent transfer upon heating;

- 0B002 continued
- c. Product and tails stations for transferring UF₆ into containers;
 - d. Liquefaction or solidification stations used to remove UF₆ from the enrichment process by compressing, cooling and converting UF₆ to a liquid or solid form;
 - e. Piping systems and header systems specially designed for handling UF₆ within gaseous diffusion, centrifuge or aerodynamic cascades;
 -] f.
 - 1. Vacuum manifolds or vacuum headers having a suction capacity of 5 m³/minute or more; or
 - 2. Vacuum pumps specially designed for use in UF₆ bearing atmospheres;
 - g. UF₆ mass spectrometers/ion sources specially designed or prepared for taking on-line samples of feed, product or tails from UF₆ gas streams and having all of the following characteristics:
 - 1. Unit resolution for mass of more than 320 amu;
 - 2. Ion sources constructed of or lined with nichrome or monel, or nickel plated;
 - 3. Electron bombardment ionisation sources; and
 - 4. Collector system suitable for isotopic analysis.
- 0B003 Plant for the conversion of uranium and equipment specially designed or prepared therefor, as follows:
- a. Systems for the conversion of uranium ore concentrates to UO₃;
 - b. Systems for the conversion of UO₃ to UF₆;
 - c. Systems for the conversion of UO₃ to UO₂;
 - d. Systems for the conversion of UO₂ to UF₄;
 - e. Systems for the conversion of UF₄ to UF₆;
 - f. Systems for the conversion of UF₄ to uranium metal;
 - g. Systems for the conversion of UF₆ to UO₂;
 - h. Systems for the conversion of UF₆ to UF₄;
 - i. Systems for the conversion of UO₂ to UCl₄.
- 0B004 Plant for the production or concentration of heavy water, deuterium and deuterium compounds and specially designed or prepared equipment and components therefor, as follows:
- a. Plant for the production of heavy water, deuterium or deuterium compounds, as follows:
 - 1. Water-hydrogen sulphide exchange plants;
 - 2. Ammonia-hydrogen exchange plants;

0B004 continued

- b. Equipment and components, as follows:
1. Water-hydrogen sulphide exchange towers fabricated from fine carbon steel (e.g. ASTM A516) with diameters of 6 m to 9 m, capable of operating at pressures greater than or equal to 2 MPa and with a corrosion allowance of 6 mm or greater;
 2. Single stage, low head (i.e. 0.2 MPa) centrifugal blowers or compressors for hydrogen sulphide gas circulation (i.e. gas containing more than 70% H₂S) with a throughput capacity greater than or equal to 56 m³/second when operating at pressures greater than or equal to 1.8 MPa suction and having seals designed for wet H₂S service;
 3. Ammonia-hydrogen exchange towers greater than or equal to 35 m in height with diameters of 1.5 m to 2.5 m capable of operating at pressures greater than 15 MPa;
 4. Tower internals, including stage contactors, and stage pumps, including those which are submersible, for heavy water production utilizing the ammonia-hydrogen exchange process;
 5. Ammonia crackers with operating pressures greater than or equal to 3 MPa for heavy water production utilizing the ammonia-hydrogen exchange process;
 6. Infrared absorption analysers capable of on-line hydrogen/deuterium ratio analysis where deuterium concentrations are equal to or greater than 90%;
 7. Catalytic burners for the conversion of enriched deuterium gas into heavy water utilizing the ammonia-hydrogen exchange process;
 8. Complete heavy water upgrade systems, or columns therefor, for the upgrade of heavy water to reactor-grade deuterium concentration.

0B005 Plant specially designed for the fabrication of "nuclear reactor" fuel elements and specially designed or prepared equipment therefor.

- Note: *A plant for the fabrication of "nuclear reactor" fuel elements includes equipment which:*
- a. *Normally comes into direct contact with or directly processes or controls the production flow of nuclear materials;*
 - b. *Seals the nuclear materials within the cladding;*
 - c. *Checks the integrity of the cladding or the seal; or*
 - d. *Checks the finish treatment of the sealed fuel.*

0B006 Plant for the reprocessing of irradiated "nuclear reactor" fuel elements, and specially designed or prepared equipment and components therefor.

Note: 0B006 includes:

- a. *Plant for the reprocessing of irradiated "nuclear reactor" fuel elements including equipment and components which normally come into direct contact with and directly control the irradiated fuel and the major nuclear material and fission product processing streams;*
- b. *Fuel element chopping or shredding machines, i.e. remotely operated equipment to cut, chop, shred or shear irradiated "nuclear reactor" fuel assemblies, bundles or rods;*
- c. *Dissolvers, critically safe tanks (e.g. small diameter, annular or slab tanks) specially designed or prepared for the dissolution of irradiated "nuclear reactor" fuel, which are capable of withstanding hot, highly corrosive liquids, and which can be remotely loaded and maintained;*
- d. *Counter-current solvent extractors and ion-exchange processing equipment specially designed or prepared for use in a plant for the reprocessing of irradiated "natural uranium", "depleted uranium" or "special fissile materials";*
- e. *Holding or storage vessels specially designed to be critically safe and resistant to the corrosive effects of nitric acid;*

Note: *Holding or storage vessels may have the following features:*

 1. *Walls or internal structures with a boron equivalent (calculated for all constituent elements as defined in the note to 0C004) of at least two per cent;*
 2. *A maximum diameter of 175 mm for cylindrical vessels; or*
 3. *A maximum width of 75 mm for either a slab or annular vessel.*
- f. *Process control instrumentation specially designed or prepared for monitoring or controlling the reprocessing of irradiated "natural uranium", "depleted uranium" or "special fissile materials".*

0B007 Plant for the conversion of plutonium and equipment specially designed or prepared therefor, as follows:

- a. Systems for the conversion of plutonium nitrate to oxide;
- b. Systems for plutonium metal production.

0C Materials

0C001 "Natural uranium" or "depleted uranium" or thorium in the form of metal, alloy, chemical compound or concentrate and any other material containing one or more of the foregoing;

Note: 0C001 does not control the following:

- a. Four grammes or less of "natural uranium" or "depleted uranium" when contained in a sensing component in instruments;
- b. "Depleted uranium" specially fabricated for the following civil non-nuclear applications:
 1. Shielding;
 2. Packaging;
 3. Ballasts having a mass not greater than 100 kg;
 4. Counter-weights having a mass not greater than 100 kg;
- c. Alloys containing less than 5% thorium;
- d. Ceramic products containing thorium, which have been manufactured for non-nuclear use.

0C002 "Special fissile materials"

Note: 0C002 does not control four "effective grammes" or less when contained in a sensing component in instruments.

0C003 Deuterium, heavy water (deuterium oxide) and other compounds of deuterium, and mixtures and solutions containing deuterium, in which the isotopic ratio of deuterium to hydrogen exceeds 1:5,000.

0C004 Graphite, nuclear grade, having a purity level of less than 5 parts per million 'boron equivalent' and with a density greater than 1.5 g/cm³.

N.B.: SEE ALSO 1C107

Note 1: 0C004 does not control the following:

- a. Manufactures of graphite having a mass less than 1 kg, other than those specially designed or prepared for use in a nuclear reactor;
- b. Graphite powder.

Note 2: In 0C004, 'boron equivalent' (BE) is defined as the sum of BE_z for impurities (excluding BE_{carbon} since carbon is not considered an impurity) including boron, where:

0C004 Note 2 continued

BE_Z (ppm) = $CF \times$ concentration of element Z in ppm;

$$\text{where } CF \text{ is the conversion factor} = \frac{\sigma_Z A_B}{\sigma_B A_Z}$$

and σ_B and σ_Z are the thermal neutron capture cross sections (in barns) for naturally occurring boron and element Z respectively; and A_B and A_Z are the atomic masses of naturally occurring boron and element Z respectively.

0C005 Specially prepared compounds or powders for the manufacture of gaseous diffusion barriers, resistant to corrosion by UF_6 (e.g. nickel or alloy containing 60 weight per cent or more nickel, aluminium oxide and fully fluorinated hydrocarbon polymers), having a purity of 99.9 weight per cent or more and a mean particle size of less than 10 micrometres measured by American Society for Testing and Materials (ASTM) B330 standard and a high degree of particle size uniformity.

0D Software

0D001 "Software" specially designed or modified for the "development", "production" or "use" of goods specified in this Category.

0E Technology

0E001 "Technology" according to the Nuclear Technology Note for the "development", "production" or "use" of goods specified in this Category.

CATEGORY 1 – SPECIAL MATERIALS AND RELATED EQUIPMENT

1A Systems, Equipment and Components

1A001 Components made from fluorinated compounds, as follows:

- a. Seals, gaskets, sealants or fuel bladders, specially designed for "aircraft" or aerospace use, made from more than 50 % by weight of any of the materials specified in 1C009.b. or 1C009.c.;
- b. Piezoelectric polymers and copolymers, made from vinylidene fluoride (CAS 75-38-7) materials, specified in 1C009.a., having all of the following:
 1. In sheet or film form; and
 2. With a thickness exceeding 200 µm;
- c. Seals, gaskets, valve seats, bladders or diaphragms, having all of the following:
 1. Made from fluoroelastomers containing at least one vinyl ether group as a constitutional unit; and
 2. Specially designed for "aircraft", aerospace or 'missile' use.

Note: In 1A001.c., 'missile' means complete rocket systems and unmanned aerial vehicle systems.

1A002 "Composite" structures or laminates, having any of the following:

N.B: SEE ALSO 1A202, 9A010 and 9A110

- a. Consisting of an organic "matrix" and materials specified in 1C010.c., 1C010.d. or 1C010.e.; or
- b. Consisting of a metal or carbon "matrix", and any of the following:
 1. Carbon "fibrous or filamentary materials" having all of the following:
 - a. A "specific modulus" exceeding 10.15×10^6 m; and
 - b. A "specific tensile strength" exceeding 17.7×10^4 m; or
 2. Materials specified in 1C010.c.

Note 1: 1A002 does not control composite structures or laminates made from epoxy resin impregnated carbon "fibrous or filamentary materials" for the repair of "civil aircraft" structures or laminates, having all of the following:

- a. An area not exceeding 1 m²;
- b. A length not exceeding 2.5 m; and
- c. A width exceeding 15 mm.

Note 2: 1A002 does not control finished or semi-finished items, specially designed for purely civilian applications as follows:

- a. Sporting goods;
- b. Automotive industry;
- c. Machine tool industry;
- d. Medical applications.

Note 3: 1A002.b.1. does not control finished or semi-finished items containing a maximum of two dimensions of interwoven filaments and specially designed for applications as follows:

- a. Metal heat-treatment furnaces for tempering metals;
- b. Silicon boule production equipment.

- 1A003 Manufactures of non-"fusible" aromatic polyimides in film, sheet, tape or ribbon form having any of the following :
- a. A thickness exceeding 0.254 mm; or
 - b. Coated or laminated with carbon, graphite, metals or magnetic substances.

Note: 1A003 does not control manufactures when coated or laminated with copper and designed for the production of electronic printed circuit boards.

N.B.: For "fusible" aromatic polyimides in any form, see 1C008.a.3.

- 1A004 Protective and detection equipment and components, other than those specified in military goods controls, as follows:

N.B.: SEE ALSO 2B351 AND 2B352.

- a. Gas masks, filter canisters and decontamination equipment therefor, designed or modified for defence against any of the following, and specially designed components therefor:
 1. Biological agents "adapted for use in war";
 2. Radioactive materials "adapted for use in war";
 3. Chemical warfare (CW) agents; or
 4. "Riot control agents", including:
 - a. α -Bromobenzeneacetonitrile, (Bromobenzyl cyanide) (CA) (CAS 5798-79-8);
 - b. [(2-chlorophenyl) methylene] propanedinitrile, (o-Chlorobenzylidenemalononitrile) (CS) (CAS 2698-41-1);
 - c. 2-Chloro-1-phenylethanone, Phenylacetyl chloride (ω -chloroacetophenone) (CN) (CAS 532-27-4);
 - d. Dibenz-(b,f)-1,4-oxazepine (CR) (CAS 257-07-8);
 - e. 10-Chloro-5,10-dihydrophenarsazine, (Phenarsazine chloride), (Adamsite), (DM) (CAS 578-94-9);
 - f. N-Nonanoylmorpholine, (MPA) (CAS 5299-64-9);
- b. Protective suits, gloves and shoes, specially designed or modified for defence against any of the following:
 1. Biological agents "adapted for use in war";
 2. Radioactive materials "adapted for use in war"; or
 3. Chemical warfare (CW) agents;
- c. Nuclear, biological and chemical (NBC) detection systems, specially designed or modified for detection or identification of any of the following, and specially designed components therefor:
 1. Biological agents "adapted for use in war";
 2. Radioactive materials "adapted for use in war"; or
 3. Chemical warfare (CW) agents.
- d. Electronic equipment designed for automatically detecting or identifying the presence of "explosives" residues and utilising 'trace detection' techniques (e.g., surface acoustic wave, ion mobility spectrometry, differential mobility spectrometry, mass spectrometry).

Technical Note:

'Trace detection' is defined as the capability to detect less than 1 ppm vapour, or 1 mg solid or liquid.

Note 1: 1A004.d. does not control equipment specially designed for laboratory use.

Note 2: 1A004.d. does not control non-contact walk-through security portals.

- 1A004 continued

Note: 1A004 does not control:

- a. Personal radiation monitoring dosimeters;
- b. Equipment limited by design or function to protect against hazards specific to residential safety and civil industries, such as mining, quarrying, agriculture, pharmaceuticals, medical, veterinary, environmental, waste management, or to the food industry.

Technical Notes:

1. 1A004 includes equipment and components that have been identified, successfully tested to national standards or otherwise proven effective, for the detection of or defence against radioactive materials "adapted for use in war", biological agents "adapted for use in war", chemical warfare agents, 'simulants' or "riot control agents", even if such equipment or components are used in civil industries such as mining, quarrying, agriculture, pharmaceuticals, medical, veterinary, environmental, waste management, or the food industry.
2. 'Simulant' is a substance or material that is used in place of toxic agent (chemical or biological) in training, research, testing or evaluation.

1A005

Body armour, and specially designed components therefor, other than those manufactured to military standards or specifications or to their equivalents in performance.

N.B.: SEE ALSO MILITARY GOODS CONTROLS.

N.B.: For "fibrous or filamentary materials" used in the manufacture of body armour, see 1C010.

Note 1: 1A005 does not control body armour or protective garments, when accompanying their user for the user's own personal protection.

Note 2: 1A005 does not control body armour designed to provide frontal protection only from both fragment and blast from non-military explosive devices.

1A006

Equipment, specially designed or modified for the disposal of improvised explosive devices, as follows, and specially designed components and accessories therefor:

N.B.: SEE ALSO MILITARY GOODS CONTROLS.

- a. Remotely operated vehicles;
- b. 'Disruptors'.

Technical Note:

'Disruptors' are devices specially designed for the purpose of preventing the operation of an explosive device by projecting a liquid, solid or frangible projectile.

Note: 1A006 does not control equipment when accompanying its operator.

1A007 Equipment and devices, specially designed to initiate charges and devices containing "energetic materials", by electrical means, as follows:

N.B.: SEE ALSO MILITARY GOODS CONTROLS, 3A229 AND 3A232.

- a. Explosive detonator firing sets designed to drive explosive detonators specified in 1A007.b.;
- b. Electrically driven explosive detonators as follows:
 1. Exploding bridge (EB);
 2. Exploding bridge wire (EBW);
 3. Slapper;
 4. Exploding foil initiators (EFI).

Technical Notes:

1. *The word initiator or igniter is sometimes used in place of the word detonator.*
2. *For the purpose of 1A007.b. the detonators of concern all utilise a small electrical conductor (bridge, bridge wire, or foil) that explosively vaporises when a fast, high-current electrical pulse is passed through it. In non-slapper types, the exploding conductor starts a chemical detonation in a contacting high explosive material such as PETN (pentaerythritoltetranitrate). In slapper detonators, the explosive vaporization of the electrical conductor drives a flyer or slapper across a gap, and the impact of the slapper on an explosive starts a chemical detonation. The slapper in some designs is driven by magnetic force. The term exploding foil detonator may refer to either an EB or a slapper-type detonator.*

1A008 Charges, devices and components, as follows:

- a. 'Shaped charges' having all of the following:
 1. Net Explosive Quantity (NEQ) greater than 90 g; and
 2. Outer casing diameter equal to or greater than 75 mm;
- b. Linear shaped cutting charges having all of the following, and specially designed components therefor:
 1. An explosive load greater than 40 g/m; and
 2. A width of 10 mm or more;
- c. Detonating cord with explosive core load greater than 64 g/m;
- d. Cutters, other than those specified in 1A008.b., and severing tools, having a Net Explosive Quantity (NEQ) greater than 3.5 kg.

Technical Note:

'Shaped charges' are explosive charges shaped to focus the effects of the explosive blast.

- 1A102 Resaturated pyrolyzed carbon-carbon components designed for space launch vehicles specified in 9A004 or sounding rockets specified in 9A104.
- 1A202 Composite structures, other than those specified in 1A002, in the form of tubes and having both of the following characteristics:
N.B.: SEE ALSO 9A010 AND 9A110.
- a. An inside diameter of between 75 mm and 400 mm; and
 - b. Made with any of the "fibrous or filamentary materials" specified in 1C010.a. or b. or 1C210.a. or with carbon prepreg materials specified in 1C210.c.
- 1A225 Platinized catalysts specially designed or prepared for promoting the hydrogen isotope exchange reaction between hydrogen and water for the recovery of tritium from heavy water or for the production of heavy water.
- 1A226 Specialized packings which may be used in separating heavy water from ordinary water, having both of the following characteristics:
- a. Made of phosphor bronze mesh chemically treated to improve wettability; and
 - b. Designed to be used in vacuum distillation towers.
- 1A227 High-density (lead glass or other) radiation shielding windows, having all of the following characteristics, and specially designed frames therefor:
- a. A 'cold area' greater than 0.09 m²;
 - b. A density greater than 3 g/cm³; and
 - c. A thickness of 100 mm or greater.

Technical Note:

In 1A227 the term 'cold area' means the viewing area of the window exposed to the lowest level of radiation in the design application.

1B Test, Inspection and Production Equipment

1B001 Equipment for the production or inspection of "composite" structures or laminates specified in 1A002 or "fibrous or filamentary materials" specified in 1C010, as follows, and specially designed components and accessories therefor:

N.B.: SEE ALSO 1B101 AND 1B201.

- a. Filament winding machines, of which the motions for positioning, wrapping and winding fibres are coordinated and programmed in three or more 'primary servo positioning' axes, specially designed for the manufacture of "composite" structures or laminates, from "fibrous or filamentary materials";
- b. Tape-laying machines, of which the motions for positioning and laying tape or sheets are coordinated and programmed in five or more 'primary servo positioning' axes, specially designed for the manufacture of "composite" airframe or 'missile' structures;
Note: In 1B001.b., 'missile' means complete rocket systems and unmanned aerial vehicle systems.
- c. Multidirectional, multidimensional weaving machines or interlacing machines, including adapters and modification kits, for weaving, interlacing or braiding fibres, to manufacture "composite" structures;
Technical Note:
For the purposes of 1B001.c., the technique of interlacing includes knitting.
Note: 1B001.c. does not control textile machinery not modified for the above end-uses.
- d. Equipment specially designed or adapted for the production of reinforcement fibres, as follows:
 1. Equipment for converting polymeric fibres (such as polyacrylonitrile, rayon, pitch or polycarbosilane) into carbon fibres or silicon carbide fibres, including special equipment to strain the fibre during heating;
 2. Equipment for the chemical vapour deposition of elements or compounds, on heated filamentary substrates, to manufacture silicon carbide fibres;
 3. Equipment for the wet-spinning of refractory ceramics (such as aluminium oxide);
 4. Equipment for converting aluminium containing precursor fibres into alumina fibres by heat treatment;
- e. Equipment for producing prepregs specified in 1C010.e. by the hot melt method;
- f. Non-destructive inspection equipment specially designed for "composite" materials, as follows:
 1. X-ray tomography systems for three dimensional defect inspection;
 2. Numerically controlled ultrasonic testing machines of which the motions for positioning transmitters or receivers are simultaneously coordinated and programmed in four or more axes to follow the three dimensional contours of the component under inspection;

1B001 continued

- g. Tow-placement machines, of which the motions for positioning and laying tows or sheets are coordinated and programmed in two or more 'primary servo positioning' axes, specially designed for the manufacture of "composite" airframe or 'missile' structures.

Technical Note:

For the purpose of 1B001, 'primary servo positioning' axes control, under computer program direction, the position of the end effector (i.e., head) in space relative to the work piece at the correct orientation and direction to achieve the desired process.

- 1B002 Equipment for producing metal alloys, metal alloy powder or alloyed materials, specially designed to avoid contamination and specially designed for use in one of the processes specified in 1C002.c.2.
N.B.: SEE ALSO 1B102.
- 1B003 Tools, dies, moulds or fixtures, for "superplastic forming" or "diffusion bonding" titanium, aluminium or their alloys, specially designed for the manufacture of any of the following:
- a. Airframe or aerospace structures;
 - b. "Aircraft" or aerospace engines; or
 - c. Specially designed components for structures specified in 1B003.a. or for engines specified in 1B003.b.
- 1B101 Equipment, other than that specified in 1B001, for the "production" of structural composites as follows; and specially designed components and accessories therefor:
N.B.: SEE ALSO 1B201.
- Note: *Components and accessories specified in 1B101 include moulds, mandrels, dies, fixtures and tooling for the preform pressing, curing, casting, sintering or bonding of composite structures, laminates and manufactures thereof.*
- a. Filament winding machines or fibre placement machines, of which the motions for positioning, wrapping and winding fibres can be coordinated and programmed in three or more axes, designed to fabricate composite structures or laminates from fibrous or filamentary materials, and coordinating and programming controls;
 - b. Tape-laying machines of which the motions for positioning and laying tape and sheets can be coordinated and programmed in two or more axes, designed for the manufacture of composite airframe and "missile" structures;
 - c. Equipment designed or modified for the "production" of "fibrous or filamentary materials" as follows:
 1. Equipment for converting polymeric fibres (such as polyacrylonitrile, rayon or polycarbosilane) including special provision to strain the fibre during heating;
 2. Equipment for the vapour deposition of elements or compounds on heated filament substrates;
 3. Equipment for the wet-spinning of refractory ceramics (such as aluminium oxide);

- 1B101 continued
- d. Equipment designed or modified for special fibre surface treatment or for producing prepregs and preforms specified in entry 9C110.
Note: 1B101.d. includes rollers, tension stretchers, coating equipment, cutting equipment and clicker dies.
- 1B102 Metal powder "production equipment", other than that specified in 1B002, and components as follows:
N.B.: SEE ALSO 1B115.b.
- a. Metal powder "production equipment" usable for the "production", in a controlled environment, of spherical or atomised materials specified in 1C011.a., 1C011.b., 1C111.a.1., 1C111.a.2. or in the Military Goods Controls.
- b. Specially designed components for "production equipment" specified in 1B002 or 1B102.a.
Note: 1B102 includes:
- Plasma generators (high frequency arc-jet) usable for obtaining sputtered or spherical metallic powders with organization of the process in an argon-water environment;
 - Electroburst equipment usable for obtaining sputtered or spherical metallic powders with organization of the process in an argon-water environment;
 - Equipment usable for the "production" of spherical aluminium powders by powdering a melt in an inert medium (e.g. nitrogen).
- 1B115 Equipment, other than that specified in 1B002 or 1B102, for the production of propellant and propellant constituents, as follows, and specially designed components therefor:
- a. "Production equipment" for the "production", handling or acceptance testing of liquid propellants or propellant constituents specified in 1C011.a., 1C011.b., 1C111 or in the Military Goods Controls;
- b. "Production equipment" for the "production", handling, mixing, curing, casting, pressing, machining, extruding or acceptance testing of solid propellants or propellant constituents specified in 1C011.a., 1C011.b., 1C111 or in the Military Goods Controls.
Note: 1B115.b. does not control batch mixers, continuous mixers or fluid energy mills. For the control of batch mixers, continuous mixers and fluid energy mills see 1B117, 1B118 and 1B119.
- Note 1: For equipment specially designed for the production of military goods, see the Military Goods Controls.
Note 2: 1B115 does not control equipment for the "production", handling and acceptance testing of boron carbide.
- 1B116 Specially designed nozzles for producing pyrolytically derived materials formed on a mould, mandrel or other substrate from precursor gases which decompose in the 1,573 K (1,300°C) to 3,173 K (2,900°C) temperature range at pressures of 130 Pa to 20 kPa.

- 1B117 Batch mixers with provision for mixing under vacuum in the range of zero to 13.326 kPa and with temperature control capability of the mixing chamber and having all of the following, and specially designed components therefor:
- A total volumetric capacity of 110 litres or more; and
 - At least one mixing/kneading shaft mounted off centre.
- 1B118 Continuous mixers with provision for mixing under vacuum in the range of zero to 13.326 kPa and with a temperature control capability of the mixing chamber having any of the following, and specially designed components therefor:
- Two or more mixing/kneading shafts; or
 - A single rotating shaft which oscillates and having kneading teeth/pins on the shaft as well as inside the casing of the mixing chamber.
- 1B119 Fluid energy mills usable for grinding or milling substances specified in 1C011.a., 1C011.b., 1C111 or in the Military Goods Controls, and specially designed components therefor.
- 1B201 Filament winding machines, other than those specified in 1B001 or 1B101, and related equipment, as follows:
- Filament winding machines having all of the following characteristics:
 - Having motions for positioning, wrapping, and winding fibres coordinated and programmed in two or more axes;
 - Specially designed to fabricate composite structures or laminates from "fibrous or filamentary materials"; and
 - Capable of winding cylindrical rotors of diameter between 75 and 400 mm and lengths of 600 mm or greater;
 - Coordinating and programming controls for the filament winding machines specified in 1B201.a.;
 - Precision mandrels for the filament winding machines specified in 1B201.a.
- 1B225 Electrolytic cells for fluorine production with an output capacity greater than 250 g of fluorine per hour.
- 1B226 Electromagnetic isotope separators designed for, or equipped with, single or multiple ion sources capable of providing a total ion beam current of 50 mA or greater.
- Note: 1B226 includes separators:*
- Capable of enriching stable isotopes;
 - With the ion sources and collectors both in the magnetic field and those configurations in which they are external to the field.
- 1B227 Ammonia synthesis converters or ammonia synthesis units, in which the synthesis gas (nitrogen and hydrogen) is withdrawn from an ammonia/hydrogen high-pressure exchange column and the synthesized ammonia is returned to said column.

- 1B228 Hydrogen-cryogenic distillation columns having all of the following characteristics:
- Designed for operation with internal temperatures of 35 K (-238°C) or less;
 - Designed for operation at an internal pressure of 0.5 to 5 MPa;
 - Constructed of either:
 - Stainless steel of the 300 series with low sulphur content and with an austenitic ASTM (or equivalent standard) grain size number of 5 or greater; or
 - Equivalent materials which are both cryogenic and H₂-compatible; and
 - With internal diameters of 1 m or greater and effective lengths of 5 m or greater.
- 1B229 Water-hydrogen sulphide exchange tray columns and 'internal contactors', as follows:
- N.B.: For columns which are specially designed or prepared for the production of heavy water see 0B004.*
- Water-hydrogen sulphide exchange tray columns, having all of the following characteristics:
 - Can operate at pressures of 2 MPa or greater;
 - Constructed of carbon steel having an austenitic ASTM (or equivalent standard) grain size number of 5 or greater; and
 - With a diameter of 1.8 m or greater;
 - 'Internal contactors' for the water-hydrogen sulphide exchange tray columns specified in 1B229.a.
Technical Note: 'Internal contactors' of the columns are segmented trays which have an effective assembled diameter of 1.8 m or greater, are designed to facilitate countercurrent contacting and are constructed of stainless steels with a carbon content of 0.03% or less. These may be sieve trays, valve trays, bubble cap trays, or turbogrid trays.
- 1B230 Pumps capable of circulating solutions of concentrated or dilute potassium amide catalyst in liquid ammonia (KNH₂/NH₃), having all of the following characteristics:
- Airtight (i.e., hermetically sealed);
 - A capacity greater than 8.5 m³/h; and
 - Either of the following characteristics:
 - For concentrated potassium amide solutions (1% or greater), an operating pressure of 1.5 to 60 MPa; or
 - For dilute potassium amide solutions (less than 1%), an operating pressure of 20 to 60 MPa.
- 1B231 Tritium facilities or plants, and equipment therefor, as follows:
- Facilities or plants for the production, recovery, extraction, concentration, or handling of tritium;
 - Equipment for tritium facilities or plants, as follows:
 - Hydrogen or helium refrigeration units capable of cooling to 23 K (-250°C) or less, with heat removal capacity greater than 150 W;
 - Hydrogen isotope storage or purification systems using metal hydrides as the storage or purification medium.

- 1B232 Turboexpanders or turboexpander-compressor sets having both of the following characteristics:
- a. Designed for operation with an outlet temperature of 35 K (-238°C) or less; and
 - b. Designed for a throughput of hydrogen gas of 1000 kg/h or greater.

- 1B233 Lithium isotope separation facilities or plants, and equipment therefor, as follows:
- a. Facilities or plants for the separation of lithium isotopes;
 - b. Equipment for the separation of lithium isotopes, as follows:
 1. Packed liquid-liquid exchange columns specially designed for lithium amalgams;
 2. Mercury or lithium amalgam pumps;
 3. Lithium amalgam electrolysis cells;
 4. Evaporators for concentrated lithium hydroxide solution.

1C **Materials**

Technical Note:

Metals and alloys:

Unless provision to the contrary is made, the words 'metals' and 'alloys' in 1C001 to 1C012 cover crude and semi-fabricated forms, as follows:

Crude forms:

Anodes, balls, bars (including notched bars and wire bars), billets, blocks, blooms, bricks, cakes, cathodes, crystals, cubes, dice, grains, granules, ingots, lumps, pellets, pigs, powder, rondelles, shot, slabs, slugs, sponge, sticks;

Semi-fabricated forms (whether or not coated, plated, drilled or punched):

- a. *Wrought or worked materials fabricated by rolling, drawing, extruding, forging, impact extruding, pressing, graining, atomising, and grinding, i.e.: angles, channels, circles, discs, dust, flakes, foils and leaf, forging, plate, powder, pressings and stampings, ribbons, rings, rods (including bare welding rods, wire rods, and rolled wire), sections, shapes, sheets, strip, pipe and tubes (including tube rounds, squares, and hollows), drawn or extruded wire;*
- b. *Cast material produced by casting in sand, die, metal, plaster or other types of moulds, including high pressure castings, sintered forms, and forms made by powder metallurgy.*

The object of the control should not be defeated by the export of non-listed forms alleged to be finished products but representing in reality crude forms or semi-fabricated forms.

1C001 Materials specially designed for use as absorbers of electromagnetic waves, or intrinsically conductive polymers, as follows:

N.B.: SEE ALSO 1C101.

- a. Materials for absorbing frequencies exceeding 2×10^8 Hz but less than 3×10^{12} Hz;

Note 1: 1C001.a. does not control:

- a. Hair type absorbers, constructed of natural or synthetic fibres, with non-magnetic loading to provide absorption;
- b. Absorbers having no magnetic loss and whose incident surface is non-planar in shape, including pyramids, cones, wedges and convoluted surfaces;
- c. Planar absorbers, having all of the following:
 1. Made from any of the following:
 - a. Plastic foam materials (flexible or non-flexible) with carbon-loading, or organic materials, including binders, providing more than 5% echo compared with metal over a bandwidth exceeding $\pm 15\%$ of the centre frequency of the incident energy, and not capable of withstanding temperatures exceeding 450 K (177°C); or
 - b. Ceramic materials providing more than 20% echo compared with metal over a bandwidth exceeding $\pm 15\%$ of the centre frequency of the incident energy, and not capable of withstanding temperatures exceeding 800 K (527°C);

Technical Note:

Absorption test samples for 1C001.a. Note: 1.c.1. should be a square at least 5 wavelengths of the centre frequency on a side and positioned in the far field of the radiating element.

2. Tensile strength less than 7×10^6 N/m²; and
3. Compressive strength less than 14×10^6 N/m²;
- d. Planar absorbers made of sintered ferrite, having all of the following:
 1. A specific gravity exceeding 4.4; and
 2. A maximum operating temperature of 548 K (275°C).

Note 2: Nothing in Note 1 to 1C001.a. releases magnetic materials to provide absorption when contained in paint.

- b. Materials for absorbing frequencies exceeding 1.5×10^{14} Hz but less than 3.7×10^{14} Hz and not transparent to visible light;

- c. Intrinsically conductive polymeric materials with a 'bulk electrical conductivity' exceeding 10,000 S/m (Siemens per metre) or a 'sheet (surface) resistivity' of less than 100 ohms/square, based on any of the following polymers:

1. Polyaniline;
2. Polypyrrole;
3. Polythiophene;
4. Poly phenylene-vinylene; or
5. Poly thienylene-vinylene.

Technical Note:

'Bulk electrical conductivity' and 'sheet (surface) resistivity' should be determined using ASTM D-257 or national equivalents.

1C002 Metal alloys, metal alloy powder and alloyed materials, as follows:

N.B.: SEE ALSO 1C202.

Note: 1C002 does not control metal alloys, metal alloy powder and alloyed materials for coating substrates.

Technical Notes:

1. The metal alloys in 1C002 are those containing a higher percentage by weight of the stated metal than of any other element.
 2. 'Stress-rupture life' should be measured in accordance with ASTM standard E-139 or national equivalents.
 3. 'Low cycle fatigue life' should be measured in accordance with ASTM Standard E-606 'Recommended Practice for Constant-Amplitude Low-Cycle Fatigue Testing' or national equivalents. Testing should be axial with an average stress ratio equal to 1 and a stress-concentration factor (K_t) equal to 1. The average stress is defined as maximum stress minus minimum stress divided by maximum stress.
- a. Aluminides, as follows:
 1. Nickel aluminides containing a minimum of 15 % by weight aluminium, a maximum of 38 % by weight aluminium and at least one additional alloying element;
 2. Titanium aluminides containing 10 % by weight or more aluminium and at least one additional alloying element;
 - b. Metal alloys, as follows, made from the powder or particulate material specified in 1C002.c.:
 1. Nickel alloys having any of the following:
 - a. A 'stress-rupture life' of 10,000 hours or longer at 923 K (650°C) at a stress of 676 MPa; or
 - b. A 'low cycle fatigue life' of 10,000 cycles or more at 823 K (550° C) at a maximum stress of 1,095 MPa;
 2. Niobium alloys having any of the following:
 - a. A 'stress-rupture life' of 10,000 hours or longer at 1,073 K (800°C) at a stress of 400 MPa; or
 - b. A 'low cycle fatigue life' of 10,000 cycles or more at 973 K (700°C) at a maximum stress of 700 MPa;
 3. Titanium alloys having any of the following:
 - a. A 'stress-rupture life' of 10,000 hours or longer at 723 K (450°C) at a stress of 200 MPa; or
 - b. A 'low cycle fatigue life' of 10,000 cycles or more at 723 K (450°C) at a maximum stress of 400 MPa;
 4. Aluminium alloys having any of the following:
 - a. A tensile strength of 240 MPa or more at 473 K (200°C); or
 - b. A tensile strength of 415 MPa or more at 298 K (25°C);
 5. Magnesium alloys having all of the following:
 - a. A tensile strength of 345 MPa or more; and
 - b. A corrosion rate of less than 1 mm/year in 3% sodium chloride aqueous solution measured in accordance with ASTM standard G-31 or national equivalents;

1C002 continued

c. Metal alloy powder or particulate material, having all of the following:

1. Made from any of the following composition systems:

*Technical Note:**X in the following equals one or more alloying elements.*

- a. Nickel alloys (Ni-Al-X, Ni-X-Al) qualified for turbine engine parts or components, i.e. with less than 3 non-metallic particles (introduced during the manufacturing process) larger than 100 µm in 10⁹ alloy particles;
- b. Niobium alloys (Nb-Al-X or Nb-X-Al, Nb-Si-X or Nb-X-Si, Nb-Ti-X or Nb-X-Ti);
- c. Titanium alloys (Ti-Al-X or Ti-X-Al);
- d. Aluminium alloys (Al-Mg-X or Al-X-Mg, Al-Zn-X or Al-X-Zn, Al-Fe-X or Al-X-Fe); or
- e. Magnesium alloys (Mg-Al-X or Mg-X-Al);

2. Made in a controlled environment by any of the following processes:

- a. "Vacuum atomisation";
- b. "Gas atomisation";
- c. "Rotary atomisation";
- d. "Splat quenching";
- e. "Melt spinning" and "comminution";
- f. "Melt extraction" and "comminution"; or
- g. "Mechanical alloying"; and

3. Capable of forming materials specified in 1C002.a. or 1C002.b.

d. Alloyed materials having all of the following:

- 1. Made from any of the composition systems specified in 1C002.c.1.;
- 2. In the form of uncomminuted flakes, ribbons or thin rods; and
- 3. Produced in a controlled environment by any of the following:
 - a. "Splat quenching";
 - b. "Melt spinning"; or
 - c. "Melt extraction".

1C003

Magnetic metals, of all types and of whatever form, having any of the following:

- a. Initial relative permeability of 120,000 or more and a thickness of 0.05 mm or less; *Technical Note:*
Measurement of initial permeability must be performed on fully annealed materials.
- b. Magnetostrictive alloys having any of the following:
 - 1. A saturation magnetostriction of more than 5×10^{-4} ; or
 - 2. A magnetomechanical coupling factor (k) of more than 0.8; or

1C003 continued

- c. Amorphous or 'nanocrystalline' alloy strips, having all of the following:
1. A composition having a minimum of 75 % by weight of iron, cobalt or nickel;
 2. A saturation magnetic induction (B_s) of 1.6 T or more; and
 3. Any of the following:
 - a. A strip thickness of 0.02 mm or less; or
 - b. An electrical resistivity of 2×10^{-4} ohm cm or more.

Technical Note:

'Nanocrystalline' materials in 1C003.c. are those materials having a crystal grain size of 50 nm or less, as determined by X-ray diffraction.

1C004 Uranium titanium alloys or tungsten alloys with a "matrix" based on iron, nickel or copper, having all of the following:

- a. A density exceeding 17.5 g/cm^3 ;
- b. An elastic limit exceeding 880 MPa;
- c. An ultimate tensile strength exceeding 1,270 MPa; and
- d. An elongation exceeding 8%.

1C005 "Superconductive" "composite" conductors in lengths exceeding 100 m or with a mass exceeding 100 g, as follows:

- a. "Superconductive" "composite" conductors containing one or more niobium-titanium 'filaments', having all of the following:
 1. Embedded in a "matrix" other than a copper or copper-based mixed "matrix"; and
 2. Having a cross-section area less than $0.28 \times 10^{-4} \text{ mm}^2$ (6 μm in diameter for circular 'filaments');
- b. "Superconductive" "composite" conductors consisting of one or more "superconductive" 'filaments' other than niobium-titanium, having all of the following:
 1. A "critical temperature" at zero magnetic induction exceeding 9.85 K (-263.31°C); and
 2. Remaining in the "superconductive" state at a temperature of 4.2 K (-268.96°C) when exposed to a magnetic field oriented in any direction perpendicular to the longitudinal axis of conductor and corresponding to a magnetic induction of 12 T with critical current density exceeding $1,750 \text{ A/mm}^2$ on overall cross-section of the conductor;
- c. "Superconductive" "composite" conductors consisting of one or more "superconductive" 'filaments' which remain "superconductive" above 115 K (-158.16°C).

Technical Note:

For the purpose of 1C005 'filaments' may be in wire, cylinder, film, tape or ribbon form.

1C006 Fluids and lubricating materials, as follows:

- a. Hydraulic fluids containing, as their principal ingredients, any of the following:
 1. Synthetic 'silahydrocarbon oils' having all of the following:

Technical Note:
For the purpose of 1C006.a.1., 'silahydrocarbon oils' contain exclusively silicon, hydrogen and carbon.

 - a. A 'flash point' exceeding 477 K (204°C);
 - b. A 'pour point' at 239 K (-34°C) or less;
 - c. A 'viscosity index' of 75 or more; and
 - d. A 'thermal stability' at 616 K (343°C); or
 2. 'Chlorofluorocarbons' having all of the following:

Technical Note:
For the purpose of 1C006.a.2., 'chlorofluorocarbons' contain exclusively carbon, fluorine and chlorine.

 - a. No 'flash point';
 - b. An 'autogenous ignition temperature' exceeding 977 K (704°C);
 - c. A 'pour point' at 219 K (-54°C) or less;
 - d. A 'viscosity index' of 80 or more; and
 - e. A boiling point at 473 K (200°C) or higher;
- b. Lubricating materials containing, as their principal ingredients, any of the following:
 1. Phenylene or alkylphenylene ethers or thio-ethers, or their mixtures, containing more than two ether or thio-ether functions or mixtures thereof; or
 2. Fluorinated silicone fluids with a kinematic viscosity of less than 5,000 mm²/s (5,000 centistokes) measured at 298 K (25°C);
- c. Damping or flotation fluids, with a purity exceeding 99.8%, containing less than 25 particles of 200 µm or larger in size per 100 ml and made from at least 85% of any of the following:
 1. Dibromotetrafluoroethane (CAS 25497-30-7, 124-73-2, 27336-23-8);
 2. Polychlorotrifluoroethylene (oily and waxy modifications only); or
 3. Polybromotrifluoroethylene;
- d. Fluorocarbon electronic cooling fluids having all of the following:
 1. Containing 85% by weight or more of any of the following, or mixtures thereof:
 - a. Monomeric forms of perfluoropolyalkylether-triazines or perfluoroaliphatic-ethers;
 - b. Perfluoroalkylamines;
 - c. Perfluorocycloalkanes; or
 - d. Perfluoroalkanes;
 2. Density at 298 K (25°C) of 1.5 g/ml or more;
 3. In a liquid state at 273 K (0°C); and
 4. Containing 60% or more by weight of fluorine.

1C006 continued

Technical Note:*For the purpose of 1C006:*

1. 'Flash point' is determined using the Cleveland Open Cup Method described in ASTM D-92 or national equivalents;
2. 'Pour point' is determined using the method described in ASTM D-97 or national equivalents;
3. 'Viscosity index' is determined using the method described in ASTM D-2270 or national equivalents;
4. 'Thermal stability' is determined by the following test procedure or national equivalents:
Twenty ml of the fluid under test is placed in a 46 ml type 317 stainless steel chamber containing one each of 12.5 mm (nominal) diameter balls of M-10 tool steel, 52100 steel and naval bronze (60% Cu, 39% Zn, 0.75% Sn);
The chamber is purged with nitrogen, sealed at atmospheric pressure and the temperature raised to and maintained at 644 ± 6 K ($371 \pm 6^\circ\text{C}$) for six hours;
The specimen will be considered thermally stable if, on completion of the above procedure, all of the following conditions are met:
 - a. The loss in weight of each ball is less than 10 mg/mm^2 of ball surface;
 - b. The change in original viscosity as determined at 311 K (38°C) is less than 25%; and
 - c. The total acid or base number is less than 0.40;
5. 'Autogenous ignition' temperature is determined using the method described in ASTM E-659 or national equivalents.

1C007

Ceramic base materials, non-"composite" ceramic materials, ceramic-"matrix"
"composite" materials and precursor materials, as follows:**N.B.: SEE ALSO 1C107.**

- a. Base materials of single or complex borides of titanium, having total metallic impurities, excluding intentional additions, of less than 5,000 ppm, an average particle size equal to or less than $5 \mu\text{m}$ and no more than 10% of the particles larger than $10 \mu\text{m}$;
- b. Non-"composite" ceramic materials in crude or semi-fabricated form, composed of borides of titanium with a density of 98% or more of the theoretical density;
Note: 1C007.b. does not control abrasives.
- c. Ceramic-ceramic "composite" materials with a glass or oxide-"matrix" and reinforced with fibres having all of the following:
 1. Made from any of the following materials:
 - a. Si-N;
 - b. Si-C;
 - c. Si-Al-O-N; or
 - d. Si-O-N; and
 2. Having a "specific tensile strength" exceeding $12.7 \times 10^3 \text{ m}$;
- d. Ceramic-ceramic "composite" materials, with or without a continuous metallic phase, incorporating particles, whiskers or fibres, where carbides or nitrides of silicon, zirconium or boron form the "matrix";

1C007 continued

- e. Precursor materials (i.e., special purpose polymeric or metallo-organic materials) for producing any phase or phases of the materials specified in 1C007.c., as follows:
1. Polydiorganosilanes (for producing silicon carbide);
 2. Polysilazanes (for producing silicon nitride);
 3. Polycarbosilazanes (for producing ceramics with silicon, carbon and nitrogen components);
- f. Ceramic-ceramic "composite" materials with an oxide or glass "matrix" reinforced with continuous fibres from any of the following systems:
1. Al₂O₃ (CAS 1344-28-1); or
 2. Si-C-N.

Note: 1C007.f. does not control "composites" containing fibres from these systems with a fibre tensile strength of less than 700 MPa at 1,273 K (1,000°C) or fibre tensile creep resistance of more than 1% creep strain at 100 MPa load and 1,273 K (1,000°C) for 100 hours.

1C008 Non-fluorinated polymeric substances as follows:

- a.
 1. Bismaleimides;
 2. Aromatic polyamide-imides;
 3. Aromatic polyimides;
 4. Aromatic polyetherimides having a glass transition temperature (T_g) exceeding 513 K (240°C);

Note: 1C008.a. controls substances in liquid or solid "fusible" form, including resin, powder, pellet, film, sheet, tape or ribbon.

N.B. For non-"fusible" aromatic polyimides in film, sheet, tape or ribbon form, see 1A003.

- b. Thermoplastic liquid crystal copolymers having a heat distortion temperature exceeding 523 K (250°C) measured according to ISO 75-2 (2004), method A or national equivalents, with a load of 1.80 N/mm² and composed of:
1. Any of the following:
 - a. Phenylene (CAS 83-12-5), biphenylene (CAS 259-79-0) or naphthalene (CAS 91-20-3);
or
 - b. Methyl, tertiary-butyl or phenyl substituted phenylene, biphenylene or naphthalene; and
 2. Any of the following:
 - a. Terephthalic acid (CAS 100-21-0);
 - b. 6-hydroxy-2 naphthoic acid (CAS 16712-64-4); or
 - c. 4-hydroxybenzoic acid (CAS 99-96-7);
- c. Not used;
- d. Polyarylene ketones;
- e. Polyarylene sulphides, where the arylene group is biphenylene, triphenylene or combinations thereof;

1C008 continued

- f. Polybiphenylenethersulphone having a 'glass transition temperature (T_g)' exceeding 513 K (240°C).

Technical Note:

The 'glass transition temperature (T_g)' for 1C008 materials is determined using the method described in ISO 11357-2 (1999) or national equivalents.

1C009 Unprocessed fluorinated compounds as follows:

- a. Copolymers of vinylidene fluoride having 75% or more beta crystalline structure without stretching;
- b. Fluorinated polyimides containing 10% by weight or more of combined fluorine;
- c. Fluorinated phosphazene elastomers containing 30% by weight or more of combined fluorine.

1C010 "Fibrous or filamentary materials", as follows:

N.B.: SEE ALSO 1C210 AND 9C110.

- a. Organic "fibrous or filamentary materials", having all of the following:

1. "Specific modulus" exceeding 12.7×10^6 m; and
2. "Specific tensile strength" exceeding 23.5×10^4 m;

Note: 1C010.a. does not control polyethylene.

- b. Carbon "fibrous or filamentary materials", having all of the following:

1. "Specific modulus" exceeding 14.65×10^6 m; and
2. "Specific tensile strength" exceeding 26.82×10^4 m;

Note: 1C010.b. does not control:

- a. "Fibrous or filamentary materials", for the repair of "civil aircraft" structures or laminates, having all of the following:

1. An area not exceeding 1 m^2 ;
2. A length not exceeding 2.5 m; and
3. A width exceeding 15 mm.

- b. Mechanically chopped, milled or cut carbon "fibrous or filamentary materials" 25.0 mm or less in length.

Technical Note:

Properties for materials described in 1C010.b. should be determined using SACMA recommended methods SRM 12 to 17, ISO 10618 (2004) 10.2.1 Method A or national equivalent tow tests and based on lot average.

1C010 continued

- c. Inorganic "fibrous or filamentary materials", having all of the following:
1. "Specific modulus" exceeding 2.54×10^6 m; and
 2. Melting, softening, decomposition or sublimation point exceeding 1,922 K (1,649°C) in an inert environment;

Note: 1C010.c. does not control:

- a. Discontinuous, multiphase, polycrystalline alumina fibres in chopped fibre or random mat form, containing 3 % by weight or more silica, with a "specific modulus" of less than 10×10^6 m;
- b. Molybdenum and molybdenum alloy fibres;
- c. Boron fibres;
- d. Discontinuous ceramic fibres with a melting, softening, decomposition or sublimation point lower than 2,043 K (1,770°C) in an inert environment.

- d. "Fibrous or filamentary materials", having any of the following:
1. Composed of any of the following:
 - a. Polyetherimides specified in 1C008.a.; or
 - b. Materials specified in 1C008.b. to 1C008.f.; or
 2. Composed of materials specified in 1C010.d.1.a. or 1C010.d.1.b. and "commingled" with other fibres specified in 1C010.a., 1C010.b. or 1C010.c.;
- e. Fully or partially resin-impregnated or pitch-impregnated "fibrous or filamentary materials" (prepregs), metal or carbon-coated "fibrous or filamentary materials" (preforms) or "carbon fibre preforms", having all of the following:

1. Having any of the following:
 - a. Inorganic "fibrous or filamentary materials" specified in 1C010.c.; or
 - b. Organic or carbon "fibrous or filamentary materials", having all of the following:
 1. "Specific modulus" exceeding 10.15×10^6 m; and
 2. "Specific tensile strength" exceeding 17.7×10^4 m; and
2. Having any of the following:
 - a. Resin or pitch specified in 1C008 or 1C009.b.;
 - b. 'Dynamic Mechanical Analysis glass transition temperature (DMA T_g)' equal to or exceeding 453 K (180°C) and having a phenolic resin; or
 - c. 'Dynamic Mechanical Analysis glass transition temperature (DMA T_g)' equal to or exceeding 505 K (232°C) and having a resin or pitch, not specified in 1C008 or 1C009.b., and not being a phenolic resin;

Note 1: Metal or carbon-coated "fibrous or filamentary materials" (preforms) or "carbon fibre preforms, not impregnated with resin or pitch, are specified by "fibrous or filamentary materials" in 1C010.a., 1C010.b. or 1C010.c.

Note 2: 1C010.e. does not control epoxy resin "matrix" impregnated carbon "fibrous or filamentary materials" (prepregs) for the repair of "civil aircraft" structures or laminates, having all the following;

1. An area not exceeding 1 m²;
2. A length not exceeding 2.5 m; and
3. A width exceeding 15 mm.

Technical Note:

The 'Dynamic Mechanical Analysis glass transition temperature (DMA T_g)' for materials specified in 1C010.e. is determined using the method described in ASTM D 7028-07, or equivalent national standard, on a dry test specimen with a minimum 90% degree of cure as defined by ASTM E 2160-04 or equivalent national standard.

- 1C011 Metals and compounds, as follows:
N.B.: SEE ALSO MILITARY GOODS CONTROLS and 1C111.
- a. Metals in particle sizes of less than 60 µm whether spherical, atomised, spheroidal, flaked or ground, manufactured from material consisting of 99% or more of zirconium, magnesium and alloys thereof;
Technical Note:
The natural content of hafnium in the zirconium (typically 2% to 7%) is counted with the zirconium.
Note: *The metals or alloys specified in 1C011.a. are controlled whether or not the metals or alloys are encapsulated in aluminium, magnesium, zirconium or beryllium.*
 - b. Boron or boron carbide of 85% purity or higher, and a particle size of 60 µm or less;
Note: *The metals or alloys specified in 1C011.b. are controlled whether or not the metals or alloys are encapsulated in aluminium, magnesium, zirconium or beryllium.*
 - c. Guanidine nitrate (CAS 506-93-4);
 - d. Nitroguanidine (NQ) (CAS 556-88-7).
- 1C012 Materials as follows:
Technical Note:
These materials are typically used for nuclear heat sources.
- a. Plutonium in any form with a plutonium isotopic assay of plutonium-238 of more than 50% by weight;
Note: *1C012.a. does not control:*
 - a. *Shipments with a plutonium content of 1 g or less;*
 - b. *Shipments of 3 "effective grammes" or less when contained in a sensing component in instruments.*
 - b. "Previously separated" neptunium-237 in any form.
Note: *1C012.b. does not control shipments with a neptunium-237 content of 1 g or less.*
- 1C101 Materials and devices for reduced observables such as radar reflectivity, ultraviolet/infrared signatures and acoustic signatures, other than those specified in 1C001, usable in 'missiles', "missile" subsystems or unmanned aerial vehicles specified in 9A012.
- Note 1: *1C101 includes:*
- a. *Structural materials and coatings specially designed for reduced radar reflectivity;*
 - b. *Coatings, including paints, specially designed for reduced or tailored reflectivity or emissivity in the microwave, infrared or ultraviolet regions of the electromagnetic spectrum.*
- Note 2: *1C101 does not include coatings when specially used for the thermal control of satellites.*
- Technical Note:
In 1C101 'missile' means complete rocket systems and unmanned aerial vehicle systems capable of a range exceeding 300 km.
- 1C102 Resaturated pyrolyzed carbon-carbon materials designed for space launch vehicles specified in 9A004 or sounding rockets specified in 9A104.
- 1C107 Graphite and ceramic materials, other than those specified in 1C007, as follows:
- a. Fine grain graphites with a bulk density of 1.72 g/cm³ or greater, measured at 288 K (15 °C), and having a grain size of 100 µm or less, usable for rocket nozzles and re-entry vehicle nose tips, which can be machined to any of the following products:
 1. Cylinders having a diameter of 120 mm or greater and a length of 50 mm or greater;

2. Tubes having an inner diameter of 65 mm or greater and a wall thickness of 25 mm or greater and a length of 50 mm or greater; or
3. Blocks having a size of 120 mm x 120 mm x 50 mm or greater;
N.B.: See also 0C004
- b. Pyrolytic or fibrous reinforced graphites, usable for rocket nozzles and reentry vehicle nose tips usable in "missiles", space launch vehicles specified in 9A004 or sounding rockets specified in 9A104;
N.B.: See also 0C004
- c. Ceramic composite materials (dielectric constant less than 6 at any frequency from 100 MHz to 100 GHz) for use in radomes usable in "missiles", space launch vehicles specified in 9A004 or sounding rockets specified in 9A104;
- d. Bulk machinable silicon-carbide reinforced unfired ceramic, usable for nose tips usable in "missiles", space launch vehicles specified in 9A004 or sounding rockets specified in 9A104;
- e. Reinforced silicon-carbide ceramic composites, usable for nose tips, reentry vehicles and nozzle flaps usable in "missiles", space launch vehicles specified in 9A004 or sounding rockets specified in 9A104.

1C111

Propellants and constituent chemicals for propellants, other than those specified in 1C011, as follows:

- a. Propulsive substances:
 1. Spherical aluminium powder, other than that specified in the Military Goods Controls, with particles of uniform diameter of less than 200 µm and an aluminium content of 97% by weight or more, if at least 10% of the total weight is made up of particles of less than 63 µm, according to ISO 2591:1988 or national equivalents;
Technical Note:
A particle size of 63 µm (ISO R-565) corresponds to 250 mesh (Tyler) or 230 mesh (ASTM standard E-11).
 2. Metal fuels, other than that specified in the Military Goods Controls, in particle sizes of less than 60 µm, whether spherical, atomized, spheroidal, flaked or ground, consisting 97% by weight or more of any of the following:
 - a. Zirconium;
 - b. Beryllium;
 - c. Magnesium; or
 - d. Alloys of the metals specified in a. to c. above;
Technical Note:
The natural content of hafnium in the zirconium (typically 2% to 7%) is counted with the zirconium.

1C111 a. continued

3. Oxidiser substances usable in liquid propellant rocket engines as follows:
- Dinitrogen trioxide (CAS 10544-73-7);
 - Nitrogen dioxide (CAS 10102-44-0)/dinitrogen tetroxide (CAS 10544-72-6);
 - Dinitrogen pentoxide (CAS 10102-03-1);
 - Mixed Oxides of Nitrogen (MON);
- Technical Note:*
Mixed Oxides of Nitrogen (MON) are solutions of Nitric Oxide (NO) in Dinitrogen Tetroxide/Nitrogen Dioxide (N₂O₄/NO₂) that can be used in missile systems. There are a range of compositions that can be denoted as MON_i or MON_{ij}, where i and j are integers representing the percentage of Nitric Oxide in the mixture (e.g., MON₃ contains 3% Nitric Oxide, MON₂₅ 25% Nitric Oxide. An upper limit is MON₄₀, 40% by weight).
- SEE MILITARY GOODS CONTROLS FOR Inhibited Red Fuming Nitric Acid (IRFNA);**
 - SEE MILITARY GOODS CONTROLS AND 1C238 FOR Compounds composed of fluorine and one or more of other halogens, oxygen or nitrogen;**
4. Hydrazine derivatives as follows:
- N.B.: SEE ALSO MILITARY GOODS CONTROLS.**
- Trimethylhydrazine (CAS 1741-01-1);
 - Tetramethylhydrazine (CAS 6415-12-9);
 - N,N diallylhydrazine;
 - Allylhydrazine (CAS 7422-78-8);
 - Ethylene dihydrazine;
 - Monomethylhydrazine dinitrate;
 - Unsymmetrical dimethylhydrazine nitrate;
 - Hydrazinium azide (CAS 14546-44-2);
 - Dimethylhydrazinium azide;
 - Hydrazinium dinitrate;
 - Diimido oxalic acid dihydrazine (CAS 3457-37-2);
 - 2-hydroxyethylhydrazine nitrate (HEHN);
 - See Military Goods Controls for Hydrazinium perchlorate;**
 - Hydrazinium diperchlorate (CAS 13812-39-0);
 - Methylhydrazine nitrate (MHN);
 - Diethylhydrazine nitrate (DEHN);
 - 3,6-dihydrazino tetrazine nitrate (1,4-dihydrazine nitrate) (DHTN);
5. High energy density materials, other than that specified in the Military Goods Controls, usable in 'missiles' or unmanned aerial vehicles specified in 9A012;
- Mixed fuel that incorporate both solid and liquid fuels, such as boron slurry, having a mass-based energy density of 40×10^6 J/kg or greater;
 - Other high energy density fuels and fuel additives (e.g., cubane, ionic solutions, JP-10) having a volume-based energy density of 37.5×10^9 J/m³ or greater, measured at 20 °C and one atmosphere (101.325 kPa) pressure;
- Note:* 1C111.a.5.b. does not control fossil refined fuels and biofuels produced from vegetables, including fuels for engines certified for use in civil aviation, unless specially formulated for 'missiles' or unmanned aerial vehicles specified in 9A012.

Technical Note:

In 1C111.a.5. 'missile' means complete rocket systems and unmanned aerial vehicle systems capable of a range exceeding 300 km.

1C111 continued

- b. Polymeric substances:
1. Carboxy-terminated polybutadiene (including carboxyl-terminated polybutadiene) (CTPB);
 2. Hydroxy-terminated polybutadiene (included hydroxyl-terminated polybutadiene) (HTPB), other than that specified in the Military Goods Controls;
 3. Polybutadiene-acrylic acid (PBAA);
 4. Polybutadiene-acrylic acid-acrylonitrile (PBAN);
 5. Polytetrahydrofuran polyethylene glycol (TPEG);
Technical Note:
Polytetrahydrofuran polyethylene glycol (TPEG) is a block co-polymer of poly 1,4-Butanediol and polyethylene glycol (PEG).
- c. Other propellant additives and agents:
1. **SEE MILITARY GOODS CONTROLS FOR Carboranes, decaboranes, pentaboranes and derivatives thereof;**
 2. Triethylene glycol dinitrate (TEGDN) (CAS 111-22-8);
 3. 2-Nitrodiphenylamine (CAS 119-75-5);
 4. Trimethylolethane trinitrate (TMETN) (CAS 3032-55-1);
 5. Diethylene glycol dinitrate (DEGDN) (CAS 693-21-0);
 6. Ferrocene derivatives as follows:
 - a. **See Military Goods Controls for catocene;**
 - b. Ethyl ferrocene (CAS 1273-89-8);
 - c. Propyl ferrocene;
 - d. **See Military Goods Controls for n-butyl ferrocene;**
 - e. Pentyl ferrocene (CAS 1274-00-6);
 - f. Dicyclopentyl ferrocene;
 - g. Dicyclohexyl ferrocene;
 - h. Diethyl ferrocene (CAS 1273-97-8);
 - i. Dipropyl ferrocene;
 - j. Dibutyl ferrocene (CAS 1274-08-4);
 - k. Dihexyl ferrocene (CAS 93894-59-8);
 - l. Acetyl ferrocenes;
 - m. **See Military Goods Controls for ferrocene Carboxylic acids;**
 - n. **See Military Goods Controls for butacene;**
 - o. Other ferrocene derivatives usable as rocket propellant burning rate modifiers, other than those specified in the Military Goods Controls.
Note: 1C111.c.6.o. does not control ferrocene derivatives that contain a six carbon aromatic functional group attached to the ferrocene molecule.
 7. 4,5 diazidomethyl-2-methyl-1,2,3-triazole (iso- DAMTR) , other than that specified in the Military Goods Controls.

Note: For propellants and constituent chemicals for propellants not specified in 1C111, see the Military Goods Controls.

- 1C116 Maraging steels having an ultimate tensile strength of 1,500 MPa or greater, measured at 293 K (20°C), in the form of sheet, plate or tubing with a wall or plate thickness equal to or less than 5 mm.
N.B.: SEE ALSO 1C216.
Technical Note:
Maraging steels are iron alloys generally characterised by high nickel, very low carbon content and the use of substitutional elements or precipitates to produce strengthening and age-hardening of the alloy.

- 1C117 Materials for the fabrication of 'missiles' components as follows
- a. Tungsten and alloys in particulate form with a tungsten content of 97% by weight or more and a particle size of 50×10^{-6} m (50 μ m) or less;
 - b. Molybdenum and alloys in particulate form with a molybdenum content of 97% by weight or more and a particle size of 50×10^{-6} m (50 μ m) or less;
 - c. Tungsten materials in solid form having all of the following:
 1. Any of the following material compositions:
 - a. Tungsten and alloys containing 97% by weight or more of tungsten;
 - b. Copper infiltrated tungsten containing 80% by weight or more of tungsten; or
 - c. Silver infiltrated tungsten containing 80% by weight or more of tungsten; and
 2. Able to be machined to any of the following products:
 - a. Cylinders having a diameter of 120 mm or greater and a length of 50 mm or greater;
 - b. Tubes having an inner diameter of 65 mm or greater and a wall thickness of 25 mm or greater and a length of 50 mm or greater; or
 - c. Blocks having a size of 120 mm by 120 mm by 50 mm or greater.

Technical Note:
In 1C117 'missile' means complete rocket systems and unmanned aerial vehicle systems capable of a range exceeding 300 km.

- 1C118 Titanium-stabilised duplex stainless steel (Ti-DSS) having all of the following:
- a. Having all of the following characteristics:
 1. Containing 17.0 - 23.0 weight percent chromium and 4.5 - 7.0 weight percent nickel;
 2. Having a titanium content of greater than 0.10 weight percent; and
 3. A ferritic-austenitic microstructure (also referred to as a two-phase microstructure) of which at least 10 percent is austenite by volume (according to ASTM E-1181-87 or national equivalents); and
 - b. Having any of the following forms:
 1. Ingots or bars having a size of 100 mm or more in each dimension;
 2. Sheets having a width of 600 mm or more and a thickness of 3 mm or less; or
 3. Tubes having an outer diameter of 600 mm or more and a wall thickness of 3 mm or less.

- 1C202 Alloys, other than those specified in 1C002.b.3. or .b.4., as follows:
- a. Aluminium alloys having both of the following characteristics:
 1. 'Capable of' an ultimate tensile strength of 460 MPa or more at 293 K (20°C); and
 2. In the form of tubes or cylindrical solid forms (including forgings) with an outside diameter of more than 75 mm;
 - b. Titanium alloys having both of the following characteristics:
 1. 'Capable of' an ultimate tensile strength of 900 MPa or more at 293 K (20°C); and
 2. In the form of tubes or cylindrical solid forms (including forgings) with an outside diameter of more than 75 mm.

Technical Note:

The phrase alloys 'capable of' encompasses alloys before or after heat treatment.

- 1C210 'Fibrous or filamentary materials' or prepregs, other than those specified in 1C010.a., b. or e., as follows:
- a. Carbon or aramid 'fibrous or filamentary materials' having either of the following characteristics:
 1. A "specific modulus" of 12.7×10^6 m or greater; or
 2. A "specific tensile strength" of 235×10^3 m or greater;

Note: 1C210.a. does not control aramid 'fibrous or filamentary materials' having 0.25 percent or more by weight of an ester based fibre surface modifier;
 - b. Glass 'fibrous or filamentary materials' having both of the following characteristics:
 1. A "specific modulus" of 3.18×10^6 m or greater; and
 2. A "specific tensile strength" of 76.2×10^3 m or greater;
 - c. Thermoset resin impregnated continuous "yarns", "rovings", "tows" or "tapes" with a width of 15 mm or less (prepregs), made from carbon or glass 'fibrous or filamentary materials' specified in 1C210.a. or b.

Technical Note:

The resin forms the matrix of the composite.

Note: In 1C210, 'fibrous or filamentary materials' is restricted to continuous "monofilaments", "yarns", "rovings", "tows" or "tapes".

- 1C216 Maraging steel, other than that specified in 1C116, 'capable of' an ultimate tensile strength of 2,050 MPa or more, at 293 K (20°C).

Note: 1C216 does not control forms in which all linear dimensions are 75 mm or less.

Technical Note:

The phrase maraging steel 'capable of' encompasses maraging steel before or after heat treatment.

- 1C225 Boron enriched in the boron-10 (^{10}B) isotope to greater than its natural isotopic abundance, as follows: elemental boron, compounds, mixtures containing boron, manufactures thereof, waste or scrap of any of the foregoing.
- Note:* In 1C225 mixtures containing boron include boron loaded materials.
- Technical Note:*
The natural isotopic abundance of boron-10 is approximately 18.5 weight per cent (20 atom per cent).
- 1C226 Tungsten, tungsten carbide, and alloys containing more than 90% tungsten by weight, other than that specified by 1C117, having both of the following characteristics:
- In forms with a hollow cylindrical symmetry (including cylinder segments) with an inside diameter between 100 mm and 300 mm; and
 - A mass greater than 20 kg.
- Note:* 1C226 does not control manufactures specially designed as weights or gamma-ray collimators.
- 1C227 Calcium having both of the following characteristics:
- Containing less than 1,000 parts per million by weight of metallic impurities other than magnesium; and
 - Containing less than 10 parts per million by weight of boron.
- 1C228 Magnesium having both of the following characteristics:
- Containing less than 200 parts per million by weight of metallic impurities other than calcium; and
 - Containing less than 10 parts per million by weight of boron.
- 1C229 Bismuth having both of the following characteristics:
- A purity of 99.99% or greater by weight; and
 - Containing less than 10 parts per million by weight of silver.
- 1C230 Beryllium metal, alloys containing more than 50% beryllium by weight, beryllium compounds, manufactures thereof, and waste or scrap of any of the foregoing.
- Note:* 1C230 does not control the following:
- Metal windows for X-ray machines, or for bore-hole logging devices;
 - Oxide shapes in fabricated or semi-fabricated forms specially designed for electronic component parts or as substrates for electronic circuits;
 - Beryl (silicate of beryllium and aluminium) in the form of emeralds or aquamarines.
- 1C231 Hafnium metal, alloys containing more than 60% hafnium by weight, hafnium compounds containing more than 60% hafnium by weight, manufactures thereof, and waste or scrap of any of the foregoing.

- 1C232 Helium-3 (^3He), mixtures containing helium-3, and products or devices containing any of the foregoing.
- Note: 1C232 does not control a product or device containing less than 1 g of helium-3.
- 1C233 Lithium enriched in the lithium-6 (^6Li) isotope to greater than its natural isotopic abundance, and products or devices containing enriched lithium, as follows: elemental lithium, alloys, compounds, mixtures containing lithium, manufactures thereof, waste or scrap of any of the foregoing.
- Note: 1C233 does not control thermoluminescent dosimeters.
Technical Note:
The natural isotopic abundance of lithium-6 is approximately 6.5 weight per cent (7.5 atom per cent).
- 1C234 Zirconium with a hafnium content of less than 1 part hafnium to 500 parts zirconium by weight, as follows: metal, alloys containing more than 50% zirconium by weight, compounds, manufactures thereof, waste or scrap of any of the foregoing.
- Note: 1C234 does not control zirconium in the form of foil having a thickness of 0.10 mm or less.
- 1C235 Tritium, tritium compounds, mixtures containing tritium in which the ratio of tritium to hydrogen atoms exceeds 1 part in 1000, and products or devices containing any of the foregoing.
- Note: 1C235 does not control a product or device containing less than 1.48×10^3 GBq (40 Ci) of tritium.
- 1C236 Alpha-emitting radionuclides having an alpha half-life of 10 days or greater but less than 200 years, in the following forms:
- Elemental;
 - Compounds having a total alpha activity of 37 GBq/kg (1 Ci/kg) or greater;
 - Mixtures having a total alpha activity of 37 GBq/kg (1 Ci/kg) or greater;
 - Products or devices containing any of the foregoing.
- Note: 1C236 does not control a product or device containing less than 3.7 GBq (100 millicuries) of alpha activity.
- 1C237 Radium-226 (^{226}Ra), radium-226 alloys, radium-226 compounds, mixtures containing radium-226, manufactures thereof, and products or devices containing any of the foregoing.
- Note: 1C237 does not control the following:
- Medical applicators;
 - A product or device containing less than 0.37 GBq (10 millicuries) of radium-226.

1C238 Chlorine trifluoride (ClF₃).

1C239 High explosives, other than those specified in the Military Goods Controls, or substances or mixtures containing more than 2% by weight thereof, with a crystal density greater than 1.8 g/cm³ and having a detonation velocity greater than 8,000 m/s.

1C240 Nickel powder and porous nickel metal, other than those specified in 0C005, as follows:

- a. Nickel powder having both of the following characteristics:
 1. A nickel purity content of 99.0% or greater by weight; and
 2. A mean particle size of less than 10 micrometres measured by American Society for Testing and Materials (ASTM) B330 standard;
- b. Porous nickel metal produced from materials specified in 1C240.a.

Note: 1C240 does not control the following:

- a. Filamentary nickel powders;
- b. Single porous nickel sheets with an area of 1,000 cm² per sheet or less.

Technical Note:

1C240.b. refers to porous metal formed by compacting and sintering the materials in 1C240.a. to form a metal material with fine pores interconnected throughout the structure.

1C350 Chemicals, which may be used as precursors for toxic chemical agents, as follows, and "chemical mixtures" containing one or more thereof:

N.B.: SEE ALSO MILITARY GOODS CONTROLS AND 1C450.

1. Thiodiglycol (111-48-8);
2. Phosphorus oxychloride (10025-87-3);
3. Dimethyl methylphosphonate (756-79-6);
4. **SEE MILITARY GOODS CONTROLS FOR Methyl phosphonyl difluoride (676-99-3);**
5. Methyl phosphonyl dichloride (676-97-1);
6. Dimethyl phosphite (DMP) (868-85-9);
7. Phosphorus trichloride (7719-12-2);
8. Trimethyl phosphite (TMP) (121-45-9);
9. Thionyl chloride (7719-09-7);
10. 3-Hydroxy-1-methylpiperidine (3554-74-3);
11. N,N-Diisopropyl-(beta)-aminoethyl chloride (96-79-7);
12. N,N-Diisopropyl-(beta)-aminoethane thiol (5842-07-9);
13. 3-Quinuclidinol (1619-34-7);
14. Potassium fluoride (7789-23-3);
15. 2-Chloroethanol (107-07-3);
16. Dimethylamine (124-40-3);
17. Diethyl ethylphosphonate (78-38-6);
18. Diethyl-N,N-dimethylphosphoramidate (2404-03-7);
19. Diethyl phosphite (762-04-9);
20. Dimethylamine hydrochloride (506-59-2);
21. Ethyl phosphinyl dichloride (1498-40-4);
22. Ethyl phosphonyl dichloride (1066-50-8);
23. **SEE MILITARY GOODS CONTROLS FOR Ethyl phosphonyl difluoride (753-98-0);**
24. Hydrogen fluoride (7664-39-3);
25. Methyl benzilate (76-89-1);
26. Methyl phosphinyl dichloride (676-83-5);
27. N,N-Diisopropyl-(beta)-amino ethanol (96-80-0);
28. Pinacolyl alcohol (464-07-3);
29. **SEE MILITARY GOODS CONTROLS FOR O-Ethyl-2-diisopropylaminoethyl methyl phosphonite (QL) (57856-11-8);**
30. Triethyl phosphite (122-52-1);
31. Arsenic trichloride (7784-34-1);
32. Benzilic acid (76-93-7);
33. Diethyl methylphosphonite (15715-41-0);
34. Dimethyl ethylphosphonate (6163-75-3);
35. Ethyl phosphinyl difluoride (430-78-4);
36. Methyl phosphinyl difluoride (753-59-3);
37. 3-Quinuclidone (3731-38-2);

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38. Phosphorus pentachloride (10026-13-8);
39. Pinacolone (75-97-8);
40. Potassium cyanide (151-50-8);
41. Potassium bifluoride (7789-29-9);
42. Ammonium hydrogen fluoride or ammonium bifluoride (1341-49-7);
43. Sodium fluoride (7681-49-4);
44. Sodium bifluoride (1333-83-1);
45. Sodium cyanide (143-33-9);
46. Triethanolamine (102-71-6);
47. Phosphorus pentasulphide (1314-80-3);
48. Di-isopropylamine (108-18-9);
49. Diethylaminoethanol (100-37-8);
50. Sodium sulphide (1313-82-2);
51. Sulphur monochloride (10025-67-9);
52. Sulphur dichloride (10545-99-0);
53. Triethanolamine hydrochloride (637-39-8);
54. N,N-Diisopropyl-(Beta)-aminoethyl chloride hydrochloride (4261-68-1);
55. Methylphosphonic acid (993-13-5);
56. Diethyl methylphosphonate (683-08-9);
57. N,N-Dimethylaminophosphoryl dichloride (677-43-0);
58. Triisopropyl phosphite (116-17-6);
59. Ethyldiethanolamine (139-87-7);
60. O,O-Diethyl phosphorothioate (2465-65-8);
61. O,O-Diethyl phosphorodithioate (298-06-6);
62. Sodium hexafluorosilicate (16893-85-9);
63. Methylphosphonothioic dichloride (676-98-2).

Note 1: For exports to "States not Party to the Chemical Weapons Convention", 1C350 does not control "chemical mixtures" containing one or more of the chemicals specified in entries 1C350.1, .3, .5, .11, .12, .13, .17, .18, .21, .22, .26, .27, .28, .31, .32, .33, .34, .35, .36, .54, .55, .56, .57 and .63 in which no individually specified chemical constitutes more than 10% by the weight of the mixture.

Note 2: For exports to "States Party to the Chemical Weapons Convention", 1C350 does not control "chemical mixtures" containing one or more of the chemicals specified in entries 1C350.1, .3, .5, .11, .12, .13, .17, .18, .21, .22, .26, .27, .28, .31, .32, .33, .34, .35, .36, .54, .55, .56, .57 and .63 in which no individually specified chemical constitutes more than 30% by the weight of the mixture.

Note 3: 1C350 does not control "chemical mixtures" containing one or more of the chemicals specified in entries 1C350 .2, .6, .7, .8, .9, .10, .14, .15, .16, .19, .20, .24, .25, .30, .37, .38, .39, .40, .41, .42, .43, .44, .45, .46, .47, .48, .49, .50, .51, .52, .53, .58, .59, .60, .61 and .62 in which no individually specified chemical constitutes more than 30% by the weight of the mixture.

Note 4: 1C350 does not control products identified as consumer goods packaged for retail sale for personal use or packaged for individual use.

1C351 Human pathogens, zoonoses and "toxins", as follows:

- a. Viruses, whether natural, enhanced or modified, either in the form of "isolated live cultures" or as material including living material which has been deliberately inoculated or contaminated with such cultures, as follows:
 1. Chikungunya virus;
 2. Congo-Crimean haemorrhagic fever virus;
 3. Dengue fever virus;
 4. Eastern equine encephalitis virus;
 5. Ebola virus;
 6. Hantaan virus;
 7. Junin virus;
 8. Lassa fever virus;
 9. Lymphocytic choriomeningitis virus;
 10. Machupo virus;
 11. Marburg virus;
 12. Monkey pox virus;
 13. Rift Valley fever virus;
 14. Tick-borne encephalitis virus (Russian Spring-Summer encephalitis virus);
 15. Variola virus;
 16. Venezuelan equine encephalitis virus;
 17. Western equine encephalitis virus;
 18. Not used;
 19. Yellow fever virus;
 20. Japanese encephalitis virus;
 21. Kyasanur Forest virus;
 22. Louping ill virus;
 23. Murray Valley encephalitis virus;
 24. Omsk haemorrhagic fever virus;
 25. Oropouche virus;
 26. Powassan virus;
 27. Rocio virus;
 28. St Louis encephalitis virus;
 29. Hendra virus (Equine morbillivirus);
 30. South American haemorrhagic fever (Sabia, Flexal, Guanarito);
 31. Pulmonary & renal syndrome-haemorrhagic fever viruses (Seoul, Dobrava, Puumala, Sin Nombre);
 32. Nipah virus;
- b. Rickettsiae, whether natural, enhanced or modified, either in the form of "isolated live cultures" or as material including living material which has been deliberately inoculated or contaminated with such cultures, as follows:
 1. Coxiella burnetii;
 2. Bartonella quintana (Rochalimaea quintana, Rickettsia quintana);
 3. Rickettsia prowasecki;
 4. Rickettsia rickettsii;

1C351 continued

- c. Bacteria, whether natural, enhanced or modified, either in the form of "isolated live cultures" or as material including living material which has been deliberately inoculated or contaminated with such cultures, as follows:
1. Bacillus anthracis;
 2. Brucella abortus;
 3. Brucella melitensis;
 4. Brucella suis;
 5. Chlamydia psittaci;
 6. Clostridium botulinum;
 7. Francisella tularensis;
 8. Burkholderia mallei (Pseudomonas mallei);
 9. Burkholderia pseudomallei (Pseudomonas pseudomallei);
 10. Salmonella typhi;
 11. Shigella dysenteriae;
 12. Vibrio cholerae;
 13. Yersinia pestis;
 14. Clostridium perfringens epsilon toxin producing types;
 15. Enterohaemorrhagic Escherichia coli, serotype O157 and other verotoxin producing serotypes;
- d. "Toxins", as follows, and "sub-unit of toxins" thereof:
1. Botulinum toxins;
 2. Clostridium perfringens toxins;
 3. Conotoxin;
 4. Ricin;
 5. Saxitoxin;
 6. Shiga toxin;
 7. Staphylococcus aureus toxins;
 8. Tetrodotoxin;
 9. Verotoxin and shiga-like ribosome inactivating proteins;
 10. Microcystin (Cyanginosin);
 11. Aflatoxins;
 12. Abrin;
 13. Cholera toxin;
 14. Diacetoxyscirpenol toxin;
 15. T-2 toxin;
 16. HT-2 toxin;
 17. Modeccin;
 18. Volkensin;
 19. Viscum album Lectin 1 (Viscumin);
- Note: 1C351.d. does not control botulinum toxins or conotoxins in product form meeting all of the following criteria:
1. Are pharmaceutical formulations designed for human administration in the treatment of medical conditions;
 2. Are pre-packaged for distribution as medical products;
 3. Are authorised by a state authority to be marketed as medical products.
- e. Fungi, whether natural, enhanced or modified, either in the form of "isolated live cultures" or as material including living material which has been deliberately inoculated or contaminated with such cultures, as follows:
1. Coccidioides immitis;
 2. Coccidioides posadasii.

Note: 1C351 does not control "vaccines" or "immunotoxins".

1C352

Animal pathogens, as follows:

- a. Viruses, whether natural, enhanced or modified, either in the form of "isolated live cultures" or as material including living material which has been deliberately inoculated or contaminated with such cultures, as follows:
 1. African swine fever virus;
 2. Avian influenza virus, which are:
 - a. Uncharacterised; or
 - b. Defined in Annex I(2) EC Directive 2005/94/EC (O.J. L.10 14.1.2006 p.16) as having high pathogenicity, as follows:
 1. Type A viruses with an IVPI (intravenous pathogenicity index) in 6 week old chickens of greater than 1.2; or
 2. Type A viruses of the subtypes H5 or H7 with genome sequences codified for multiple basic amino acids at the cleavage site of the haemagglutinin molecule similar to that observed for other HPAI viruses, indicating that the haemagglutinin molecule can be cleaved by a host ubiquitous protease;
 3. Bluetongue virus;
 4. Foot and mouth disease virus;
 5. Goat pox virus;
 6. Porcine herpes virus (Aujeszky's disease);
 7. Swine fever virus (Hog cholera virus);
 8. Lyssa virus;
 9. Newcastle disease virus;
 10. Peste des petits ruminants virus;
 11. Porcine enterovirus type 9 (swine vesicular disease virus);
 12. Rinderpest virus;
 13. Sheep pox virus;
 14. Teschen disease virus;
 15. Vesicular stomatitis virus;
 16. Lumpy skin disease virus;
 17. African horse sickness virus.
- b. Mycoplasmas, whether natural, enhanced or modified, either in the form of "isolated live cultures" or as material including living material which has been deliberately inoculated or contaminated with such cultures, as follows:
 1. Mycoplasma mycoides subspecies mycoides SC (small colony);
 2. Mycoplasma capricolum subspecies capripneumoniae.

Note: 1C352 does not control "vaccines".

1C353 Genetic elements and genetically modified organisms, as follows:

- a. Genetically modified organisms or genetic elements that contain nucleic acid sequences associated with pathogenicity of organisms specified in 1C351.a., 1C351.b., 1C351.c, 1C351.e., 1C352 or 1C354;
- b. Genetically modified organisms or genetic elements that contain nucleic acid sequences coding for any of the "toxins" specified in 1C351.d. or "sub-units of toxins" thereof.

Technical Notes:

1. Genetic elements include, inter alia, chromosomes, genomes, plasmids, transposons and vectors whether genetically modified or unmodified.
2. Nucleic acid sequences associated with the pathogenicity of any of the micro-organisms specified in 1C351.a., 1C351.b., 1C351.c., 1C351.e., 1C352 or 1C354 means any sequence specific to the specified micro-organism that:
 - a. In itself or through its transcribed or translated products represents a significant hazard to human, animal or plant health; or
 - b. Is known to enhance the ability of a specified micro-organism, or any other organism into which it may be inserted or otherwise integrated, to cause serious harm to humans, animals or plant health.

Note: 1C353 does not apply to nucleic acid sequences associated with the pathogenicity of enterohaemorrhagic *Escherichia coli*, serotype O157 and other verotoxin producing strains, other than those coding for the verotoxin, or for its sub-units.

1C354 Plant pathogens, as follows:

- a. Viruses, whether natural, enhanced or modified, either in the form of "isolated live cultures" or as material including living material which has been deliberately inoculated or contaminated with such cultures, as follows:
 1. Potato Andean latent tymovirus;
 2. Potato spindle tuber viroid;
- b. Bacteria, whether natural, enhanced or modified, either in the form of "isolated live cultures" or as material which has been deliberately inoculated or contaminated with such cultures, as follows:
 1. *Xanthomonas albilineans*;
 2. *Xanthomonas campestris* pv. *citri* including strains referred to as *Xanthomonas campestris* pv. *citri* types A,B,C,D,E or otherwise classified as *Xanthomonas citri*, *Xanthomonas campestris* pv. *aurantifolia* or *Xanthomonas campestris* pv. *citrumelo*;
 3. *Xanthomonas oryzae* pv. *Oryzae* (*Pseudomonas campestris* pv. *Oryzae*);
 4. *Clavibacter michiganensis* subsp. *Sepedonicus* (*Corynebacterium michiganensis* subsp. *Sepedonicum* or *Corynebacterium Sepedonicum*);
 5. *Ralstonia solanacearum* Races 2 and 3 (*Pseudomonas solanacearum* Races 2 and 3 or *Burkholderia solanacearum* Races 2 and 3);

1C354 continued

- c. Fungi, whether natural, enhanced or modified, either in the form of "isolated live cultures" or as material which has been deliberately inoculated or contaminated with such cultures, as follows:
1. Colletotrichum coffeanum var. virulans (Colletotrichum kahawae);
 2. Cochliobolus miyabeanus (Helminthosporium oryzae);
 3. Microcyclus ulei (syn. Dothidella ulei);
 4. Puccinia graminis (syn. Puccinia graminis f. sp. tritici);
 5. Puccinia striiformis (syn. Puccinia glumarum);
 6. Magnaporthe grisea (pyricularia grisea/pyricularia oryzae).

1C450 Toxic chemicals and toxic chemical precursors, as follows, and "chemical mixtures" containing one or more thereof:

N.B.: SEE ALSO ENTRY 1C350, 1C351.d. AND MILITARY GOODS CONTROLS.

a. Toxic chemicals, as follows:

1. Amiton: O,O-Diethyl S-[2-(diethylamino)ethyl] phosphorothiolate (78-53-5) and corresponding alkylated or protonated salts;
2. PFIB: 1,1,3,3,3-Pentafluoro-2-(trifluoromethyl)-1-propene (382-21-8);
3. **SEE MILITARY GOODS CONTROLS FOR BZ: 3-Quinuclidinyl benzilate (6581-06-2);**
4. Phosgene: Carbonyl dichloride (75-44-5);
5. Cyanogen chloride (506-77-4);
6. Hydrogen cyanide (74-90-8);
7. Chloropicrin: Trichloronitromethane (76-06-2);

Note 1: For exports to "States not Party to the Chemical Weapons Convention", 1C450 does not control "chemical mixtures" containing one or more of the chemicals specified in entries 1C450.a.1. and .a.2. in which no individually specified chemical constitutes more than 1% by the weight of the mixture.

Note 2: For exports to "States Party to the Chemical Weapons Convention", 1C450 does not control "chemical mixtures" containing one or more of the chemicals specified in entries 1C450.a.1. and .a.2. in which no individually specified chemical constitutes more than 30% by the weight of the mixture.

Note 3: 1C450 does not control "chemical mixtures" containing one or more of the chemicals specified in entries 1C450.a.4., .a.5., .a.6. and .a.7. in which no individually specified chemical constitutes more than 30% by the weight of the mixture.

Note 4: 1C450 does not control products identified as consumer goods packaged for retail sale for personal use or packaged for individual use.

1C450 continued

b. Toxic chemical precursors, as follows:

1. Chemicals, other than those specified in the Military Goods Controls or in 1C350, containing a phosphorus atom to which is bonded one methyl, ethyl or propyl (normal or iso) group but not further carbon atoms;
Note: 1C450.b.1 does not control Fonofos: O-Ethyl S-phenyl ethylphosphonothiolothionate (944-22-9);
2. N,N-Dialkyl [methyl, ethyl or propyl (normal or iso)] phosphoramidic dihalides, other than N,N-Dimethylaminophosphoryl dichloride;
N.B.: See 1C350.57. for N,N-Dimethylaminophosphoryl dichloride.
3. Dialkyl [methyl, ethyl or propyl (normal or iso)] N,N-dialkyl [methyl, ethyl or propyl (normal or iso)]-phosphoramidates, other than Diethyl-N,N-dimethylphosphoramidate which is specified in 1C350;
4. N,N-Dialkyl [methyl, ethyl or propyl (normal or iso)] aminoethyl-2-chlorides and corresponding protonated salts, other than N,N-Diisopropyl-(beta)-aminoethyl chloride or N,N-Diisopropyl-(beta)-aminoethyl chloride hydrochloride which are specified in 1C350;
5. N,N-Dialkyl [methyl, ethyl or propyl (normal or iso)] aminoethane-2-ols and corresponding protonated salts, other than N,N-Diisopropyl-(beta)-aminoethanol (96-80-0) and N,N-Diethylaminoethanol (100-37-8) which are specified in 1C350;
Note: 1C450.b.5. does not control the following:
 - a. N,N-Dimethylaminoethanol (108-01-0) and corresponding protonated salts;
 - b. Protonated salts of N,N-Diethylaminoethanol (100-37-8);
6. N,N-Dialkyl [methyl, ethyl or propyl (normal or iso)] aminoethane-2-thiols and corresponding protonated salts, other than N,N-Diisopropyl-(beta)-aminoethane thiol which is specified in 1C350;
7. See 1C350 for ethyldiethanolamine (139-87-7);
8. Methyldiethanolamine (105-59-9).

Note 1: For exports to "States not Party to the Chemical Weapons Convention", 1C450 does not control "chemical mixtures" containing one or more of the chemicals specified in entries 1C450.b.1., .b.2., .b.3., .b.4., .b.5. and .b.6. in which no individually specified chemical constitutes more than 10% by the weight of the mixture.

Note 2: For exports to "States Party to the Chemical Weapons Convention", 1C450 does not control "chemical mixtures" containing one or more of the chemicals specified in entries 1C450.b.1., .b.2., .b.3., .b.4., .b.5. and .b.6. in which no individually specified chemical constitutes more than 30% by the weight of the mixture.

Note 3: 1C450 does not control "chemical mixtures" containing one or more of the chemicals specified in entry 1C450.b.8. in which no individually specified chemical constitutes more than 30% by the weight of the mixture.

Note 4: 1C450 does not control products identified as consumer goods packaged for retail sale for personal use or packaged for individual use.

1D Software

- 1D001 "Software" specially designed or modified for the "development", "production" or "use" of equipment specified in 1B001 to 1B003.
- 1D002 "Software" for the "development" of organic "matrix", metal "matrix" or carbon "matrix" laminates or "composites".
- 1D003 "Software" specially designed or modified to enable equipment to perform the functions of equipment specified in 1A004.c. or 1A004.d.
- 1D101 "Software" specially designed or modified for the "use" of goods specified in 1B101, 1B102, 1B115, 1B117, 1B118 or 1B119.
- 1D103 "Software" specially designed for analysis of reduced observables such as radar reflectivity, ultraviolet/infrared signatures and acoustic signatures.
- 1D201 "Software" specially designed for the "use" of goods specified in 1B201.

1E Technology

- 1E001 "Technology" according to the General Technology Note for the "development" or "production" of equipment or materials specified in 1A001.b., 1A001.c., 1A002 to 1A005, 1A006.b., 1A007, 1B or 1C.
- 1E002 Other "technology" as follows:
- a. "Technology" for the "development" or "production" of polybenzothiazoles or polybenzoxazoles;
 - b. "Technology" for the "development" or "production" of fluoroelastomer compounds containing at least one vinyl ether monomer;

1E002 continued

- c. "Technology" for the design or "production" of the following base materials or non-"composite" ceramic materials:
1. Base materials having all of the following:
 - a. Any of the following compositions:
 1. Single or complex oxides of zirconium and complex oxides of silicon or aluminium;
 2. Single nitrides of boron (cubic crystalline forms);
 3. Single or complex carbides of silicon or boron; or
 4. Single or complex nitrides of silicon;
 - b. Any of the following total metallic impurities (excluding intentional additions):
 1. Less than 1,000 ppm for single oxides or carbides; or
 2. Less than 5,000 ppm for complex compounds or single nitrides; and
 - c. Being any of the following:
 1. Zirconia (CAS 1314-23-4) with an average particle size equal to or less than 1 µm and no more than 10% of the particles larger than 5 µm;
 2. Other base materials with an average particle size equal to or less than 5 µm and no more than 10% of the particles larger than 10 µm; or
 3. Having all of the following:
 - a. Platelets with a length to thickness ratio exceeding 5;
 - b. Whiskers with a length to diameter ratio exceeding 10 for diameters less than 2 µm; and
 - c. Continuous or chopped fibres less than 10 µm in diameter;
 2. Non-"composite" ceramic materials composed of the materials specified in 1E002.c.1;

Note: 1E002.c.2. does not control "technology" for the design or production of abrasives.
- d. "Technology" for the "production" of aromatic polyamide fibres;
- e. "Technology" for the installation, maintenance or repair of materials specified in 1C001;
- f. "Technology" for the repair of "composite" structures, laminates or materials specified in 1A002, 1C007.c. or 1C007.d.;

Note: 1E002.f. does not control "technology" for the repair of "civil aircraft" structures using carbon "fibrous or filamentary materials" and epoxy resins, contained in aircraft manufacturers' manuals.
- g. 'Libraries (parametric technical databases)' specially designed or modified to enable equipment to perform the functions of equipment specified in 1A004.c. or 1A004.d.

Technical Note:
For the purpose of 1E002.g., 'library (parametric technical database)' means a collection of technical information, reference to which may enhance the performance of relevant equipment or systems.

- 1E101 "Technology" according to the General Technology Note for the "use" of goods specified in 1A102, 1B001, 1B101, 1B102, 1B115 to 1B119, 1C001, 1C101, 1C107, 1C111 to 1C118, 1D101 or 1D103.
- 1E102 "Technology" according to the General Technology Note for the "development" of "software" specified in 1D001, 1D101 or 1D103.
- 1E103 "Technology" for the regulation of temperature, pressure or atmosphere in autoclaves or hydroclaves, when used for the "production" of "composites" or partially processed "composites".
- 1E104 "Technology" relating to the "production" of pyrolytically derived materials formed on a mould, mandrel or other substrate from precursor gases which decompose in the 1,573 K (1,300°C) to 3,173 K (2,900°C) temperature range at pressures of 130 Pa to 20 kPa.
Note: 1E104 includes "technology" for the composition of precursor gases, flow-rates and process control schedules and parameters.
- 1E201 "Technology" according to the General Technology Note for the "use" of goods specified in 1A002, 1A007, 1A202, 1A225 to 1A227, 1B201, 1B225 to 1B233, 1C002.b.3. or .b.4., 1C010.b., 1C202, 1C210, 1C216, 1C225 to 1C240 or 1D201.
- 1E202 "Technology" according to the General Technology Note for the "development" or "production" of goods specified in 1A007, 1A202 or 1A225 to 1A227.
- 1E203 "Technology" according to the General Technology Note for the "development" of "software" specified in 1D201.

CATEGORY 2 - MATERIALS PROCESSING

2A Systems, Equipment and Components

N.B.: For quiet running bearings, see the Military Goods Controls.

2A001 Anti-friction bearings and bearing systems, as follows, and components thereof:

Note: 2A001 does not control balls with tolerances specified by the manufacturer in accordance with ISO 3290 as grade 5 or worse.

- a. Ball bearings and solid roller bearings, having all tolerances specified by the manufacturer in accordance with ISO 492 Tolerance Class 4 (or ANSI/ABMA Std 20 Tolerance Class ABEC-7 or RBEC-7, or other national equivalents), or better, and having both rings and rolling elements (ISO 5593), made from monel or beryllium;

Note: 2A001.a. does not control tapered roller bearings.
- b. Other ball bearings and solid roller bearings, having all tolerances specified by the manufacturer in accordance with ISO 492 Tolerance Class 2 (or ANSI/ABMA Std 20 Tolerance Class ABEC-9 or RBEC-9, or other national equivalents), or better;

Note: 2A001.b. does not control tapered roller bearings.
- c. Active magnetic bearing systems using any of the following:
 1. Materials with flux densities of 2.0 T or greater and yield strengths greater than 414 MPa;
 2. All-electromagnetic 3D homopolar bias designs for actuators; or
 3. High temperature (450 K (177°C) and above) position sensors.

2A225 Crucibles made of materials resistant to liquid actinide metals, as follows:

- a. Crucibles having both of the following characteristics:
 1. A volume of between 150 cm³ and 8,000 cm³; and
 2. Made of or coated with any of the following materials, having a purity of 98% or greater by weight:
 - a. Calcium fluoride (CaF₂);
 - b. Calcium zirconate (metazirconate) (CaZrO₃);
 - c. Cerium sulphide (Ce₂S₃);
 - d. Erbium oxide (erbia) (Er₂O₃);
 - e. Hafnium oxide (hafnia) (HfO₂);
 - f. Magnesium oxide (MgO);
 - g. Nitrided niobium-titanium-tungsten alloy (approximately 50% Nb, 30% Ti, 20% W);
 - h. Yttrium oxide (yttria) (Y₂O₃); or
 - i. Zirconium oxide (zirconia) (ZrO₂);
- b. Crucibles having both of the following characteristics:
 1. A volume of between 50 cm³ and 2,000 cm³; and
 2. Made of or lined with tantalum, having a purity of 99.9% or greater by weight;

2A225 continued

- c. Crucibles having all of the following characteristics:
1. A volume of between 50 cm³ and 2,000 cm³;
 2. Made of or lined with tantalum, having a purity of 98% or greater by weight; and
 3. Coated with tantalum carbide, nitride, boride, or any combination thereof.

2A226 Valves having all of the following characteristics:

- a. A 'nominal size' of 5 mm or greater;
- b. Having a bellows seal; and
- c. Wholly made of or lined with aluminium, aluminium alloy, nickel, or nickel alloy containing more than 60% nickel by weight.

Technical Note:

For valves with different inlet and outlet diameters, the 'nominal size' in 2A226 refers to the smallest diameter.

2B Test, Inspection and Production Equipment

Technical Notes:

1. *Secondary parallel contouring axes, (e.g., the w-axis on horizontal boring mills or a secondary rotary axis the centre line of which is parallel to the primary rotary axis) are not counted in the total number of contouring axes. Rotary axes need not rotate over 360°. A rotary axis can be driven by a linear device (e.g., a screw or a rack-and-pinion).*
2. *For the purposes of 2B, the number of axes which can be co-ordinated simultaneously for "contouring control" is the number of axes along or around which, during processing of the workpiece, simultaneous and interrelated motions are performed between the workpiece and a tool. This does not include any additional axes along or around which other relative movement within the machine are performed such as:*
 - a. *Wheel-dressing systems in grinding machines;*
 - b. *Parallel rotary axes designed for mounting of separate workpieces;*
 - c. *Co-linear rotary axes designed for manipulating the same workpiece by holding it in a chuck from different ends.*
3. *Axis nomenclature shall be in accordance with International Standard ISO 841, 'Numerical Control Machines - Axis and Motion Nomenclature'.*
4. *For the purposes of 2B001 to 2B009 a "tilting spindle" is counted as a rotary axis.*
5. *'Stated positioning accuracy' derived from measurements made according to ISO 230/2 (1988)¹ or national equivalents may be used for each machine tool model as an alternative to individual machine tests. 'Stated positioning accuracy' means the accuracy value provided to the competent authorities of the Member State in which the exporter is established as representative of the accuracy of a specific machine model.*

2B Technical Note 5 continued

Determination of 'Stated Positioning Accuracy'

- a. Select five machines of a model to be evaluated;
- b. Measure the linear axis accuracies according to ISO 230/2 (1988)¹ ;
- c. Determine the A-values for each axis of each machine. The method of calculating the A-value is described in the ISO standard;
- d. Determine the mean value of the A-value of each axis. This mean value \hat{A} becomes the stated value of each axis for the model ($\hat{A}_x \hat{A}_y \dots$);
- e. Since the Category 2 list refers to each linear axis there will be as many stated values as there are linear axes;
- f. If any axis of a machine model not controlled by 2B001.a. to 2B001.c. or 2B201 has a stated accuracy \hat{A} of 6 microns for grinding machines and 8 microns for milling and turning machines or better, the manufacturer should be required to reaffirm the accuracy level once every eighteen months.

2B001 Machine tools and any combination thereof, for removing (or cutting) metals, ceramics or "composites", which, according to the manufacturer's technical specification, can be equipped with electronic devices for "numerical control", and specially designed components as follows:
N.B.: SEE ALSO 2B201.

Note 1: 2B001 does not control special purpose machine tools limited to the manufacture of gears. For such machines see 2B003.

Note 2: 2B001 does not control special purpose machine tools limited to the manufacture of any of the following:

- a. Crankshafts or camshafts;
- b. Tools or cutters;
- c. Extruder worms; or
- d. Engraved or faceted jewellery parts.

Note 3: A machine tool having at least two of the three turning, milling or grinding capabilities (e.g., a turning machine with milling capability), must be evaluated against each applicable entry 2B001.a., b. or c.

N.B.: For optical finishing machines, see 2B002.

- a. Machine tools for turning having all of the following:
 1. Positioning accuracy with "all compensations available" equal to or less (better) than 6 μm according to ISO 230/2 (1988)¹ or national equivalents along any linear axis; and
 2. Two or more axes which can be coordinated simultaneously for "contouring control";

Note: 2B001.a. does not control turning machines specially designed for producing contact lenses, having all of the following:

 - a. Machine controller limited to using ophthalmic based software for part programming data input; and
 - b. No vacuum chucking.

¹ Manufacturers calculating positioning accuracy in accordance with ISO 230/2 (1997) should consult the competent authorities of the Member State in which they are established.

2B001 continued

- b. Machine tools for milling having any of the following:
 - 1. Having all of the following:
 - a. Positioning accuracy with "all compensations available" equal to or less (better) than 6 μm according to ISO 230/2 (1988)¹ or national equivalents along any linear axis; and
 - b. Three linear axes plus one rotary axis which can be coordinated simultaneously for "contouring control";
 - 2. Five or more axes which can be coordinated simultaneously for "contouring control";
 - 3. A positioning accuracy for jig boring machines, with "all compensations available", equal to or less (better) than 4 μm according to ISO 230/2 (1988)¹ or national equivalents along any linear axis; or
 - 4. Fly cutting machines having all of the following:
 - a. Spindle "run-out" and "camming" less (better) than 0.0004 mm TIR; and
 - b. Angular deviation of slide movement (yaw, pitch and roll) less (better) than 2 seconds of arc, TIR over 300 mm of travel;
- c. Machine tools for grinding having any of the following:
 - 1. Having all of the following:
 - a. Positioning accuracy with "all compensations available" equal to or less (better) than 4 μm according to ISO 230/2 (1988)¹ or national equivalents along any linear axis; and
 - b. Three or more axes which can be coordinated simultaneously for "contouring control"; or
 - 2. Five or more axes which can be coordinated simultaneously for "contouring control";

Note: 2B001.c. does not control grinding machine as follows:

 - a. Cylindrical external, internal, and external-internal grinding machines, having all of the following:
 - 1. Limited to cylindrical grinding; and
 - 2. Limited to a maximum workpiece capacity of 150 mm outside diameter or length.
 - b. Machines designed specifically as jig grinders that do not have a z-axis or a w-axis, with a positioning accuracy with "all compensations available" less (better) than 4 μm according to ISO 230/2 (1988)¹ or national equivalents.
 - c. Surface grinders.
- d. Electrical discharge machines (EDM) of the non-wire type which have two or more rotary axes which can be coordinated simultaneously for "contouring control";

¹ Manufacturers calculating positioning accuracy in accordance with ISO 230/2 (1997) should consult the competent authorities of the Member State in which they are established.

2B001 continued

- e. Machine tools for removing metals, ceramics or "composites", having all of the following:
 - 1. Removing material by means of any of the following:
 - a. Water or other liquid jets, including those employing abrasive additives;
 - b. Electron beam; or
 - c. "Laser" beam; and
 - 2. Having two or more rotary axes and all of the following:
 - a. Can be coordinated simultaneously for "contouring control"; and
 - b. A positioning accuracy of less (better) than 0.003°;
- f. Deep-hole-drilling machines and turning machines modified for deep-hole-drilling, having a maximum depth-of-bore capability exceeding 5 m and specially designed components therefor.

2B002 Numerically controlled optical finishing machine tools equipped for selective material removal to produce non-spherical optical surfaces having all of the following characteristics:

- a. Finishing the form to less (better) than 1.0 µm;
- b. Finishing to a roughness less (better) than 100 nm rms.
- c. Four or more axes which can be coordinated simultaneously for "contouring control"; and
- d. Using any of the following processes:
 - 1. Magnetorheological finishing ("MRF");
 - 2. Electrorheological finishing ("ERF");
 - 3. 'Energetic particle beam finishing';
 - 4. 'Inflatable membrane tool finishing'; or
 - 5. 'Fluid jet finishing'.

Technical Notes:

For the purposes of 2B002:

1. 'MRF' is a material removal process using an abrasive magnetic fluid whose viscosity is controlled by a magnetic field.
2. 'ERF' is a removal process using an abrasive fluid whose viscosity is controlled by an electric field.
3. 'Energetic particle beam finishing' uses Reactive Atom Plasmas (RAP) or ion-beams to selectively remove material.
4. 'Inflatable membrane tool finishing' is a process that uses a pressurized membrane that deforms to contact the workpiece over a small area.
5. 'Fluid jet finishing' makes use of a fluid stream for material removal.

2B003 "Numerically controlled" or manual machine tools, and specially designed components, controls and accessories therefor, specially designed for the shaving, finishing, grinding or honing of hardened ($R_c = 40$ or more) spur, helical and double-helical gears with a pitch diameter exceeding 1,250 mm and a face width of 15% of pitch diameter or larger finished to a quality of AGMA 14 or better (equivalent to ISO 1328 class 3).

2B004 Hot "isostatic presses" having all of the following, and specially designed components and accessories therefor:

N.B.: SEE ALSO 2B104 and 2B204.

- a. A controlled thermal environment within the closed cavity and a chamber cavity with an inside diameter of 406 mm or more; and
- b. Having any of the following:
 1. A maximum working pressure exceeding 207 MPa;
 2. A controlled thermal environment exceeding 1,773 K (1,500°C); or
 3. A facility for hydrocarbon impregnation and removal of resultant gaseous degradation products.

Technical Note:

The inside chamber dimension is that of the chamber in which both the working temperature and the working pressure are achieved and does not include fixtures. That dimension will be the smaller of either the inside diameter of the pressure chamber or the inside diameter of the insulated furnace chamber, depending on which of the two chambers is located inside the other.

N.B. For specially designed dies, moulds and tooling see 1B003, 9B009 and the Military Goods Controls.

2B005 Equipment specially designed for the deposition, processing and in-process control of inorganic overlays, coatings and surface modifications, as follows, for non-electronic substrates, by processes shown in the Table and associated Notes following 2E003.f., and specially designed automated handling, positioning, manipulation and control components therefor:

- a. Chemical vapour deposition (CVD) production equipment having all of the following:

N.B.: SEE ALSO 2B105.

 1. A process modified for one of the following:
 - a. Pulsating CVD;
 - b. Controlled nucleation thermal deposition (CNTD); or
 - c. Plasma enhanced or plasma assisted CVD; and
 2. Having any of the following:
 - a. Incorporating high vacuum (equal to or less than 0.01 Pa) rotating seals; or
 - b. Incorporating *in situ* coating thickness control;
- b. Ion implantation production equipment having beam currents of 5 mA or more;
- c. Electron beam physical vapour deposition (EB-PVD) production equipment incorporating power systems rated for over 80 kW and having any of the following:
 1. A liquid pool level "laser" control system which regulates precisely the ingots feed rate; or
 2. A computer controlled rate monitor operating on the principle of photo-luminescence of the ionised atoms in the evaporant stream to control the deposition rate of a coating containing two or more elements;

2B005 continued

- d. Plasma spraying production equipment having any of the following:
 - 1. Operating at reduced pressure controlled atmosphere (equal to or less than 10 kPa measured above and within 300 mm of the gun nozzle exit) in a vacuum chamber capable of evacuation down to 0.01 Pa prior to the spraying process; or
 - 2. Incorporating *in situ* coating thickness control;
- e. Sputter deposition production equipment capable of current densities of 0.1 mA/mm² or higher at a deposition rate of 15 µm/h or more;
- f. Cathodic arc deposition production equipment incorporating a grid of electromagnets for steering control of the arc spot on the cathode;
- g. Ion plating production equipment allowing for the *in situ* measurement of any of the following:
 - 1. Coating thickness on the substrate and rate control; or
 - 2. Optical characteristics.

Note: 2B005 does not control chemical vapour deposition, cathodic arc, sputter deposition, ion plating or ion implantation equipment, specially designed for cutting or machining tools.

2B006 Dimensional inspection or measuring systems, equipment and "electronic assemblies", as follows:

- a. Computer controlled or "numerically controlled" Coordinate Measuring Machines (CMM), having a three dimensional (volumetric) maximum permissible error of indication (MPE_E) at any point within the operating range of the machine (i.e., within the length of axes) equal to or less (better) than $(1.7 + L/1,000) \mu\text{m}$ (L is the measured length in mm), according to ISO 10360-2 (2001);
Technical Note:
The MPEE of the most accurate configuration of the CMM specified by the manufacturer (e.g., best of the following: probe, stylus length, motion parameters, environment) and with "all compensations available" shall be compared to the $1.7+L/1,000 \mu\text{m}$ threshold.

N.B.: SEE ALSO 2B206.

2B006 continued

b. Linear and angular displacement measuring instruments, as follows:

1. 'Linear displacement' measuring instruments having any of the following:

Technical Note:*For the purpose of 2B006.b.1. 'linear displacement' means the change of distance between the measuring probe and the measured object.*

- a. Non-contact type measuring systems with a "resolution" equal to or less (better) than 0.2 μm within a measuring range up to 0.2 mm;
- b. Linear voltage differential transformer systems having all of the following:
 - 1. "Linearity" equal to or less (better) than 0.1% within a measuring range up to 5 mm; and
 - 2. Drift equal to or less (better) than 0.1% per day at a standard ambient test room temperature ± 1 K;
- c. Measuring systems having all of the following:
 - 1. Containing a "laser"; and
 - 2. Maintaining, for at least 12 hours, at a temperature of 20 ± 1 °C, all of the following:
 - a. A "resolution" over their full scale of 0.1 μm or less (better); and
 - b. Capable of achieving a "measurement uncertainty", when compensated for the refractive index of air, equal to or less (better) than $(0.2 + L/2,000)$ μm (L is the measured length in mm); or
- d. "Electronic assemblies" specially designed to provide feedback capability in systems specified in 2B006.b.1.c.;

Note: *2B006.b.1. does not control measuring interferometer systems, with an automatic control system that is designed to use no feedback techniques, containing a "laser" to measure slide movement errors of machine-tools, dimensional inspection machines or similar equipment.*

2. Angular displacement measuring instruments having an "angular position deviation" equal to or less (better) than 0.00025°;

Note: *2B006.b.2. does not control optical instruments, such as autocollimators, using collimated light (e.g., laser light) to detect angular displacement of a mirror.*

c. Equipment for measuring surface irregularities, by measuring optical scatter as a function of angle, with a sensitivity of 0.5 nm or less (better).

Note: *Machine tools, which can be used as measuring machines, are controlled if they meet or exceed the criteria specified for the machine tool function or the measuring machine function.*

- 2B007 "Robots" having any of the following characteristics and specially designed controllers and "end-effectors" therefor:
N.B.: SEE ALSO 2B207.
- a. Capable in real time of full three-dimensional image processing or full three-dimensional 'scene analysis' to generate or modify "programmes" or to generate or modify numerical programme data;
Technical Note:
The 'scene analysis' limitation does not include approximation of the third dimension by viewing at a given angle, or limited grey scale interpretation for the perception of depth or texture for the approved tasks (2 1/2 D).
 - b. Specially designed to comply with national safety standards applicable to potentially explosive munitions environments;
Note: 2B007.b. does not control "robots" specially designed for paint-spraying booths.
 - c. Specially designed or rated as radiation-hardened to withstand a total radiation dose greater than 5×10^3 Gy (silicon) without operational degradation; or
Technical Note:
The term Gy(silicon) refers to the energy in Joules per kilogram absorbed by an unshielded silicon sample when exposed to ionising radiation.
 - d. Specially designed to operate at altitudes exceeding 30,000 m.
- 2B008 Assemblies or units, specially designed for machine tools, or dimensional inspection or measuring systems and equipment, as follows:
- a. Linear position feedback units (e.g., inductive type devices, graduated scales, infrared systems or "laser" systems) having an overall "accuracy" less (better) than $(800 + (600 \times L \times 10^{-3}))$ nm (L equals the effective length in mm);
N.B.: For "laser" systems see also Note to 2B006.b.1.c. and d.
 - b. Rotary position feedback units (e.g., inductive type devices, graduated scales, infrared systems or "laser" systems) having an "accuracy" less (better) than 0.00025°;
N.B.: For "laser" systems see also Note to 2B006.b.2.
 - c. "Compound rotary tables" and "tilting spindles", capable of upgrading, according to the manufacturer's specifications, machine tools to or above the levels specified in 2B.
- 2B009 Spin-forming machines and flow-forming machines, which, according to the manufacturer's technical specification, can be equipped with "numerical control" units or a computer control and having all of the following:
N.B.: SEE ALSO 2B109 AND 2B209.
- a. Two or more controlled axes of which at least two can be coordinated simultaneously for "contouring control"; and
 - b. A roller force more than 60 kN.
- Technical Note:
For the purpose of 2B009, machines combining the function of spin-forming and flow-forming are regarded as flow-forming machines.
- 2B104 "Isostatic presses", other than those specified in 2B004, having all of the following:
N.B.: SEE ALSO 2B204.

- a. Maximum working pressure of 69 MPa or greater;
- b. Designed to achieve and maintain a controlled thermal environment of 873 K (600°C) or greater; and
- c. Possessing a chamber cavity with an inside diameter of 254 mm or greater.

2B105 Chemical vapour deposition (CVD) furnaces, other than those specified in 2B005.a., designed or modified for the densification of carbon-carbon composites.

2B109 Flow-forming machines, other than those specified in 2B009, and specially designed components as follows:

N.B.: SEE ALSO 2B209.

- a. Flow-forming machines having all of the following:
 1. According to the manufacturer's technical specification, can be equipped with "numerical control" units or a computer control, even when not equipped with such units; and
 2. With more than two axes which can be coordinated simultaneously for "contouring control".
- b. Specially designed components for flow-forming machines specified in 2B009 or 2B109.a.

Note: 2B109 does not control machines that are not usable in the production of propulsion components and equipment (e.g. motor cases) for systems specified in 9A005, 9A007.a. or 9A105.a.

Technical Note:

Machines combining the function of spin-forming and flow-forming are for the purpose of 2B109 regarded as flow-forming machines.

2B116 Vibration test systems, equipment and components therefor, as follows:

- a. Vibration test systems employing feedback or closed loop techniques and incorporating a digital controller, capable of vibrating a system at an acceleration equal to or greater than 10 g rms between 20 Hz and 2 kHz while imparting forces equal to or greater than 50 kN, measured 'bare table';
- b. Digital controllers, combined with specially designed vibration test software, with a 'real-time control bandwidth' greater than 5 kHz designed for use with vibration test systems specified in 2B116.a.;

Technical Note:

In 2B116.b., 'real-time control bandwidth' means the maximum rate at which a controller can execute complete cycles of sampling, processing data and transmitting control signals.

- c. Vibration thrusters (shaker units), with or without associated amplifiers, capable of imparting a force equal to or greater than 50 kN, measured 'bare table', and usable in vibration test systems specified in 2B116.a.;

- 2B116 continued
- d. Test piece support structures and electronic units designed to combine multiple shaker units in a system capable of providing an effective combined force equal to or greater than 50 kN, measured 'bare table', and usable in vibration systems specified in 2B116.a.
- Technical Note:*
In 2B116, 'bare table' means a flat table, or surface, with no fixture or fittings.
- 2B117 Equipment and process controls, other than those specified in 2B004, 2B005.a., 2B104 or 2B105, designed or modified for densification and pyrolysis of structural composite rocket nozzles and reentry vehicle nose tips.
- 2B119 Balancing machines and related equipment, as follows:
N.B.: SEE ALSO 2B219.
- a. Balancing machines having all the following characteristics:
1. Not capable of balancing rotors/assemblies having a mass greater than 3 kg;
 2. Capable of balancing rotors/assemblies at speeds greater than 12,500 rpm;
 3. Capable of correcting unbalance in two planes or more; and
 4. Capable of balancing to a residual specific unbalance of 0.2 g mm per kg of rotor mass;
- Note:* 2B119.a. does not control balancing machines designed or modified for dental or other medical equipment.
- b. Indicator heads designed or modified for use with machines specified in 2B119.a.
Technical Note:
Indicator heads are sometimes known as balancing instrumentation.
- 2B120 Motion simulators or rate tables having all of the following characteristics:
- a. Two axes or more;
- b. Designed or modified to incorporate slip rings or integrated non-contact devices capable of transferring electrical power, signal information, or both; and
- c. Having any of the following characteristics:
1. For any single axis having all of the following:
 - a. Capable of rates of 400 degrees/s or more, or 30 degrees/s or less; and
 - b. A rate resolution equal to or less than 6 degrees/s and an accuracy equal to or less than 0.6 degrees/s;
 2. Having a worst-case rate stability equal to or better (less) than plus or minus 0.05 % averaged over 10 degrees or more; or
 3. A positioning "accuracy" equal to or less (better) than 5 arc second.
- Note 1:* 2B120 does not control rotary tables designed or modified for machine tools or for medical equipment. For controls on machine tool rotary tables see 2B008.
- Note 2:* Motion simulators or rate tables specified in 2B120 remain controlled whether or not slip rings or integrated non-contact devices are fitted at time of export.
- 2B121 Positioning tables (equipment capable of precise rotary positioning in any axes), other than those specified in 2B120, having all the following characteristics:
- a. Two axes or more; and
- b. A positioning "accuracy" equal to or less (better) than 5 arc second.

Note: 2B121 does not control rotary tables designed or modified for machine tools or for medical equipment. For controls on machine tool rotary tables see 2B008.

2B122 Centrifuges capable of imparting accelerations above 100 g and designed or modified to incorporate slip rings or integrated non-contact devices capable of transferring electrical power, signal information, or both.

Note: Centrifuges specified in 2B122 remain controlled whether or not slip rings or integrated non-contact devices are fitted at time of export.

2B201 Machine tools and any combination thereof, other than those specified in 2B001, as follows, for removing or cutting metals, ceramics or "composites", which, according to the manufacturer's technical specification, can be equipped with electronic devices for simultaneous "contouring control" in two or more axes:

- a. Machine tools for milling, having any of the following characteristics:
1. Positioning accuracies with "all compensations available" equal to or less (better) than 6 μm according to ISO 230/2 (1988)¹ or national equivalents along any linear axis; or
 2. Two or more contouring rotary axes;
- Note: 2B201.a. does not control milling machines having the following characteristics:
- a. X-axis travel greater than 2 m; and
 - b. Overall positioning accuracy on the x-axis more (worse) than 30 μm .

- b. Machine tools for grinding, having any of the following characteristics:
1. Positioning accuracies with "all compensations available" equal to or less (better) than 4 μm according to ISO 230/2 (1988)¹ or national equivalents along any linear axis; or
 2. Two or more contouring rotary axes.
- Note: 2B201.b. does not control the following grinding machines:
- a. Cylindrical external, internal, and external-internal grinding machines having all of the following characteristics:
 1. Limited to a maximum workpiece capacity of 150 mm outside diameter or length; and
 2. Axes limited to x, z and c;
 - b. Jig grinders that do not have a z-axis or a w-axis with an overall positioning accuracy less (better) than 4 μm according to ISO 230/2 (1988)¹ or national equivalents.

¹ Manufacturers calculating positioning accuracy in accordance with ISO 230/2 (1997) should consult the competent authorities of the Member State in which they are established.

2B201 continued

Note 1: 2B201 does not control special purpose machine tools limited to the manufacture of any of the following parts:

- a. Gears;
- b. Crankshafts or camshafts;
- c. Tools or cutters;
- d. Extruder worms.

Note 2: A machine tool having at least two of the three turning, milling or grinding capabilities (e.g., a turning machine with milling capability), must be evaluated against each applicable entry 2B001.a. or 2B201.a. or b.

2B204 "Isostatic presses", other than those specified in 2B004 or 2B104, and related equipment, as follows:

- a. "Isostatic presses" having both of the following characteristics:
 1. Capable of achieving a maximum working pressure of 69 MPa or greater; and
 2. A chamber cavity with an inside diameter in excess of 152 mm;
- b. Dies, moulds and controls, specially designed for "isostatic presses" specified in 2B204.a.

Technical Note:

In 2B204 the inside chamber dimension is that of the chamber in which both the working temperature and the working pressure are achieved and does not include fixtures. That dimension will be the smaller of either the inside diameter of the pressure chamber or the inside diameter of the insulated furnace chamber, depending on which of the two chambers is located inside the other.

2B206 Dimensional inspection machines, instruments or systems, other than those specified in 2B006, as follows:

- a. Computer controlled or numerically controlled coordinate measuring machines (CMM) having both of the following characteristics:
 1. Two or more axes; and
 2. A maximum permissible error of length measurement ($E_{0,MPE}$) along any axis (one dimensional), identified as E_{0X} , E_{0Y} , or E_{0Z} , equal to or less (better) than $(1.25 + L/1000) \mu\text{m}$ (where L is the measured length in millimetres) at any point within the operating range of the machine (i.e., within the length of the axis), tested according to ISO 10360-2(2009);
- b. Systems for simultaneous linear-angular inspection of hemishells, having both of the following characteristics:
 1. "Measurement uncertainty" along any linear axis equal to or less (better) than $3.5 \mu\text{m}$ per 5 mm; and
 2. "Angular position deviation" equal to or less than 0.02° .

Note 1: Machine tools that can be used as measuring machines are controlled if they meet or exceed the criteria specified for the machine tool function or the measuring machine function.

Note 2: A machine specified in 2B206 is controlled if it exceeds the control threshold anywhere within its operating range.

Technical Notes:

All parameters of measurement values in 2B206 represent plus/minus i.e., not total band.

2B207 "Robots", "end-effectors" and control units, other than those specified in 2B007, as follows:

- a. "Robots" or "end-effectors" specially designed to comply with national safety standards applicable to handling high explosives (for example, meeting electrical code ratings for high explosives);
- b. Control units specially designed for any of the "robots" or "end-effectors" specified in 2B207.a.

2B209 Flow forming machines, spin forming machines capable of flow forming functions, other than those specified in 2B009 or 2B109, and mandrels, as follows:

- a. Machines having both of the following characteristics:
 1. Three or more rollers (active or guiding); and
 2. Which, according to the manufacturer's technical specification, can be equipped with "numerical control" units or a computer control;
- b. Rotor-forming mandrels designed to form cylindrical rotors of inside diameter between 75 mm and 400 mm.

Note: 2B209.a. includes machines which have only a single roller designed to deform metal plus two auxiliary rollers which support the mandrel, but do not participate directly in the deformation process.

2B219 Centrifugal multiplane balancing machines, fixed or portable, horizontal or vertical, as follows:

- a. Centrifugal balancing machines designed for balancing flexible rotors having a length of 600 mm or more and having all of the following characteristics:
 1. Swing or journal diameter greater than 75 mm;
 2. Mass capability of from 0.9 to 23 kg ; and
 3. Capable of balancing speed of revolution greater than 5,000 r.p.m.;
- b. Centrifugal balancing machines designed for balancing hollow cylindrical rotor components and having all of the following characteristics:
 1. Journal diameter greater than 75 mm;
 2. Mass capability of from 0.9 to 23 kg;
 3. Capable of balancing to a residual imbalance equal to or less than 0.01 kg x mm/kg per plane; and
 4. Belt drive type.

- 2B225 Remote manipulators that can be used to provide remote actions in radiochemical separation operations or hot cells, having either of the following characteristics:
- A capability of penetrating 0.6 m or more of hot cell wall (through-the-wall operation); or
 - A capability of bridging over the top of a hot cell wall with a thickness of 0.6 m or more (over-the-wall operation).
- Technical Note:*
Remote manipulators provide translation of human operator actions to a remote operating arm and terminal fixture. They may be of 'master/slave' type or operated by joystick or keypad.
- 2B226 Controlled atmosphere (vacuum or inert gas) induction furnaces, and power supplies therefor, as follows:
N.B: SEE ALSO 3B.
- Furnaces having all of the following characteristics:
 - Capable of operation above 1,123 K (850°C);
 - Induction coils 600 mm or less in diameter; and
 - Designed for power inputs of 5 kW or more;
 - Power supplies, with a specified power output of 5 kW or more, specially designed for furnaces specified in 2B226.a.
- Note:* 2B226.a. does not control furnaces designed for the processing of semiconductor wafers.
- 2B227 Vacuum or other controlled atmosphere metallurgical melting and casting furnaces and related equipment as follows:
- Arc remelt and casting furnaces having both of the following characteristics:
 - Consumable electrode capacities between 1,000 cm³ and 20,000 cm³; and
 - Capable of operating with melting temperatures above 1,973 K (1,700°C);
 - Electron beam melting furnaces and plasma atomization and melting furnaces, having both of the following characteristics:
 - A power of 50 kW or greater; and
 - Capable of operating with melting temperatures above 1,473 K (1,200°C).
 - Computer control and monitoring systems specially configured for any of the furnaces specified in 2B227.a. or b.
- 2B228 Rotor fabrication or assembly equipment, rotor straightening equipment, bellows-forming mandrels and dies, as follows:
- Rotor assembly equipment for assembly of gas centrifuge rotor tube sections, baffles, and end caps;
Note: 2B228.a. includes precision mandrels, clamps, and shrink fit machines.

2B228 continued

- b. Rotor straightening equipment for alignment of gas centrifuge rotor tube sections to a common axis;

Technical Note:

In 2B228.b. such equipment normally consists of precision measuring probes linked to a computer that subsequently controls the action of, for example, pneumatic rams used for aligning the rotor tube sections.

- c. Bellows-forming mandrels and dies for producing single-convolution bellows.

Technical Note:

In 2B228.c. the bellows have all of the following characteristics:

1. *Inside diameter between 75 mm and 400 mm;*
2. *Length equal to or greater than 12.7 mm;*
3. *Single convolution depth greater than 2 mm; and*
4. *Made of high-strength aluminium alloys, maraging steel or high strength "fibrous or filamentary materials".*

2B230 "Pressure transducers" capable of measuring absolute pressures at any point in the range 0 to 13 kPa and having both of the following characteristics:

- a. Pressure sensing elements made of or protected by aluminium, aluminium alloy, nickel or nickel alloy with more than 60% nickel by weight; and
- b. Having either of the following characteristics:
1. A full scale of less than 13 kPa and an 'accuracy' of better than $\pm 1\%$ of full-scale; or
 2. A full scale of 13 kPa or greater and an 'accuracy' of better than ± 130 Pa.

Technical Note:

For the purposes of 2B230, 'accuracy' includes non-linearity, hysteresis and repeatability at ambient temperature.

2B231 Vacuum pumps having all of the following characteristics:

- a. Input throat size equal to or greater than 380 mm;
- b. Pumping speed equal to or greater than 15 m³/s; and
- c. Capable of producing an ultimate vacuum better than 13 mPa.

Technical Notes:

1. *The pumping speed is determined at the measurement point with nitrogen gas or air.*
2. *The ultimate vacuum is determined at the input of the pump with the input of the pump blocked off.*

2B232 Multistage light gas guns or other high-velocity gun systems (coil, electromagnetic, and electrothermal types, and other advanced systems) capable of accelerating projectiles to 2 km/s or greater.

2B350 Chemical manufacturing facilities, equipment and components, as follows:

- a. Reaction vessels or reactors, with or without agitators, with total internal (geometric) volume greater than 0.1 m^3 (100 litres) and less than 20 m^3 (20,000 litres), where all surfaces that come in direct contact with the chemical(s) being processed or contained are made from any of the following materials:
 1. 'Alloys' with more than 25% nickel and 20% chromium by weight;
 2. Fluoropolymers;
 3. Glass (including vitrified or enamelled coating or glass lining);
 4. Nickel or 'alloys' with more than 40% nickel by weight;
 5. Tantalum or tantalum 'alloys';
 6. Titanium or titanium 'alloys';
 7. Zirconium or zirconium 'alloys'; or
 8. Niobium (columbium) or niobium 'alloys';

- b. Agitators for use in reaction vessels or reactors specified in 2B350.a.; and impellers, blades or shafts designed for such agitators, where all surfaces of the agitator that come in direct contact with the chemical(s) being processed or contained are made from any of the following materials:
 1. 'Alloys' with more than 25% nickel and 20% chromium by weight;
 2. Fluoropolymers;
 3. Glass (including vitrified or enamelled coatings or glass lining);
 4. Nickel or 'alloys' with more than 40% nickel by weight;
 5. Tantalum or tantalum 'alloys';
 6. Titanium or titanium 'alloys';
 7. Zirconium or zirconium 'alloys'; or
 8. Niobium (columbium) or niobium 'alloys';

- c. Storage tanks, containers or receivers with a total internal (geometric) volume greater than 0.1 m^3 (100 litres) where all surfaces that come in direct contact with the chemical(s) being processed or contained are made from any of the following materials:
 1. 'Alloys' with more than 25% nickel and 20% chromium by weight;
 2. Fluoropolymers;
 3. Glass (including vitrified or enamelled coatings or glass lining);
 4. Nickel or 'alloys' with more than 40% nickel by weight;
 5. Tantalum or tantalum 'alloys';
 6. Titanium or titanium 'alloys';
 7. Zirconium or zirconium 'alloys'; or
 8. Niobium (columbium) or niobium 'alloys';

- d. Heat exchangers or condensers with a heat transfer surface area greater than 0.15 m^2 , and less than 20 m^2 ; and tubes, plates, coils or blocks (cores) designed for such heat exchangers or condensers, where all surfaces that come in direct contact with the chemical(s) being processed are made from any of the following materials:
 1. 'Alloys' with more than 25% nickel and 20% chromium by weight;
 2. Fluoropolymers;
 3. Glass (including vitrified or enamelled coatings or glass lining);
 4. Graphite or 'carbon graphite';
 5. Nickel or 'alloys' with more than 40% nickel by weight;
 6. Tantalum or tantalum 'alloys';
 7. Titanium or titanium 'alloys';
 8. Zirconium or zirconium 'alloys';
 9. Silicon carbide;
 10. Titanium carbide; or
 11. Niobium (columbium) or niobium 'alloys';

2B350 continued

- e. Distillation or absorption columns of internal diameter greater than 0.1 m; and liquid distributors, vapour distributors or liquid collectors designed for such distillation or absorption columns, where all surfaces that come in direct contact with the chemical(s) being processed are made from any of the following materials:
1. 'Alloys' with more than 25% nickel and 20% chromium by weight;
 2. Fluoropolymers;
 3. Glass (including vitrified or enamelled coatings or glass lining);
 4. Graphite or 'carbon graphite';
 5. Nickel or 'alloys' with more than 40% nickel by weight;
 6. Tantalum or tantalum 'alloys';
 7. Titanium or titanium 'alloys';
 8. Zirconium or zirconium 'alloys'; or
 9. Niobium (columbium) or niobium 'alloys';
- f. Remotely operated filling equipment in which all surfaces that come in direct contact with the chemical(s) being processed are made from any of the following materials:
1. 'Alloys' with more than 25% nickel and 20% chromium by weight; or
 2. Nickel or 'alloys' with more than 40% nickel by weight;
- g. Valves with 'nominal sizes' greater than 10 mm and casings (valve bodies) or preformed casing liners designed for such valves, in which all surfaces that come in direct contact with the chemical(s) being processed or contained are made from any of the following materials:
1. 'Alloys' with more than 25% nickel and 20% chromium by weight;
 2. Fluoropolymers;
 3. Glass (including vitrified or enamelled coatings or glass lining);
 4. Nickel or 'alloys' with more than 40% nickel by weight;
 5. Tantalum or tantalum 'alloys';
 6. Titanium or titanium 'alloys';
 7. Zirconium or zirconium 'alloys';
 8. Niobium (columbium) or niobium 'alloys'; or
 9. Ceramic materials as follows:
 - a. Silicon carbide with purity of 80% or more by weight;
 - b. Aluminium oxide (alumina) with purity of 99.9% or more by weight;
 - c. Zirconium oxide (zirconia);
- Technical Note:*
The 'nominal size' is defined as the smaller of the inlet and outlet diameters.
- h. Multi-walled piping incorporating a leak detection port, in which all surfaces that come in direct contact with the chemical(s) being processed or contained are made from any of the following materials:
1. 'Alloys' with more than 25% nickel and 20% chromium by weight;
 2. Fluoropolymers;
 3. Glass (including vitrified or enamelled coatings or glass lining);
 4. Graphite or 'carbon graphite';
 5. Nickel or 'alloys' with more than 40% nickel by weight;
 6. Tantalum or tantalum 'alloys';
 7. Titanium or titanium 'alloys';
 8. Zirconium or zirconium 'alloys'; or
 9. Niobium (columbium) or niobium 'alloys';

2B350 continued

- i. Multiple-seal and seal-less pumps, with manufacturer's specified maximum flow-rate greater than 0.6 m³/hour, or vacuum pumps with manufacturer's specified maximum flow-rate greater than 5 m³/hour (under standard temperature (273 K (0°C)) and pressure (101.3 kPa) conditions); and casings (pump bodies), preformed casing liners, impellers, rotors or jet pump nozzles designed for such pumps, in which all surfaces that come in direct contact with the chemical(s) being processed are made from any of the following materials:
 1. 'Alloys' with more than 25% nickel and 20% chromium by weight;
 2. Ceramics;
 3. Ferrosilicon;
 4. Fluoropolymers;
 5. Glass (including vitrified or enamelled coatings or glass lining);
 6. Graphite or 'carbon graphite';
 7. Nickel or 'alloys' with more than 40% nickel by weight;
 8. Tantalum or tantalum 'alloys';
 9. Titanium or titanium 'alloys';
 10. Zirconium or zirconium 'alloys'; or
 11. Niobium (columbium) or niobium 'alloys';
- j. Incinerators designed to destroy chemicals specified in entry 1C350, having specially designed waste supply systems, special handling facilities and an average combustion chamber temperature greater than 1,273 K (1,000°C), in which all surfaces in the waste supply system that come into direct contact with the waste products are made from or lined with any of the following materials:
 1. 'Alloys' with more than 25% nickel and 20% chromium by weight;
 2. Ceramics; or
 3. Nickel or 'alloys' with more than 40% nickel by weight.

Technical Notes:

1. 'Carbon graphite' is a composition consisting of amorphous carbon and graphite, in which the graphite content is eight percent or more by weight.
2. For the listed materials in the above entries, the term 'alloy' when not accompanied by a specific elemental concentration is understood as identifying those alloys where the identified metal is present in a higher percentage by weight than any other element

2B351 Toxic gas monitoring systems and their dedicated detecting components, other than those specified in 1A004, as follows; and detectors; sensor devices; and replaceable sensor cartridges therefor:

- a. Designed for continuous operation and usable for the detection of chemical warfare agents or chemicals specified in 1C350, at concentrations of less than 0.3 mg/m³; or
- b. Designed for the detection of cholinesterase-inhibiting activity.

2B352 Equipment capable of use in handling biological materials, as follows:

- a. Complete biological containment facilities at P3, P4 containment level;
Technical Note:
P3 or P4 (BL3, BL4, L3, L4) containment levels are as specified in the WHO Laboratory Biosafety manual (3rd edition Geneva 2004).

2B352 continued

- b. Fermenters capable of cultivation of pathogenic "microorganisms", viruses or capable of toxin production, without the propagation of aerosols, and having a total capacity of 20 litres or more;
Technical Note:
Fermenters include bioreactors, chemostats and continuous-flow systems.
- c. Centrifugal separators, capable of continuous separation without the propagation of aerosols, having all the following characteristics:
1. Flow rate exceeding 100 litres per hour;
 2. Components of polished stainless steel or titanium;
 3. One or more sealing joints within the steam containment area; and
 4. Capable of in-situ steam sterilisation in a closed state;
- Technical Note:
Centrifugal separators include decanters.
- d. Cross (tangential) flow filtration equipment and components as follows:
1. Cross (tangential) flow filtration equipment capable of separation of pathogenic microorganisms, viruses, toxins or cell cultures, without the propagation of aerosols, having all of the following characteristics:
 - a. A total filtration area equal to or greater than 1 m²; and
 - b. Having any of the following characteristics:
 1. Capable of being sterilised or disinfected in-situ; or
 2. Using disposable or single-use filtration components;
- Technical Note:
In 2B352.d.1.b. sterilised denotes the elimination of all viable microbes from the equipment through the use of either physical (e.g. steam) or chemical agents. Disinfected denotes the destruction of potential microbial infectivity in the equipment through the use of chemical agents with a germicidal effect. Disinfection and sterilisation are distinct from sanitisation, the latter referring to cleaning procedures designed to lower the microbial content of equipment without necessarily achieving elimination of all microbial infectivity or viability.
2. Cross (tangential) flow filtration components (e.g. modules, elements, cassettes, cartridges, units or plates) with filtration area equal to or greater than 0.2 m² for each component and designed for use in cross (tangential) flow filtration equipment specified in 2B352.d.;
- Note: 2B352.d. does not control reverse osmosis equipment, as specified by the manufacturer.
- e. Steam sterilisable freeze drying equipment with a condenser capacity exceeding 10 kg of ice in 24 hours and less than 1,000 kg of ice in 24 hours;
- f. Protective and containment equipment, as follows:
1. Protective full or half suits, or hoods dependent upon a tethered external air supply and operating under positive pressure;
Note: 2B352.f.1. does not control suits designed to be worn with self-contained breathing apparatus.
 2. Class III biological safety cabinets or isolators with similar performance standards;
Note: In 2B352.f.2., isolators include flexible isolators, dry boxes, anaerobic chambers, glove boxes and laminar flow hoods (closed with vertical flow).
- g. Chambers designed for aerosol challenge testing with "microorganisms", viruses or "toxins" and having a capacity of 1 m³ or greater.

2C Materials

None.

2D Software

2D001 "Software", other than that specified in 2D002, specially designed or modified for the "development", "production" or "use" of equipment specified in 2A001 or 2B001 to 2B009.

2D002 "Software" for electronic devices, even when residing in an electronic device or system, enabling such devices or systems to function as a "numerical control" unit, capable of co-ordinating simultaneously more than four axes for "contouring control".

Note 1: 2D002 does not control "software" specially designed or modified for the operation of machine tools not specified in Category 2.

Note 2: 2D002 does not control "software" for items specified in 2B002. See 2D001 for "software" for items specified in 2B002.

2D101 "Software" specially designed or modified for the "use" of equipment specified in 2B104, 2B105, 2B109, 2B116, 2B117 or 2B119 to 2B122.

N.B.: SEE ALSO 9D004.

2D201 "Software" specially designed for the "use" of equipment specified in 2B204, 2B206, 2B207, 2B209, 2B219 or 2B227.

2D202 "Software" specially designed or modified for the "development", "production" or "use" of equipment specified in 2B201.

2D351 "Software", other than that specified in 1D003, specially designed for "use" of equipment specified in 2B351.

2E Technology

- 2E001 "Technology" according to the General Technology Note for the "development" of equipment or "software" specified in 2A, 2B or 2D.
- 2E002 "Technology" according to the General Technology Note for the "production" of equipment specified in 2A or 2B.
- 2E003 Other "technology", as follows:
- a. "Technology" for the "development" of interactive graphics as an integrated part in "numerical control" units for preparation or modification of part programmes;
 - b. "Technology" for metal-working manufacturing processes, as follows:
 1. "Technology" for the design of tools, dies or fixtures specially designed for any of the following processes:
 - a. "Superplastic forming";
 - b. "Diffusion bonding"; or
 - c. "Direct-acting hydraulic pressing";
 2. Technical data consisting of process methods or parameters as listed below used to control:
 - a. "Superplastic forming" of aluminium alloys, titanium alloys or "superalloys":
 1. Surface preparation;
 2. Strain rate;
 3. Temperature;
 4. Pressure;
 - b. "Diffusion bonding" of "superalloys" or titanium alloys:
 1. Surface preparation;
 2. Temperature;
 3. Pressure;
 - c. "Direct-acting hydraulic pressing" of aluminium alloys or titanium alloys:
 1. Pressure;
 2. Cycle time;
 - d. "Hot isostatic densification" of titanium alloys, aluminium alloys or "superalloys":
 1. Temperature;
 2. Pressure;
 3. Cycle time;

2E003 continued

- c. "Technology" for the "development" or "production" of hydraulic stretch-forming machines and dies therefor, for the manufacture of airframe structures;
- d. "Technology" for the "development" of generators of machine tool instructions (e.g., part programmes) from design data residing inside "numerical control" units;
- e. "Technology" for the "development" of integration "software" for incorporation of expert systems for advanced decision support of shop floor operations into "numerical control" units;
- f. "Technology" for the application of inorganic overlay coatings or inorganic surface modification coatings (specified in column 3 of the following table) to non-electronic substrates (specified in column 2 of the following table), by processes specified in column 1 of the following table and defined in the Technical Note.

Note: The table and Technical Note appear after entry 2E301.

N.B. This table should be read to specify the technology of a particular Coating Process only when the Resultant Coating in column 3 is in a paragraph directly across from the relevant Substrate under column 2. For example, Chemical Vapour Deposition (CVD) coating process technical data are included for the application of silicides to carbon-carbon, ceramic and metal "matrix" "composites" substrates, but are not included for the application of silicides to 'cemented tungsten carbide' (16), 'silicon carbide' (18) substrates. In the second case, the resultant coating is not listed in the paragraph under column 3 directly across from the paragraph under column 2 listing 'cemented tungsten carbide' (16), 'silicon carbide' (18).

2E101 "Technology" according to the General Technology Note for the "use" of equipment or "software" specified in 2B004, 2B009, 2B104, 2B109, 2B116, 2B119 to 2B122 or 2D101.

2E201 "Technology" according to the General Technology Note for the "use" of equipment or "software" specified in 2A225, 2A226, 2B001, 2B006, 2B007.b., 2B007.c., 2B008, 2B009, 2B201, 2B204, 2B206, 2B207, 2B209, 2B225 to 2B232, 2D201 or 2D202.

2E301 "Technology" according to the General Technology Note for the "use" of goods specified in 2B350 to 2B352.

TABLE - DEPOSITION TECHNIQUES

| 1. <u>Coating Process (1)*</u> | 2. <u>Substrate</u> | 3. <u>Resultant Coating</u> |
|--|---|---|
| A. Chemical Vapour Deposition (CVD) | "Superalloys" | Aluminides for internal passages |
| | Ceramics (19) and Low- expansion glasses (14) | Silicides Carbides Dielectric layers (15) Diamond Diamond-like carbon (17) |
| | Carbon-carbon, Ceramic and Metal "matrix" "composites" | Silicides Carbides Refractory metals Mixtures thereof (4) Dielectric layers (15) Aluminides Alloyed aluminides (2) Boron nitride |
| | Cemented tungsten carbide (16), Silicon carbide (18) | Carbides Tungsten Mixtures thereof (4) Dielectric layers (15) |
| | Molybdenum and Molybdenum alloys | Dielectric layers (15) |
| | Beryllium and Beryllium alloys | Dielectric layers (15) Diamond Diamond-like carbon (17) |
| | Sensor window materials (9) | Dielectric layers (15) Diamond Diamond-like carbon (17) |

* The numbers in parenthesis refer to the Notes following this Table.

TABLE - DEPOSITION TECHNIQUES

| 1. <u>Coating Process</u> (1) | 2. <u>Substrate</u> | 3. <u>Resultant Coating</u> |
|--|---|--|
| B. Thermal-Evaporation Physical Vapour Deposition (TE-PVD) | | |
| B.1. Physical Vapour Deposition (PVD): Electron-Beam (EB-PVD) | "Superalloys" | Alloyed silicides Alloyed aluminides (2) MCrAlX (5) Modified zirconia (12) Silicides Aluminides Mixtures thereof (4) |
| | Ceramics (19) and Low- expansion glasses (14) | Dielectric layers (15) |
| | Corrosion resistant steel (7) | MCrAlX (5) Modified zirconia (12) Mixtures thereof (4) |
| | Carbon-carbon, Ceramic and Metal "matrix" "composites" | Silicides Carbides Refractory metals Mixtures thereof (4) Dielectric layers (15) Boron nitride |
| | Cemented tungsten carbide (16), Silicon carbide (18) | Carbides Tungsten Mixtures thereof (4) Dielectric layers (15) |
| | Molybdenum and Molybdenum alloys | Dielectric layers (15) |
| | Beryllium and Beryllium alloys | Dielectric layers (15) Borides Beryllium |
| | Sensor window materials (9) | Dielectric layers (15) |
| | Titanium alloys (13) | Borides Nitrides |

TABLE - DEPOSITION TECHNIQUES

| 1. <u>Coating Process</u> (1) | 2. <u>Substrate</u> | 3. <u>Resultant Coating</u> |
|--|--|---|
| B.2. Ion assisted resistive heating Physical Vapour Deposition (PVD) (Ion Plating) | Ceramics (19) and Low-expansion glasses (14) | Dielectric layers (15) Diamond-like carbon (17) |
| | Carbon-carbon, Ceramic and Metal "matrix" "composites" | Dielectric layers (15) |
| | Cemented tungsten carbide (16), Silicon carbide | Dielectric layers (15) |
| | Molybdenum and Molybdenum alloys | Dielectric layers (15) |
| | Beryllium and Beryllium alloys | Dielectric layers (15) |
| | Sensor window materials (9) | Dielectric layers (15) Diamond-like carbon (17) |
| B.3. Physical Vapour Deposition (PVD): "Laser" Vaporization | Ceramics (19) and Low-expansion glasses (14) | Silicides Dielectric layers (15) Diamond-like carbon (17) |
| | Carbon-carbon, Ceramic and Metal "matrix" "composites" | Dielectric layers (15) |
| | Cemented tungsten carbide (16), Silicon carbide | Dielectric layers (15) |
| | Molybdenum and Molybdenum alloys | Dielectric layers (15) |
| | Beryllium and Beryllium alloys | Dielectric layers (15) |
| | Sensor window materials (9) | Dielectric layers (15) Diamond-like carbon |

TABLE - DEPOSITION TECHNIQUES

| 1. <u>Coating Process</u> (1) | 2. <u>Substrate</u> | 3. <u>Resultant Coating</u> |
|---|---|--|
| B.4. Physical Vapour Deposition (PVD): Cathodic Arc Discharge | "Superalloys" | Alloyed silicides Alloyed aluminides (2) MCrAlX (5) |
| | Polymers (11) and Organic "matrix" "composites" | Borides Carbides Nitrides Diamond-like carbon (17) |
| C. Pack cementation (see A above for out-of-pack cementation) (10) | Carbon-carbon, Ceramic and Metal "matrix" "composites" | Silicides Carbides Mixtures thereof (4) |
| | Titanium alloys (13) | Silicides Aluminides Alloyed aluminides (2) |
| | Refractory metals and alloys (8) | Silicides Oxides |
| D. Plasma spraying | "Superalloys" | MCrAlX (5) Modified zirconia (12) Mixtures thereof (4) Abradable Nickel-Graphite Abradable materials containing Ni-Cr-Al Abradable Al-Si-Polyester Alloyed aluminides (2) |
| | Aluminium alloys (6) | MCrAlX (5) Modified zirconia (12) Silicides Mixtures thereof (4) |
| | Refractory metals and alloys (8) | Aluminides Silicides Carbides |

TABLE - DEPOSITION TECHNIQUES

| 1. <u>Coating Process</u> (1) | 2. <u>Substrate</u> | 3. <u>Resultant Coating</u> |
|-------------------------------|--|--|
| D. (continued) | Corrosion resistant steel (7) | MCrAlX (5) Modified zirconia (12) Mixtures thereof (4) |
| | Titanium alloys (13) | Carbides Aluminides Silicides Alloyed aluminides (2) Abradable Nickel-Graphite Abradable materials containing Ni-Cr-Al Abradable Al-Si-Polyester |
| <hr/> | | |
| E. Slurry Deposition | Refractory metals and alloys (8) | Fused silicides Fused aluminides except for resistance heating elements |
| | Carbon-carbon, Ceramic and Metal "matrix" "composites" | Silicides Carbides Mixtures thereof (4) |
| <hr/> | | |
| F. Sputter Deposition | "Superalloys" | Alloyed silicides Alloyed aluminides (2) Noble metal modified aluminides (3) MCrAlX (5) Modified zirconia (12) Platinum Mixtures thereof (4) |
| | Ceramics and Low-expansion glasses (14) | Silicides Platinum Mixtures thereof (4) Dielectric layers (15) Diamond-like carbon (17) |

TABLE - DEPOSITION TECHNIQUES

| 1. <u>Coating Process</u> (1) | 2. <u>Substrate</u> | 3. <u>Resultant Coating</u> |
|-------------------------------|--|---|
| F. (continued) | Titanium alloys (13) | Borides Nitrides Oxides Silicides Aluminides Alloyed aluminides (2) Carbides |
| | Carbon-carbon, Ceramic and Metal "matrix" "composites" | Silicides Carbides Refractory metals Mixtures thereof (4) Dielectric layers (15) Boron nitride |
| | Cemented tungsten carbide (16), Silicon carbide (18) | Carbides Tungsten Mixtures thereof (4) Dielectric layers (15) Boron nitride |
| | Molybdenum and Molybdenum alloys | Dielectric layers (15) |
| | Beryllium and Beryllium alloys | Borides Dielectric layers (15) Beryllium |
| | Sensor window materials (9) | Dielectric layers (15) Diamond-like carbon (17) |
| | Refractory metals and alloys (8) | Aluminides Silicides Oxides Carbides |

TABLE - DEPOSITION TECHNIQUES

| 1. <u>Coating Process</u> (1) | 2. <u>Substrate</u> | 3. <u>Resultant Coating</u> |
|-------------------------------|---------------------------------|--|
| G. Ion Implantation | High temperature bearing steels | Additions of Chromium Tantalum or Niobium (Columbium) |
| | Titanium alloys (13) | Borides Nitrides |
| | Beryllium and Beryllium alloys | Borides |
| | Cemented tungsten carbide (16) | Carbides Nitrides |

TABLE - DEPOSITION TECHNIQUES - NOTES

1. The term 'coating process' includes coating repair and refurbishing as well as original coating.
2. The term 'alloyed aluminide coating' includes single or multiple-step coatings in which an element or elements are deposited prior to or during application of the aluminide coating, even if these elements are deposited by another coating process. It does not, however, include the multiple use of single-step pack cementation processes to achieve alloyed aluminides.
3. The term 'noble metal modified aluminide' coating includes multiple-step coatings in which the noble metal or noble metals are laid down by some other coating process prior to application of the aluminide coating.
4. The term 'mixtures thereof' includes infiltrated material, graded compositions, co-deposits and multilayer deposits and are obtained by one or more of the coating processes specified in the Table.
5. 'MCrAlX' refers to a coating alloy where M equals cobalt, iron, nickel or combinations thereof and X equals hafnium, yttrium, silicon, tantalum in any amount or other intentional additions over 0.01 % by weight in various proportions and combinations, except:
 - a. CoCrAlY coatings which contain less than 22 % by weight of chromium, less than 7 % by weight of aluminium and less than 2 % by weight of yttrium;
 - b. CoCrAlY coatings which contain 22 to 24 % by weight of chromium, 10 to 12 % by weight of aluminium and 0.5 to 0.7 % by weight of yttrium; or
 - c. NiCrAlY coatings which contain 21 to 23 % by weight of chromium, 10 to 12 % by weight of aluminium and 0.9 to 1.1 % by weight of yttrium.
6. The term 'aluminium alloys' refers to alloys having an ultimate tensile strength of 190 MPa or more measured at 293 K (20°C).
7. The term 'corrosion resistant steel' refers to AISI (American Iron and Steel Institute) 300 series or equivalent national standard steels.
8. 'Refractory metals and alloys' include the following metals and their alloys: niobium (columbium), molybdenum, tungsten and tantalum.
9. 'Sensor window materials', as follows: alumina, silicon, germanium, zinc sulphide, zinc selenide, gallium arsenide, diamond, gallium phosphide, sapphire and the following metal halides: sensor window materials of more than 40 mm diameter for zirconium fluoride and hafnium fluoride.
10. "Technology" for single-step pack cementation of solid airfoils is not controlled by Category 2.

TABLE - DEPOSITION TECHNIQUES - NOTES

11. 'Polymers', as follows: polyimide, polyester, polysulphide, polycarbonates and polyurethanes.
12. 'Modified zirconia' refers to additions of other metal oxides (e.g., calcia, magnesia, yttria, hafnia, rare earth oxides) to zirconia in order to stabilise certain crystallographic phases and phase compositions. Thermal barrier coatings made of zirconia, modified with calcia or magnesia by mixing or fusion, are not controlled.
13. 'Titanium alloys' refers only to aerospace alloys having an ultimate tensile strength of 900 MPa or more measured at 293 K (20°C).
14. 'Low-expansion glasses' refers to glasses which have a coefficient of thermal expansion of $1 \times 10^{-7} \text{ K}^{-1}$ or less measured at 293 K (20°C).
15. 'Dielectric layers' are coatings constructed of multi-layers of insulator materials in which the interference properties of a design composed of materials of various refractive indices are used to reflect, transmit or absorb various wavelength bands. Dielectric layers refers to more than four dielectric layers or dielectric/metal "composite" layers.
16. 'Cemented tungsten carbide' does not include cutting and forming tool materials consisting of tungsten carbide/(cobalt, nickel), titanium carbide/(cobalt, nickel), chromium carbide/nickel-chromium and chromium carbide/nickel.
17. "Technology" specially designed to deposit diamond-like carbon on any of the following is not controlled:
magnetic disk drives and heads, equipment for the manufacture of disposables, valves for faucets, acoustic diaphragms for speakers, engine parts for automobiles, cutting tools, punching-pressing dies, office automation equipment, microphones or medical devices or moulds, for casting or moulding of plastics, manufactured from alloys containing less than 5% beryllium.
18. 'Silicon carbide' does not include cutting and forming tool materials.
19. Ceramic substrates, as used in this entry, does not include ceramic materials containing 5% by weight, or greater, clay or cement content, either as separate constituents or in combination.

TABLE - DEPOSITION TECHNIQUES - TECHNICAL NOTE

Processes specified in Column 1 of the Table are defined as follows:

- a. Chemical Vapour Deposition (CVD) is an overlay coating or surface modification coating process wherein a metal, alloy, "composite", dielectric or ceramic is deposited upon a heated substrate. Gaseous reactants are decomposed or combined in the vicinity of a substrate resulting in the deposition of the desired elemental, alloy or compound material on the substrate. Energy for this decomposition or chemical reaction process may be provided by the heat of the substrate, a glow discharge plasma, or "laser" irradiation.

N.B.1 CVD includes the following processes: directed gas flow out-of-pack deposition, pulsating CVD, controlled nucleation thermal deposition (CNTD), plasma enhanced or plasma assisted CVD processes.

N.B.2 Pack denotes a substrate immersed in a powder mixture.

N.B.3 The gaseous reactants used in the out-of-pack process are produced using the same basic reactions and parameters as the pack cementation process, except that the substrate to be coated is not in contact with the powder mixture.

- b. Thermal Evaporation-Physical Vapour Deposition (TE-PVD) is an overlay coating process conducted in a vacuum with a pressure less than 0.1 Pa wherein a source of thermal energy is used to vaporize the coating material. This process results in the condensation, or deposition, of the evaporated species onto appropriately positioned substrates.

The addition of gases to the vacuum chamber during the coating process to synthesize compound coatings is an ordinary modification of the process.

The use of ion or electron beams, or plasma, to activate or assist the coating's deposition is also a common modification in this technique. The use of monitors to provide in-process measurement of optical characteristics and thickness of coatings can be a feature of these processes.

Specific TE-PVD processes are as follows:

1. Electron Beam PVD uses an electron beam to heat and evaporate the material which forms the coating;
2. Ion Assisted Resistive Heating PVD employs electrically resistive heating sources in combination with impinging ion beam(s) to produce a controlled and uniform flux of evaporated coating species;
3. "Laser" Vaporization uses either pulsed or continuous wave "laser" beams to vaporize the material which forms the coating;

TABLE - DEPOSITION TECHNIQUES - TECHNICAL NOTE

Processes specified in Column 1 of the Table - continued:

- b. 4. Cathodic Arc Deposition employs a consumable cathode of the material which forms the coating and has an arc discharge established on the surface by a momentary contact of a ground trigger. Controlled motion of arcing erodes the cathode surface creating a highly ionized plasma. The anode can be either a cone attached to the periphery of the cathode, through an insulator, or the chamber. Substrate biasing is used for non line-of-sight deposition.

N.B. This definition does not include random cathodic arc deposition with non-biased substrates.

5. Ion Plating is a special modification of a general TE-PVD process in which a plasma or an ion source is used to ionize the species to be deposited, and a negative bias is applied to the substrate in order to facilitate the extraction of the species from the plasma. The introduction of reactive species, evaporation of solids within the process chamber, and the use of monitors to provide in-process measurement of optical characteristics and thicknesses of coatings are ordinary modifications of the process.

- c. Pack Cementation is a surface modification coating or overlay coating process wherein a substrate is immersed in a powder mixture (a pack), that consists of:

1. The metallic powders that are to be deposited (usually aluminium, chromium, silicon or combinations thereof);
2. An activator (normally a halide salt); and
3. An inert powder, most frequently alumina.

The substrate and powder mixture is contained within a retort which is heated to between 1,030 K (757°C) and 1,375 K (1,102°C) for sufficient time to deposit the coating.

- d. Plasma Spraying is an overlay coating process wherein a gun (spray torch) which produces and controls a plasma accepts powder or wire coating materials, melts them and propels them towards a substrate, whereon an integrally bonded coating is formed. Plasma spraying constitutes either low pressure plasma spraying or high velocity plasma spraying.

N.B.1 Low pressure means less than ambient atmospheric pressure.

N.B.2 High velocity refers to nozzle-exit gas velocity exceeding 750 m/s calculated at 293 K (20°C) at 0.1 MPa.

- e. Slurry Deposition is a surface modification coating or overlay coating process wherein a metallic or ceramic powder with an organic binder is suspended in a liquid and is applied to a substrate by either spraying, dipping or painting, subsequent air or oven drying, and heat treatment to obtain the desired coating.

TABLE - DEPOSITION TECHNIQUES - TECHNICAL NOTE

Processes specified in Column 1 of the Table - continued:

- f. Sputter Deposition is an overlay coating process based on a momentum transfer phenomenon, wherein positive ions are accelerated by an electric field towards the surface of a target (coating material). The kinetic energy of the impacting ions is sufficient to cause target surface atoms to be released and deposited on an appropriately positioned substrate.
- N.B.1 The Table refers only to triode, magnetron or reactive sputter deposition which is used to increase adhesion of the coating and rate of deposition and to radio frequency (RF) augmented sputter deposition used to permit vaporisation of non-metallic coating materials.
- N.B.2 Low-energy ion beams (less than 5 keV) can be used to activate the deposition.
- g. Ion Implantation is a surface modification coating process in which the element to be alloyed is ionized, accelerated through a potential gradient and implanted into the surface region of the substrate. This includes processes in which ion implantation is performed simultaneously with electron beam physical vapour deposition or sputter deposition.

CATEGORY 3 - ELECTRONICS

3A Systems, Equipment and Components

Note 1: The control status of equipment and components described in 3A001 or 3A002, other than those described in 3A001.a.3. to 3A001.a.10. or 3A001.a.12., which are specially designed for or which have the same functional characteristics as other equipment is determined by the control status of the other equipment.

Note 2: The control status of integrated circuits described in 3A001.a.3. to 3A001.a.9. or 3A001.a.12. which are unalterably programmed or designed for a specific function for another equipment is determined by the control status of the other equipment.

N.B.: When the manufacturer or applicant cannot determine the control status of the other equipment, the control status of the integrated circuits is determined in 3A001.a.3. to 3A001.a.9. and 3A001.a.12.

3A001 Electronic components and specially designed components therefor, as follows:

a. General purpose integrated circuits, as follows:

Note 1: The control status of wafers (finished or unfinished), in which the function has been determined, is to be evaluated against the parameters of 3A001.a.

Note 2: Integrated circuits include the following types:

- "Monolithic integrated circuits";
- "Hybrid integrated circuits";
- "Multichip integrated circuits";
- "Film type integrated circuits", including silicon-on-sapphire integrated circuits;
- "Optical integrated circuits".

1. Integrated circuits designed or rated as radiation hardened to withstand any of the following:

- a. A total dose of 5×10^3 Gy (silicon) or higher;
- b. A dose rate upset of 5×10^6 Gy (silicon)/s or higher; or
- c. A fluence (integrated flux) of neutrons (1 MeV equivalent) of 5×10^{13} n/cm² or higher on silicon, or its equivalent for other materials;

Note: 3A001.a.1.c. does not apply to Metal Insulator Semiconductors (MIS).

3A001

a. continued

2. "Microprocessor microcircuits", "microcomputer microcircuits", microcontroller microcircuits, storage integrated circuits manufactured from a compound semiconductor, analogue-to-digital converters, digital-to-analogue converters, electro-optical or "optical integrated circuits" designed for "signal processing", field programmable logic devices, custom integrated circuits for which either the function is unknown or the control status of the equipment in which the integrated circuit will be used is unknown, Fast Fourier Transform (FFT) processors, electrical erasable programmable read-only memories (EEPROMs), flash memories or static random-access memories (SRAMs), having any of the following:

- a. Rated for operation at an ambient temperature above 398 K (125°C);
- b. Rated for operation at an ambient temperature below 218 K (-55°C); or
- c. Rated for operation over the entire ambient temperature range from 218 K (-55°C) to 398 K (125°C);

Note: 3A001.a.2. does not apply to integrated circuits for civil automobiles or railway train applications.

3. "Microprocessor microcircuits", "microcomputer microcircuits" and microcontroller microcircuits, manufactured from a compound semiconductor and operating at a clock frequency exceeding 40 MHz;

Note: 3A001.a.3. includes digital signal processors, digital array processors and digital coprocessors.

4. Storage integrated circuits manufactured from a compound semiconductor;

5. Analogue-to-digital and digital-to-analogue converter integrated circuits, as follows:

- a. Analogue-to-digital converters having any of the following:

N.B. SEE ALSO 3A101

1. A resolution of 8 bit or more, but less than 10 bit, with an output rate greater than 500 million words per second;
2. A resolution of 10 bit or more, but less than 12 bit, with an output rate greater than 200 million words per second;
3. A resolution of 12 bit with an output rate greater than 105 million words per second;
4. A resolution of more than 12 bit, but equal to or less than 14 bit, with an output rate greater than 10 million words per second; or
5. A resolution of more than 14 bit with an output rate greater than 2.5 million words per second;

- b. Digital-to-analogue converters with a resolution of 12 bit or more and a "settling time" of less than 10 ns;

Technical Notes:

1. A resolution of n bit corresponds to a quantisation of 2^n levels.
2. The number of bits in the output word is equal to the resolution of the analogue-to-digital converter.
3. The output rate is the maximum output rate of the converter, regardless of the architecture or oversampling. Vendors may also refer to the output rate as sampling rate, conversion rate or throughput rate. It is often specified in megahertz (MHz) or mega samples per second (MSPS).
4. For the purpose of measuring output rate, one output word per second is equivalent to one Hertz or one sample per second.

3A001 a. continued

6. Electro-optical and "optical integrated circuits", designed for "signal processing" and having all of the following:
 - a. One or more than one internal "laser" diode;
 - b. One or more than one internal light detecting element; and
 - c. Optical waveguides;
7. 'Field programmable logic devices' having any of the following:
 - a. A maximum number of digital input/outputs greater than 200; or
 - b. A system gate count of greater than 230,000;

Note: 3A001.a.7. includes:

- Simple Programmable Logic Devices (SPLDs)
- Complex Programmable Logic Devices (CPLDs)
- Field Programmable Gate Arrays (FPGAs)
- Field Programmable Logic Arrays (FPLAs)
- Field Programmable Interconnects (FPICs)

Technical Notes:

1. 'Field programmable logic devices' are also known as field programmable gate or field programmable logic arrays.
 2. Maximum number of digital input/outputs in 3A001.a.7.a. is also referred to as the maximum user input/outputs or maximum available input/outputs, whether the integrated circuit is packaged or bare die.
8. Not used;
 9. Neural network integrated circuits;
 10. Custom integrated circuits for which the function is unknown, or the control status of the equipment in which the integrated circuits will be used is unknown to the manufacturer, having any of the following:
 - a. More than 1,500 terminals;
 - b. A typical "basic gate propagation delay time" of less than 0.02 ns; or
 - c. An operating frequency exceeding 3 GHz;
 11. Digital integrated circuits, other than those described in 3A001.a.3. to 3A001.a.10. and 3A001.a.12., based upon any compound semiconductor and having any of the following:
 - a. An equivalent gate count of more than 3,000 (2 input gates); or
 - b. A toggle frequency exceeding 1.2 GHz;
 12. Fast Fourier Transform (FFT) processors having a rated execution time for an N-point complex FFT of less than $(N \log_2 N) / 20,480$ ms, where N is the number of points;

Technical Note:

When N is equal to 1,024 points, the formula in 3A001.a.12. gives an execution time of 500 μ s.

3A001 continued

- b. Microwave or millimetre wave components, as follows:
1. Electronic vacuum tubes and cathodes, as follows:
 - Note 1: 3A001.b.1. does not control tubes designed or rated for operation in any frequency band and having all of the following:
 - a. Does not exceed 31.8 GHz; and
 - b. Is "allocated by the ITU" for radio-communications services, but not for radio-determination.
 - Note 2: 3A001.b.1. does not control non-"space-qualified" tubes having all of the following:
 - a. An average output power equal to or less than 50 W; and
 - b. Designed or rated for operation in any frequency band and having all of the following:
 1. Exceeds 31.8 GHz but does not exceed 43.5 GHz; and
 2. Is "allocated by the ITU" for radio-communications services, but not for radio-determination.
 - a. Travelling wave tubes, pulsed or continuous wave, as follows:
 1. Tubes operating at frequencies exceeding 31.8 GHz;
 2. Tubes having a cathode heater element with a turn on time to rated RF power of less than 3 seconds;
 3. Coupled cavity tubes, or derivatives thereof, with a "fractional bandwidth" of more than 7% or a peak power exceeding 2.5 kW;
 4. Helix tubes, or derivatives thereof, having any of the following:
 - a. An "instantaneous bandwidth" of more than one octave, and average power (expressed in kW) times frequency (expressed in GHz) of more than 0.5;
 - b. An "instantaneous bandwidth" of one octave or less, and average power (expressed in kW) times frequency (expressed in GHz) of more than 1; or
 - c. Being "space-qualified";
 - b. Crossed-field amplifier tubes with a gain of more than 17 dB;
 - c. Impregnated cathodes designed for electronic tubes producing a continuous emission current density at rated operating conditions exceeding 5 A/cm^2 ;

3A001

b. continued

2. Microwave "Monolithic Integrated Circuits" (MMIC) power amplifiers having any of the following:
 - a. Rated for operation at frequencies exceeding 3.2 GHz up to and including 6 GHz and with an average output power greater than 4W (36 dBm) with a "fractional bandwidth" greater than 15%;
 - b. Rated for operation at frequencies exceeding 6 GHz up to and including 16 GHz and with an average output power greater than 1W (30 dBm) with a "fractional bandwidth" greater than 10%;
 - c. Rated for operation at frequencies exceeding 16 GHz up to and including 31.8 GHz and with an average output power greater than 0.8W (29 dBm) with a "fractional bandwidth" greater than 10%;
 - d. Rated for operation at frequencies exceeding 31.8 GHz up to and including 37.5 GHz;
 - e. Rated for operation at frequencies exceeding 37.5 GHz up to and including 43.5 GHz and with an average output power greater than 0.25W (24 dBm) with a "fractional bandwidth" greater than 10%; or
 - f. Rated for operation at frequencies exceeding 43.5 GHz;

Note 1: 3A001.b.2. does not control broadcast satellite equipment designed or rated to operate in the frequency range of 40.5 GHz to 42.5 GHz.

Note 2: The control status of the MMIC whose rated operating frequency includes frequencies listed in more than one frequency range, as defined by 3A001.b.2.a. to 3A001.b.2.f., is determined by the lowest average output power control threshold.

Note 3: Notes 1 and 2 in the chapeau to Category 3 mean that 3A001.b.2. does not control MMICs if they are specially designed for other applications, e.g., telecommunications, radar, automobiles.
3. Discrete microwave transistors having any of the following:
 - a. Rated for operation at frequencies exceeding 3.2 GHz up to and including 6 GHz and having an average output power greater than 60W (47.8 dBm);
 - b. Rated for operation at frequencies exceeding 6 GHz up to and including 31.8 GHz and having an average output power greater than 20W (43 dBm);
 - c. Rated for operation at frequencies exceeding 31.8 GHz up to and including 37.5 GHz and having an average output power greater than 0.5W (27 dBm);
 - d. Rated for operation at frequencies exceeding 37.5 GHz up to and including 43.5 GHz and having an average output power greater than 1W (30 dBm); or
 - e. Rated for operation at frequencies exceeding 43.5 GHz;

Note: The control status of a transistor whose rated operating frequency includes frequencies listed in more than one frequency range, as defined by 3A001.b.3.a. to 3A001.b.3.e., is determined by the lowest average output power control threshold.

3A001

b. continued

4. Microwave solid state amplifiers and microwave assemblies/modules containing microwave solid state amplifiers, having any of the following:
 - a. Rated for operation at frequencies exceeding 3.2 GHz up to and including 6 GHz and with an average output power greater than 60W (47.8 dBm) with a "fractional bandwidth" greater than 15%;
 - b. Rated for operation at frequencies exceeding 6 GHz up to and including 31.8 GHz and with an average output power greater than 15W (42 dBm) with a "fractional bandwidth" greater than 10%;
 - c. Rated for operation at frequencies exceeding 31.8 GHz up to and including 37.5 GHz;
 - d. Rated for operation at frequencies exceeding 37.5 GHz up to and including 43.5 GHz and with an average output power greater than 1W (30 dBm) with a "fractional bandwidth" greater than 10%;
 - e. Rated for operation at frequencies exceeding 43.5 GHz; or
 - f. Rated for operation at frequencies above 3.2 GHz and having all of the following:
 1. An average output power (in watts), P, greater than 150 divided by the maximum operating frequency (in GHz) squared ;
 2. A "fractional bandwidth" of 5% or greater; and
 3. Any two sides perpendicular to one another with length d (in cm) equal to or less than 15 divided by the lowest operating frequency in GHz ;

Technical Note:
 3.2 GHz should be used as the lowest operating frequency (f_{GHz}) in the formula in 3A001.b.4.f.3., for amplifiers that have a rated operating range extending downward to 3.2 GHz and below .

N.B.: MMIC power amplifiers should be evaluated against the criteria in 3A001.b.2.

Note 1: 3A001.b.4. does not control broadcast satellite equipment designed or rated to operate in the frequency range of 40.5 to 42.5 GHz.

Note 2: The control status of an item whose rated operating frequency includes frequencies listed in more than one frequency range, as defined by 3A001.b.4.a. to 3A001.b.4.e., is determined by the lowest average output power control threshold.
5. Electronically or magnetically tunable band-pass or band-stop filters, having more than 5 tunable resonators capable of tuning across a 1.5:1 frequency band (f_{max}/f_{min}) in less than 10 μ s and having any of the following:
 - a. A band-pass bandwidth of more than 0.5% of centre frequency; or
 - b. A band-stop bandwidth of less than 0.5% of centre frequency;
6. Not used;
7. Converters and harmonic mixers, designed to extend the frequency range of equipment described in 3A002.c., 3A002.d., 3A002.e. or 3A002.f. beyond the limits stated therein;

3A001

b. continued

8. Microwave power amplifiers containing tubes specified in 3A001.b.1. and having all of the following:
- Operating frequencies above 3 GHz;
 - An average output power to mass ratio exceeding 80 W/kg; and
 - A volume of less than 400 cm³;

Note: 3A001.b.8. does not control equipment designed or rated for operation in any frequency band which is "allocated by the ITU" for radio-communications services, but not for radio-determination.

9. Microwave power modules (MPM) consisting of, at least, a travelling wave tube, a microwave "monolithic integrated circuit" and an integrated electronic power conditioner and having all of the following:
- A 'turn-on time' from off to fully operational in less than 10 seconds;
 - A volume less than the maximum rated power in Watts multiplied by 10 cm³/W; and
 - An "instantaneous bandwidth" greater than 1 octave ($f_{\max} > 2f_{\min}$) and having any of the following:
 - For frequencies equal to or less than 18 GHz, an RF output power greater than 100 W; or
 - A frequency greater than 18 GHz;

Technical Notes:

- To calculate the volume in 3A001.b.9.b., the following example is provided: for a maximum rated power of 20 W, the volume would be: $20 \text{ W} \times 10 \text{ cm}^3/\text{W} = 200 \text{ cm}^3$.
- The 'turn-on time' in 3A001.b.9.a. refers to the time from fully-off to fully operational, i.e., it includes the warm-up time of the MPM.

10. Oscillators or oscillator assemblies, designed to operate with all of the following:
- A single sideband (SSB) phase noise, in dBc/Hz, better than $-(126+20\log_{10}F-20\log_{10}f)$ for $10 \text{ Hz} < F < 10 \text{ kHz}$; and
 - A single sideband (SSB) phase noise, in dBc/Hz, better than $-(114+20\log_{10}F-20\log_{10}f)$ for $10 \text{ kHz} \leq F < 500 \text{ kHz}$;

Technical Note:

In 3A001.b.10., F is the offset from the operating frequency in Hz and f is the operating frequency in MHz.

11. "Frequency synthesizer" "electronic assemblies" having a "frequency switching time" from one selected frequency to another as specified by any of the following:
- Less than 312 ps;
 - Less than 100 μ s for any frequency change exceeding 1.6 GHz within the synthesized frequency range exceeding 3.2 GHz but not exceeding 10.6 GHz;
 - Less than 250 μ s for any frequency change exceeding 550 MHz within the synthesized frequency range exceeding 10.6 GHz but not exceeding 31.8 GHz;
 - Less than 500 μ s for any frequency change exceeding 550 MHz within the synthesized frequency range exceeding 31.8 GHz but not exceeding 43.5 GHz; or
 - Less than 1 ms within the synthesized frequency range exceeding 43.5 GHz.

N.B.: For general purpose "signal analysers", signal generators, network analysers and microwave test receivers, see 3A002.c., 3A002.d., 3A002.e. and 3A002.f., respectively.

3A001

continued

c. Acoustic wave devices as follows and specially designed components therefor:

- Surface acoustic wave and surface skimming (shallow bulk) acoustic wave devices, having any of the following:
 - A carrier frequency exceeding 6 GHz;
 - A carrier frequency exceeding 1 GHz, but not exceeding 6 GHz and having any of the following:
 - A 'frequency side-lobe rejection' exceeding 65 dB;

2. A product of the maximum delay time and the bandwidth (time in μs and bandwidth in MHz) of more than 100;
3. A bandwidth greater than 250 MHz; or
4. A dispersive delay of more than 10 μs ; or
- c. A carrier frequency of 1 GHz or less and having any of the following:
 1. A product of the maximum delay time and the bandwidth (time in μs and bandwidth in MHz) of more than 100;
 2. A dispersive delay of more than 10 μs ; or
 3. A 'frequency side-lobe rejection' exceeding 65 dB and a bandwidth greater than 100 MHz;

Technical Note:

'Frequency side-lobe rejection' is the maximum rejection value specified in data sheet.

2. Bulk (volume) acoustic wave devices which permit the direct processing of signals at frequencies exceeding 6 GHz;
3. Acoustic-optic "signal processing" devices employing interaction between acoustic waves (bulk wave or surface wave) and light waves which permit the direct processing of signals or images, including spectral analysis, correlation or convolution;

Note: 3A001.c. does not control acoustic wave devices that are limited to a single band pass, low pass, high pass or notch filtering, or resonating function.

- d. Electronic devices and circuits containing components, manufactured from "superconductive" materials, specially designed for operation at temperatures below the "critical temperature" of at least one of the "superconductive" constituents and having any of the following:
 1. Current switching for digital circuits using "superconductive" gates with a product of delay time per gate (in seconds) and power dissipation per gate (in watts) of less than 10^{-14} J; or
 2. Frequency selection at all frequencies using resonant circuits with Q-values exceeding 10,000;

3A001 continued

e. High energy devices as follows:

1. 'Cells' as follows:

- a. 'Primary cells' having an 'energy density' exceeding 550 Wh/kg at 20°C;
- b. 'Secondary cells' having an 'energy density' exceeding 250 Wh/kg

Technical Notes:

1. For the purpose of 3A001.e.1., 'energy density' (Wh/kg) is calculated from the nominal voltage multiplied by the nominal capacity in ampere-hours (Ah) divided by the mass in kilograms. If the nominal capacity is not stated, energy density is calculated from the nominal voltage squared then multiplied by the discharge duration in hours divided by the discharge load in ohms and the mass in kilograms.
2. For the purpose of 3A001.e.1., a 'cell' is defined as an electrochemical device, which has positive and negative electrodes, an electrolyte, and is a source of electrical energy. It is the basic building block of a battery.
3. For the purpose of 3A001.e.1.a., a 'primary cell' is a 'cell' that is not designed to be charged by any other source.
4. For the purpose of 3A001.e.1.b., a 'secondary cell' is a 'cell' that is designed to be charged by an external electrical source.

Note: 3A001.e.1. does not control batteries, including single-cell batteries.

2. High energy storage capacitors as follows:

N.B.: SEE ALSO 3A201.a.

- a. Capacitors with a repetition rate of less than 10 Hz (single shot capacitors) and having all of the following:
 1. A voltage rating equal to or more than 5 kV;
 2. An energy density equal to or more than 250 J/kg; and
 3. A total energy equal to or more than 25 kJ;
- b. Capacitors with a repetition rate of 10 Hz or more (repetition rated capacitors) and having all of the following:
 1. A voltage rating equal to or more than 5 kV;
 2. An energy density equal to or more than 50 J/kg;
 3. A total energy equal to or more than 100 J; and
 4. A charge/discharge cycle life equal to or more than 10,000;

3. "Superconductive" electromagnets and solenoids, specially designed to be fully charged or discharged in less than one second and having all of the following:

N.B.: SEE ALSO 3A201.b.

Note: 3A001.e.3. does not control "superconductive" electromagnets or solenoids specially designed for Magnetic Resonance Imaging (MRI) medical equipment.

- a. Energy delivered during the discharge exceeding 10 kJ in the first second;
- b. Inner diameter of the current carrying windings of more than 250 mm; and
- c. Rated for a magnetic induction of more than 8 T or "overall current density" in the winding of more than 300 A/mm²;

3A001 e continued

4. Solar cells, cell-interconnect-coverglass (CIC) assemblies, solar panels, and solar arrays, which are "space-qualified", having a minimum average efficiency exceeding 20% at an operating temperature of 301 K (28°C) under simulated 'AM0' illumination with an irradiance of 1,367 watts per square metre (W/m²);

Technical Note:

'AM0', or 'Air Mass Zero', refers to the spectral irradiance of sun light in the earth's outer atmosphere when the distance between the earth and sun is one astronomical unit (AU).

- f. Rotary input type absolute position encoders having an accuracy equal to or less (better) than ± 1.0 second of arc;
- g. Solid-state pulsed power switching thyristor devices and 'thyristor modules', using either electrically, optically, or electron radiation controlled switch methods and having any of the following:
1. A maximum turn-on current rate of rise (di/dt) greater than 30,000 A/ μ s and off-state voltage greater than 1,100 V; or
 2. A maximum turn-on current rate of rise (di/dt) greater than 2,000 A/ μ s and having all of the following:
 - a. An off-state peak voltage equal to or greater than 3,000 V; and
 - b. A peak (surge) current equal to or greater than 3,000 A.

Note 1: 3A001.g. includes:

- Silicon Controlled Rectifiers (SCRs)
- Electrical Triggering Thyristors (ETTs)
- Light Triggering Thyristors (LTTs)
- Integrated Gate Commutated Thyristors (IGCTs)
- Gate Turn-off Thyristors (GTOs)
- MOS Controlled Thyristors (MCTs)
- Solidtrons

Note 2: 3A001.g. does not control thyristor devices and 'thyristor modules' incorporated into equipment designed for civil railway or "civil aircraft" applications.

Technical Note:

For the purposes of 3A001.g., a 'thyristor module' contains one or more thyristor devices.

- h. Solid-state power semiconductor switches, diodes, or 'modules', having all of the following:
1. Rated for a maximum operating junction temperature greater than 488 K (215°C);
 2. Repetitive peak off-state voltage (blocking voltage) exceeding 300 V; and
 3. Continuous current greater than 1 A.

Note 1: Repetitive peak off-state voltage in 3A001.h. includes drain to source voltage, collector to emitter voltage, repetitive peak reverse voltage and peak repetitive off-state blocking voltage.

3A001. h continued

Note 2: 3A001.h. includes:

- Junction Field Effect Transistors (JFETs)
- Vertical Junction Field Effect Transistors (VJFETs)
- Metal Oxide Semiconductor Field effect Transistors (MOSFETs)
- Double Diffused Metal Oxide Semiconductor Field Effect Transistor (DMOSFET)
- Insulated Gate Bipolar Transistor (IGBT)
- High Electron Mobility Transistors (HEMTs)
- Bipolar Junction Transistors (BJTs)
- Thyristors and Silicon Controlled Rectifiers (SCRs)
- Gate Turn-Off Thyristors (GTOs)
- Emitter Turn-Off Thyristors (ETOs)
- PiN Diodes
- Schottky Diodes

Note 3: 3A001.h. does not control switches, diodes, or 'modules' incorporated into equipment designed for civil automobile, civil railway or "civil aircraft" applications.

Technical Note:

For the purposes of 3A001.h., 'modules' contain one or more solid-state power semiconductor switches or diodes.

3A002 General purpose electronic equipment and accessories therefor, as follows:

a. Recording equipment as follows and specially designed test tape therefor:

1. Analogue instrumentation magnetic tape recorders, including those permitting the recording of digital signals (e.g. using a high density digital recording (HDDR) module), having any of the following:
 - a. A bandwidth exceeding 4 MHz per electronic channel or track;
 - b. A bandwidth exceeding 2 MHz per electronic channel or track and having more than 42 tracks; or
 - c. A time displacement (base) error, measured in accordance with applicable IRIG or EIA documents, of less than $\pm 0.1 \mu\text{s}$;

Note: Analogue magnetic tape recorders specially designed for civilian video purposes are not considered to be instrumentation tape recorders.

2. Digital video magnetic tape recorders having a maximum digital interface transfer rate exceeding 360 Mbit/s;

Note: 3A002.a.2. does not control digital video magnetic tape recorders specially designed for television recording using a signal format, which may include a compressed signal format, standardised or recommended by the ITU, the IEC, the SMPTE, the EBU, the ETSI or the IEEE for civil television applications.

3. Digital instrumentation magnetic tape data recorders employing helical scan techniques or fixed head techniques and having any of the following:

- a. A maximum digital interface transfer rate exceeding 175 Mbit/s; or
- b. Being "space-qualified";

Note: 3A002.a.3. does not control analogue magnetic tape recorders equipped with HDDR conversion electronics and configured to record only digital data.

- 3A002. a continued
4. Equipment having a maximum digital interface transfer rate exceeding 175 Mbit/s and designed to convert digital video magnetic tape recorders for use as digital instrumentation data recorders;
 5. Waveform digitisers and transient recorders, having all of the following:
 - a. Digitising rate equal to or more than 200 million samples per second and a resolution of 10 bit or more; and
 - b. A 'continuous throughput' of 2 Gbit/s or more;

Technical Notes:

 1. *For those instruments with a parallel bus architecture, the 'continuous throughput' rate is the highest word rate multiplied by the number of bits in a word.*
 2. *'Continuous throughput' is the fastest data rate the instrument can output to mass storage without the loss of any information whilst sustaining the sampling rate and analogue-to-digital conversion.*
 6. Digital instrumentation data recorders using magnetic disk storage technique and having all of the following:
 - a. Digitising rate equal to or more than 100 million samples per second and a resolution of 8 bit or more; and
 - b. A 'continuous throughput' of 1 Gbit/s or more;
- b. Not used;
- c. Radio-frequency "signal analysers" as follows:
1. "Signal analysers" capable of analysing frequencies exceeding 31.8 GHz but not exceeding 37.5 GHz and having a 3 dB resolution bandwidth (RBW) exceeding 10 MHz;
 2. "Signal analysers" capable of analysing frequencies exceeding 43.5 GHz;
 3. "Dynamic signal analysers" having a "real-time bandwidth" exceeding 500 kHz;
- Note: 3A002.c.3. does not control those "dynamic signal analysers" using only constant percentage bandwidth filters (also known as octave or fractional octave filters).
- d. Frequency synthesised signal generators producing output frequencies, the accuracy and short term and long term stability of which are controlled, derived from or disciplined by the internal master reference oscillator, and having any of the following:
1. A maximum synthesised frequency exceeding 31.8 GHz but not exceeding 43.5 GHz and rated to generate a 'pulse duration' of less than 100 ns;
 2. A maximum synthesised frequency exceeding 43.5 GHz;
 3. A "frequency switching time" from one selected frequency to another as specified by any of the following:
 - a. Less than 312 ps;
 - b. Less than 100 μ s for any frequency change exceeding 1.6 GHz within the synthesised frequency range exceeding 3.2 GHz but not exceeding 10.6 GHz;
 - c. Less than 250 μ s for any frequency change exceeding 550 MHz within the synthesised frequency range exceeding 10.6 GHz but not exceeding 31.8 GHz;
 - d. Less than 500 μ s for any frequency change exceeding 550 MHz within the synthesised frequency range exceeding 31.8 GHz but not exceeding 43.5 GHz; or
 - e. Less than 1 ms within the synthesised frequency range exceeding 43.5 GHz; or
- 3A002 d. continued
4. A maximum synthesised frequency exceeding 3.2 GHz and having all of the following:
 - a. A single sideband (SSB) phase noise, in dBc/Hz, better than $-(126 + 20\log_{10}F - 20\log_{10}f)$ for $10 \text{ Hz} < F < 10 \text{ kHz}$; and
 - b. A single sideband (SSB) phase noise, in dBc/Hz, better than $-(114 + 20\log_{10}F - 20\log_{10}f)$ for $10 \text{ kHz} \leq F < 500 \text{ kHz}$;

Technical Note:
In 3A002.d.4., F is the offset from the operating frequency in Hz and f is the operating frequency in MHz;

Note 1.: For the purpose of 3A002.d., frequency synthesised signal generators include arbitrary waveform and function generators.

Note 2.: 3A002.d. does not control equipment in which the output frequency is either produced by the addition or subtraction of two or more crystal oscillator frequencies, or by an addition or subtraction followed by a multiplication of the result.

Technical Notes:

1. Arbitrary waveform and function generators are normally specified by sample rate (e.g., GSample/s), which is converted to the RF domain by the Nyquist factor of two. Thus, a 1 GSample/s arbitrary waveform has a direct output capability of 500 MHz. Or, when oversampling is used, the maximum direct output capability is proportionately lower.
 2. For the purposes of 3A002.d.1., 'pulse duration' is defined as the time interval between the leading edge of the pulse achieving 90% of the peak and the trailing edge of the pulse achieving 10% of the peak.
- e. Network analysers having any of the following:
1. Maximum operating frequency exceeding 43.5 GHz and output power exceeding 31.62 mW (15 dBm); or
 2. Maximum operating frequency exceeding 70 GHz;
- f. Microwave test receivers having all of the following:
1. A maximum operating frequency exceeding 43.5 GHz; and
 2. Being capable of measuring amplitude and phase simultaneously;
- g. Atomic frequency standards being any of the following:
1. "Space-qualified";
 2. Non-rubidium and having a long-term stability less (better) than 1×10^{-11} /month; or
 3. Non-"space-qualified" and having all of the following:
 - a. Being a rubidium standard;
 - b. Long-term stability less (better) than 1×10^{-11} /month; and
 - c. Total power consumption of less than 1 W.

3A003 Spray cooling thermal management systems employing closed loop fluid handling and reconditioning equipment in a sealed enclosure where a dielectric fluid is sprayed onto electronic components using specially designed spray nozzles that are designed to maintain electronic components within their operating temperature range, and specially designed components therefor.

3A101 Electronic equipment, devices and components, other than those specified in 3A001, as follows:

- a. Analogue-to-digital converters, usable in "missiles", designed to meet military specifications for ruggedized equipment;
- b. Accelerators capable of delivering electromagnetic radiation produced by bremsstrahlung from accelerated electrons of 2 MeV or greater, and systems containing those accelerators.

Note: 3A101.b. above does not specify equipment specially designed for medical purposes.

3A102 'Thermal batteries' designed or modified for 'missiles'.

Technical Notes:

1. In 3A102 'thermal batteries' are single use batteries that contain a solid non-conducting inorganic salt as the electrolyte. These batteries incorporate a pyrolytic material that, when ignited, melts the electrolyte and activates the battery.
2. In 3A102 'missile' means complete rocket systems and unmanned aerial vehicle systems capable of a range exceeding 300 km.

3A201 Electronic components, other than those specified in 3A001, as follows;

- a. Capacitors having either of the following sets of characteristics:
 1. a. Voltage rating greater than 1.4 kV;
b. Energy storage greater than 10 J;
c. Capacitance greater than 0.5 μ F; and
d. Series inductance less than 50 nH; or
 2. a. Voltage rating greater than 750 V;
b. Capacitance greater than 0.25 μ F; and
c. Series inductance less than 10 nH;
- b. Superconducting solenoidal electromagnets having all of the following characteristics:
 1. Capable of creating magnetic fields greater than 2 T;
 2. A ratio of length to inner diameter greater than 2;
 3. Inner diameter greater than 300 mm; and
 4. Magnetic field uniform to better than 1% over the central 50% of the inner volume;

Note: 3A201.b. does not control magnets specially designed for and exported 'as parts of' medical nuclear magnetic resonance (NMR) imaging systems. The phrase 'as part of' does not necessarily mean physical part in the same shipment; separate shipments from different sources are allowed, provided the related export documents clearly specify that the shipments are dispatched 'as part of' the imaging systems.

3A201 continued

- c. Flash X-ray generators or pulsed electron accelerators having either of the following sets of characteristics:
1. a. An accelerator peak electron energy of 500 keV or greater but less than 25 MeV; and
 - b. With a 'figure of merit' (K) of 0.25 or greater; or
 2. a. An accelerator peak electron energy of 25 MeV or greater; and
 - b. A 'peak power' greater than 50 MW.

Note: 3A201.c. does not control accelerators that are component parts of devices designed for purposes other than electron beam or X-ray radiation (electron microscopy, for example) nor those designed for medical purposes:

Technical Notes:

1. The 'figure of merit' K is defined as:

$$K = 1.7 \times 10^3 V^{2.65} Q$$

V is the peak electron energy in million electron volts.

If the accelerator beam pulse duration is less than or equal to 1 μ s, then Q is the total accelerated charge in Coulombs. If the accelerator beam pulse duration is greater than 1 μ s, then Q is the maximum accelerated charge in 1 μ s.

Q equals the integral of i with respect to t, over the lesser of 1 μ s or the time duration of the beam pulse ($Q = \int i dt$), where i is beam current in amperes and t is time in seconds.

2. 'Peak power' = (peak potential in volts) x (peak beam current in amperes).
3. In machines based on microwave accelerating cavities, the time duration of the beam pulse is the lesser of 1 μ s or the duration of the bunched beam packet resulting from one microwave modulator pulse.
4. In machines based on microwave accelerating cavities, the peak beam current is the average current in the time duration of a bunched beam packet.

3A225 Frequency changers or generators, other than those specified in 0B001.b.13., having all of the following characteristics:

- a. Multiphase output capable of providing a power of 40 W or greater;
- b. Capable of operating in the frequency range between 600 and 2000 Hz;
- c. Total harmonic distortion better (less) than 10%; and
- d. Frequency control better (less) than 0.1%.

Technical Note:

Frequency changers in 3A225 are also known as converters or inverters.

3A226 High-power direct current power supplies, other than those specified in 0B001.j.6., having both of the following characteristics:

- a. Capable of continuously producing, over a time period of 8 hours, 100 V or greater with current output of 500 A or greater; and
- b. Current or voltage stability better than 0.1% over a time period of 8 hours.

3A227 High-voltage direct current power supplies, other than those specified in 0B001.j.5., having both of the following characteristics:

- a. Capable of continuously producing, over a time period of 8 hours, 20 kV or greater with current output of 1 A or greater; and
- b. Current or voltage stability better than 0.1% over a time period of 8 hours.

3A228 Switching devices, as follows:

- a. Cold-cathode tubes, whether gas filled or not, operating similarly to a spark gap, having all of the following characteristics:
 - 1. Containing three or more electrodes;
 - 2. Anode peak voltage rating of 2.5 kV or more;
 - 3. Anode peak current rating of 100 A or more; and
 - 4. Anode delay time of 10 μ s or less;

Note: 3A228 includes gas krytron tubes and vacuum spraytron tubes.
- b. Triggered spark-gaps having both of the following characteristics:
 - 1. An anode delay time of 15 μ s or less; and
 - 2. Rated for a peak current of 500 A or more;
- c. Modules or assemblies with a fast switching function, other than those specified in 3A001.g. or 3A001.h., having all of the following characteristics:
 - 1. Anode peak voltage rating greater than 2 kV;
 - 2. Anode peak current rating of 500 A or more; and
 - 3. Turn-on time of 1 μ s or less.

3A229 High-current pulse generators as follows:

N.B.: SEE ALSO MILITARY GOODS CONTROLS.

N.B. See 1A007.a. for explosive detonator firing sets.

- a. Not used;
- b. Modular electrical pulse generators (pulsers) having all of the following characteristics:
 - 1. Designed for portable, mobile, or ruggedized-use;
 - 2. Enclosed in a dust-tight enclosure;
 - 3. Capable of delivering their energy in less than 15 μ s;
 - 4. Having an output greater than 100 A;
 - 5. Having a 'rise time' of less than 10 μ s into loads of less than 40 ohms;
 - 6. No dimension greater than 254 mm;
 - 7. Weight less than 25 kg; and
 - 8. Specified for use over an extended temperature range 223 K (-50°C) to 373 K (100°C) or specified as suitable for aerospace applications.

Note: 3A229.b. includes xenon flash-lamp drivers.

Technical Note:

In 3A229.b.5. 'rise time' is defined as the time interval from 10% to 90% current amplitude when driving a resistive load.

- 3A230 High-speed pulse generators having both of the following characteristics:
- Output voltage greater than 6 V into a resistive load of less than 55 ohms, and
 - 'Pulse transition time' less than 500 ps.
- Technical Note:
In 3A230, 'pulse transition time' is defined as the time interval between 10% and 90% voltage amplitude.
- 3A231 Neutron generator systems, including tubes, having both of the following characteristics:
- Designed for operation without an external vacuum system; and
 - Utilizing electrostatic acceleration to induce a tritium-deuterium nuclear reaction.
- 3A232 Multipoint initiation systems, other than those specified in 1A007, as follows:
N.B.: SEE ALSO MILITARY GOODS CONTROLS.
- N.B.: *See 1A007.b. for detonators.*
- Not used;
 - Arrangements using single or multiple detonators designed to nearly simultaneously initiate an explosive surface over greater than 5,000 mm² from a single firing signal with an initiation timing spread over the surface of less than 2.5 μs.
- Note: *3A232 does not control detonators using only primary explosives, such as lead azide.*
- 3A233 Mass spectrometers, other than those specified in 0B002.g., capable of measuring ions of 230 atomic mass units or greater and having a resolution of better than 2 parts in 230, as follows, and ion sources therefor:
- Inductively coupled plasma mass spectrometers (ICP/MS);
 - Glow discharge mass spectrometers (GDMS);
 - Thermal ionization mass spectrometers (TIMS);
 - Electron bombardment mass spectrometers which have a source chamber constructed from, lined with or plated with materials resistant to UF₆;
 - Molecular beam mass spectrometers having either of the following characteristics:
 - A source chamber constructed from, lined with or plated with stainless steel or molybdenum and equipped with a cold trap capable of cooling to 193 K (-80°C) or less; or
 - A source chamber constructed from, lined with or plated with materials resistant to UF₆;
 - Mass spectrometers equipped with a microfluorination ion source designed for actinides or actinide fluorides.

3B Test, Inspection and Production Equipment

3B001 Equipment for the manufacturing of semiconductor devices or materials, as follows and specially designed components and accessories therefor:

- a. Equipment designed for epitaxial growth as follows:
 1. Equipment capable of producing a layer of any material other than silicon with a thickness uniform to less than $\pm 2.5\%$ across a distance of 75 mm or more;
Note: 3B001.a.1. includes Atomic Layer Epitaxy (ALE) equipment.
 2. Metal Organic Chemical Vapour Deposition (MOCVD) reactors specially designed for compound semiconductor crystal growth by the chemical reaction between materials specified in 3C003 or 3C004;
 3. Molecular beam epitaxial growth equipment using gas or solid sources;
- b. Equipment designed for ion implantation and having any of the following:
 1. A beam energy (accelerating voltage) exceeding 1MeV;
 2. Being specially designed and optimised to operate at a beam energy (accelerating voltage) of less than 2 keV;
 3. Direct write capability; or
 4. A beam energy of 65 keV or more and a beam current of 45 mA or more for high energy oxygen implant into a heated semiconductor material "substrate";
- c. Anisotropic plasma dry etching equipment having all of the following:
 1. Designed or optimised to produce critical dimensions of 65 nm or less; and
 2. Within-wafer non-uniformity equal to or less than 10% 3σ measured with an edge exclusion of 2 mm or less;
- d. Plasma enhanced Chemical Vapour Deposition (CVD) equipment as follows:
 1. Equipment with cassette-to-cassette operation and load-locks, and designed according to the manufacturer's specifications or optimised for use in the production of semiconductor devices with critical dimensions of 180 nm or less;
 2. Equipment specially designed for equipment specified in 3B001.e. and designed according to the manufacturer's specifications or optimised for use in the production of semiconductor devices with critical dimensions of 180 nm or less;
- e. Automatic loading multi-chamber central wafer handling systems having all of the following:
 1. Interfaces for wafer input and output, to which more than two functionally different 'semiconductor process tools' specified in 3B001.a., 3B001.b., 3B001.c. or 3B001.d. are designed to be connected; and
 2. Designed to form an integrated system in a vacuum environment for 'sequential multiple wafer processing';
Note: 3B001.e. does not control automatic robotic wafer handling systems specially designed for parallel wafer processing.

Technical Notes:

1. For the purpose of 3B001.e., 'semiconductor process tools' refers to modular tools that provide physical processes for semiconductor production that are functionally different, such as deposition, etch, implant or thermal processing.
2. For the purpose of 3B001.e., 'sequential multiple wafer processing' means the capability to process each wafer in different 'semiconductor process tools', such as by transferring each wafer from one tool to a second tool and on to a third tool with the automatic loading multi-chamber central wafer handling systems.

3B001 continued

- f. Lithography equipment as follows:
 1. Align and expose step and repeat (direct step on wafer) or step and scan (scanner) equipment for wafer processing using photo-optical or X-ray methods and having any of the following:

- a. A light source wavelength shorter than 245 nm; or
- b. Capable of producing a pattern with a 'minimum resolvable feature size' of 180 nm or less;

Technical Note:

The 'minimum resolvable feature size' is calculated by the following formula:

$$MRF = \frac{(an\ exposure\ light\ source\ wavelength\ in\ nm) \times (K\ factor)}{numerical\ aperture}$$

where the *K factor* = 0.45

MRF = 'minimum resolvable feature size'

- 2. Imprint lithography equipment capable of producing features of 180 nm or less;
 - Note: 3B001.f.2. includes:
 - Micro contact printing tools
 - Hot embossing tools
 - Nano-imprint lithography tools
 - Step and flash imprint lithography (S-FIL) tools
 - 3. Equipment specially designed for mask making or semiconductor device processing using direct writing methods, having all of the following:
 - a. Using deflected focussed electron beam, ion beam or "laser" beam; and
 - b. Having any of the following:
 - 1. A spot size smaller than 0.2 µm;
 - 2. Being capable of producing a pattern with a feature size of less than 1 µm; or
 - 3. An overlay accuracy of better than ± 0.20 µm (3 sigma);
 - g. Masks and reticles, designed for integrated circuits specified in 3A001;
 - h. Multi-layer masks with a phase shift layer;
 - Note: 3B001.h. does not control multi-layer masks with a phase shift layer designed for the fabrication of memory devices not controlled by 3A001.
 - i. Imprint lithography templates designed for integrated circuits specified in 3A001.
- 3B002 Test equipment specially designed for testing finished or unfinished semiconductor devices as follows and specially designed components and accessories therefor:
- a. For testing S-parameters of transistor devices at frequencies exceeding 31.8 GHz;
 - b. Not used;
 - c. For testing microwave integrated circuits specified in 3A001.b.2.

3C Materials

- 3C001 Hetero-epitaxial materials consisting of a "substrate" having stacked epitaxially grown multiple layers of any of the following:
- Silicon (Si);
 - Germanium (Ge);
 - Silicon carbide (SiC); or
 - "III/V compounds" of gallium or indium.
- 3C002 Resist materials as follows and "substrates" coated with the following resists:
- Positive resists designed for semiconductor lithography specially adjusted (optimised) for use at wavelengths below 245 nm;
 - All resists designed for use with electron beams or ion beams, with a sensitivity of $0.01 \mu\text{coulomb}/\text{mm}^2$ or better;
 - All resists designed for use with X-rays, with a sensitivity of $2.5 \text{ mJ}/\text{mm}^2$ or better;
 - All resists optimised for surface imaging technologies, including 'silylated' resists;
Technical Note:
'Silylation' techniques are defined as processes incorporating oxidation of the resist surface to enhance performance for both wet and dry developing.
 - All resists designed or optimised for use with imprint lithography equipment specified in 3B001.f.2. that use either a thermal or photo-curable process.
- 3C003 Organo-inorganic compounds as follows:
- Organo-metallic compounds of aluminium, gallium or indium, having a purity (metal basis) better than 99.999%;
 - Organo-arsenic, organo-antimony and organo-phosphorus compounds, having a purity (inorganic element basis) better than 99.999%.
- Note:* 3C003 only controls compounds whose metallic, partly metallic or non-metallic element is directly linked to carbon in the organic part of the molecule.
- 3C004 Hydrides of phosphorus, arsenic or antimony, having a purity better than 99.999%, even diluted in inert gases or hydrogen.
- Note:* 3C004 does not control hydrides containing 20% molar or more of inert gases or hydrogen.
- 3C005 Silicon carbide (SiC), gallium nitride (GaN), aluminium nitride (AlN) or aluminium gallium nitride (AlGaN) "substrates", or ingots, boules, or other preforms of those materials, having resistivities greater than 10,000 ohm-cm at 20°C.
- 3C006 "Substrates" specified in 3C005 with at least one epitaxial layer of silicon carbide, gallium nitride, aluminium nitride or aluminium gallium nitride.

3D Software

3D001 "Software" specially designed for the "development" or "production" of equipment specified in 3A001.b. to 3A002.g. or 3B.

3D002 "Software" specially designed for the "use" of equipment specified in 3B001.a. to f. or 3B002.

3D003 'Physics-based' simulation "software" specially designed for the "development" of lithographic, etching or deposition processes for translating masking patterns into specific topographical patterns in conductors, dielectrics or semiconductor materials.

Technical Note:

'Physics-based' in 3D003 means using computations to determine a sequence of physical cause and effect events based on physical properties (e.g., temperature, pressure, diffusion constants and semiconductor materials properties).

Note: *Libraries, design attributes or associated data for the design of semiconductor devices or integrated circuits are considered as "technology".*

3D004 "Software" specially designed for the "development" of the equipment specified in 3A003.

3D101 "Software" specially designed or modified for the "use" of equipment specified in 3A101.b.

3E Technology

3E001 "Technology" according to the General Technology Note for the "development" or "production" of equipment or materials specified in 3A, 3B or 3C;

Note 1: *3E001 does not control "technology" for the "production" of equipment or components controlled by 3A003.*

Note 2: *3E001 does not control "technology" for the "development" or "production" of integrated circuits specified in 3A001.a.3. to 3A001.a.12., having all of the following:*

- 1. Using "technology" of 0.5 μm or more; and*
- 2. Not incorporating 'multi-layer structures'.*

Technical Note:

'Multi-layer structures' do not include devices incorporating a maximum of three metal layers and three polysilicon layers.

- 3E002 "Technology" according to the General Technology Note, other than that specified in 3E001, for the "development" or "production" of a "microprocessor microcircuit", "microcomputer microcircuit" or microcontroller microcircuit core, having an arithmetic logic unit with an access width of 32 bits or more and any of the following features or characteristics:
- a. A 'vector processor unit' designed to perform more than two calculations on floating-point vectors (one-dimensional arrays of 32-bit or larger numbers) simultaneously;
Technical Note:
A 'vector processor unit' is a processor element with built-in instructions that perform multiple calculations on floating-point vectors (one-dimensional arrays of 32-bit or larger numbers) simultaneously, having at least one vector arithmetic logic unit.
 - b. Designed to perform more than two 64-bit or larger floating-point operation results per cycle; or
 - c. Designed to perform more than four 16-bit fixed-point multiply-accumulate results per cycle (e.g., digital manipulation of analogue information that has been previously converted into digital form, also known as digital "signal processing").
Note: 3E002.c. does not control "technology" for multimedia extensions.
- Note 1:* 3E002 does not control "technology" for the "development" or "production" of micro-processor cores, having all of the following:
- a. Using "technology" at or above 0.130 μm ; and
 - b. Incorporating multi-layer structures with five or fewer metal layers.
- Note 2:* 3E002 includes "technology" for digital signal processors and digital array processors.
- 3E003 Other "technology" for the "development" or "production" of the following:
- a. Vacuum microelectronic devices;
 - b. Hetero-structure semiconductor devices such as high electron mobility transistors (HEMT), hetero-bipolar transistors (HBT), quantum well and super lattice devices;
Note: 3E003.b. does not control "technology" for high electron mobility transistors (HEMT) operating at frequencies lower than 31.8 GHz and hetero-junction bipolar transistors (HBT) operating at frequencies lower than 31.8 GHz.
 - c. "Superconductive" electronic devices;
 - d. Substrates of films of diamond for electronic components.
 - e. Substrates of silicon-on-insulator (SOI) for integrated circuits in which the insulator is silicon dioxide;
 - f. Substrates of silicon carbide for electronic components;
 - g. Electronic vacuum tubes operating at frequencies of 31.8 GHz or higher.
- 3E101 "Technology" according to the General Technology Note for the "use" of equipment or "software" specified in 3A001.a.1. or 2., 3A101, 3A102 or 3D101.
- 3E102 "Technology" according to the General Technology Note for the "development" of "software" specified in 3D101.
- 3E201 "Technology" according to the General Technology Note for the "use" of equipment specified in 3A001.e.2., 3A001.e.3., 3A001.g., 3A201, 3A225 to 3A233.

CATEGORY 4 - COMPUTERS

Note 1: *Computers, related equipment and "software" performing telecommunications or "local area network" functions must also be evaluated against the performance characteristics of Category 5, Part 1 (Telecommunications).*

Note 2: *Control units which directly interconnect the buses or channels of central processing units, "main storage" or disk controllers are not regarded as telecommunications equipment described in Category 5, Part 1 (Telecommunications).*

N.B.: *For the control status of "software" specially designed for packet switching, see 5D001.*

Note 3: *Computers, related equipment and "software" performing cryptographic, cryptanalytic, certifiable multi-level security or certifiable user isolation functions, or which limit electromagnetic compatibility (EMC), must also be evaluated against the performance characteristics in Category 5, Part 2 ("Information Security").*

4A Systems, Equipment and Components

4A001 Electronic computers and related equipment, having any of the following and "electronic assemblies" and specially designed components therefor:

N.B.: SEE ALSO 4A101.

- a. Specially designed to have any of the following:
 1. Rated for operation at an ambient temperature below 228 K (-45°C) or above 358 K (85°C); or
Note: *4A001.a.1. does not control computers specially designed for civil automobile or railway train applications.*
 2. Radiation hardened to exceed any of the following specifications:
 - a. Total Dose 5×10^3 Gy (silicon);
 - b. Dose Rate Upset 5×10^6 Gy (silicon)/s; or
 - c. Single Event Upset 1×10^7 Error/bit/day;
- b. Not used.

4A003 "Digital computers", "electronic assemblies", and related equipment therefor, as follows and specially designed components therefor:

Note 1: 4A003 includes the following:

- 'Vector processors';
- Array processors;
- Digital signal processors;
- Logic processors;
- Equipment designed for "image enhancement";
- Equipment designed for "signal processing".

Note 2: The control status of the "digital computers" and related equipment described in 4A003 is determined by the control status of other equipment or systems provided:

a. The "digital computers" or related equipment are essential for the operation of the other equipment or systems;

b. The "digital computers" or related equipment are not a "principal element" of the other equipment or systems; and

N.B. 1: The control status of "signal processing" or "image enhancement" equipment specially designed for other equipment with functions limited to those required for the other equipment is determined by the control status of the other equipment even if it exceeds the "principal element" criterion.

N.B. 2: For the control status of "digital computers" or related equipment for telecommunications equipment, see Category 5, Part 1 (Telecommunications).

c. The "technology" for the "digital computers" and related equipment is determined by 4E.

a. Designed or modified for "fault tolerance";

Note: For the purposes of 4A003.a., "digital computers" and related equipment are not considered to be designed or modified for "fault tolerance" if they utilise any of the following:

1. Error detection or correction algorithms in "main storage";
2. The interconnection of two "digital computers" so that, if the active central processing unit fails, an idling but mirroring central processing unit can continue the system's functioning;
3. The interconnection of two central processing units by data channels or by using shared storage to permit one central processing unit to perform other work until the second central processing unit fails, at which time the first central processing unit takes over in order to continue the system's functioning; or
4. The synchronisation of two central processing units by "software" so that one central processing unit recognises when the other central processing unit fails and recovers tasks from the failing unit.

b. "Digital computers" having an "Adjusted Peak Performance" ("APP") exceeding 1.5 Weighted TeraFLOPS (WT);

4A003 continued

- c. "Electronic assemblies" specially designed or modified for enhancing performance by aggregation of processors so that the "APP" of the aggregation exceeds the limit specified in 4A003.b.;

Note 1: 4A003.c. controls only "electronic assemblies" and programmable interconnections not exceeding the limit specified in 4A003.b. when shipped as unintegrated "electronic assemblies". It does not control "electronic assemblies" inherently limited by nature of their design for use as related equipment specified in 4A003.e.

Note 2: 4A003.c. does not control "electronic assemblies" specially designed for a product or family of products whose maximum configuration does not exceed the limit specified in 4A003.b.

- d. Not used;
- e. Equipment performing analogue-to-digital conversions exceeding the limits specified in 3A001.a.5.;
- f. Not used;
- g. Equipment specially designed for aggregating the performance of "digital computers" by providing external interconnections which allows communications at unidirectional data rates exceeding 2.0 Gbyte/s per link.

Note: 4A003.g. does not control internal interconnection equipment (e.g. backplanes, buses), passive interconnection equipment, "network access controllers" or "communications channel controllers".

4A004 Computers as follows and specially designed related equipment, "electronic assemblies" and components therefor:

- a. "Systolic array computers";
- b. "Neural computers";
- c. "Optical computers".

4A101 Analogue computers, "digital computers" or digital differential analysers, other than those specified in 4A001.a.1., which are ruggedized and designed or modified for use in space launch vehicles specified in 9A004 or sounding rockets specified in 9A104.

4A102 "Hybrid computers" specially designed for modelling, simulation or design integration of space launch vehicles specified in 9A004 or sounding rockets specified in 9A104.

Note: This control only applies when the equipment is supplied with "software" specified in 7D103 or 9D103.

4B Test, Inspection and Production Equipment

None.

4C Materials

None.

4D Software

Note: The control status of "software" for the "development", "production", or "use" of equipment described in other Categories is dealt with in the appropriate Category.

4D001 "Software" as follows:

- a. "Software" specially designed or modified for the "development", "production" or "use" of equipment or "software" specified in 4A001 to 4A004, or 4D.
- b. "Software", other than that specified in 4D001.a., specially designed or modified for the "development" or "production" of equipment as follows:
 1. "Digital computers" having an "Adjusted Peak Performance" ("APP") exceeding 0.25 Weighted TeraFLOPS (WT);
 2. "Electronic assemblies" specially designed or modified for enhancing performance by aggregation of processors so that the "APP" of the aggregation exceeds the limit in 4D001.b.1.;

4D002 "Software" specially designed or modified to support "technology" specified in 4E.

4D003 Not used.

4E Technology

- 4E001
- a. "Technology" according to the General Technology Note, for the "development", "production" or "use" of equipment or "software" specified in 4A or 4D.
 - b. "Technology", other than that specified in 4E001.a., specially designed or modified for the "development" or "production" of equipment as follows:
 1. "Digital computers" having an "Adjusted Peak Performance" ("APP") exceeding 0.25 Weighted TeraFLOPS (WT);
 2. "Electronic assemblies" specially designed or modified for enhancing performance by aggregation of processors so that the "APP" of the aggregation exceeds the limit in 4E001.b.1.

TECHNICAL NOTE ON "ADJUSTED PEAK PERFORMANCE" ("APP")

"APP" is an adjusted peak rate at which "digital computers" perform 64-bit or larger floating point additions and multiplications.

"APP" is expressed in Weighted TeraFLOPS (WT), in units of 10^{12} adjusted floating point operations per second

Abbreviations used in this Technical Note

| | |
|-------|--|
| n | number of processors in the "digital computer" |
| i | processor number (i,...n) |
| t_i | processor cycle time ($t_i = 1/F_i$) |
| F_i | processor frequency |
| R_i | peak floating point calculating rate |
| W_i | architecture adjustment factor |

Outline of "APP" calculation method

1. For each processor i, determine the peak number of 64-bit or larger floating point operations, FPO_i, performed per cycle for each processor in the "digital computer".

Note In determining FPO, include only 64-bit or larger floating point additions and/or multiplications. All floating point operations must be expressed in operations per processor cycle; operations requiring multiple cycles may be expressed in fractional results per cycle. For processors not capable of performing calculations on floating point operands of 64-bit or more, the effective calculating rate R is zero.

2. Calculate the floating point rate R for each processor $R_i = FPO_i/t_i$.
3. Calculate "APP" as "APP" = $W_1 \times R_1 + W_2 \times R_2 + \dots + W_n \times R_n$.
4. For 'vector processors', $W_i = 0.9$. For non-'vector processors', $W_i = 0.3$.

Note 1 For processors that perform compound operations in a cycle, such as addition and multiplication, each operation is counted.

Note 2 For a pipelined processor the effective calculating rate R is the faster of the pipelined rate, once the pipeline is full, or the non-pipelined rate.

Note 3 The calculating rate R of each contributing processor is to be calculated at its maximum value theoretically possible before the "APP" of the combination is derived. Simultaneous operations are assumed to exist when the computer manufacturer claims concurrent, parallel, or simultaneous operation or execution in a manual or brochure for the computer.

Note 4 Do not include processors that are limited to input/output and peripheral functions (e.g., disk drive, communication and video display) when calculating "APP".

Note 5 "APP" values are not to be calculated for processor combinations (inter)connected by "Local Area Networks", Wide Area Networks, I/O shared connections/devices, I/O controllers and any communication interconnection implemented by "software".

TECHNICAL NOTE ON "AJUSTED PEAK PERFORMANCE" ("APP")

Note 6 "APP" values must be calculated for:

1. Processor combinations containing processors specially designed to enhance performance by aggregation, operating simultaneously and sharing memory; or
2. Multiple memory/processor combinations operating simultaneously utilizing specially designed hardware.

Note 7A 'vector processor' is defined as a processor with built-in instructions that perform multiple calculations on floating-point vectors (one-dimensional arrays of 64-bit or larger numbers) simultaneously, having at least 2 vector functional units and at least 8 vector registers of at least 64 elements each.

CATEGORY 5 - TELECOMMUNICATIONS AND "INFORMATION SECURITY"**Part 1 - TELECOMMUNICATIONS**

Note 1: *The control status of components, "lasers", test and "production" equipment and "software" therefor which are specially designed for telecommunications equipment or systems is determined in Category 5, Part 1.*

N.B.: *For "lasers" specially designed for telecommunications equipment or systems, see 6A005.*

Note 2: *"Digital computers", related equipment or "software", when essential for the operation and support of telecommunications equipment described in this Category, are regarded as specially designed components, provided they are the standard models customarily supplied by the manufacturer. This includes operation, administration, maintenance, engineering or billing computer systems.*

5A1 Systems, Equipment and Components

5A001 Telecommunications systems, equipment, components and accessories as follows:

- a. Any type of telecommunications equipment having any of the following characteristics, functions or features:
 1. Specially designed to withstand transitory electronic effects or electromagnetic pulse effects, both arising from a nuclear explosion;
 2. Specially hardened to withstand gamma, neutron or ion radiation; or
 3. Specially designed to operate outside the temperature range from 218 K (-55°C) to 397 K (124°C);

Note: 5A001.a.3. applies only to electronic equipment.

Note: 5A001.a.2. and 5A001.a.3. do not control equipment designed or modified for use on board satellites.
- b. Telecommunication systems and equipment, and specially designed components and accessories therefor, having any of the following characteristics, functions or features:
 1. Being underwater untethered communications systems having any of the following:
 - a. An acoustic carrier frequency outside the range from 20 kHz to 60 kHz;
 - b. Using an electromagnetic carrier frequency below 30 kHz;
 - c. Using electronic beam steering techniques; or
 - d. Using "lasers" or light-emitting diodes (LEDs) with an output wavelength greater than 400 nm and less than 700 nm, in a "local area network";
 2. Being radio equipment operating in the 1.5 MHz to 87.5 MHz band and having all of the following:
 - a. Automatically predicting and selecting frequencies and "total digital transfer rates" per channel to optimise the transmission; and

- 5A001 b. 2. continued
- b. Incorporating a linear power amplifier configuration having a capability to support multiple signals simultaneously at an output power of 1 kW or more in the frequency range of 1.5 MHz or more but less than 30 MHz, or 250 W or more in the frequency range of 30 MHz or more but not exceeding 87.5 MHz, over an "instantaneous bandwidth" of one octave or more and with an output harmonic and distortion content of better than -80 dB;
3. Being radio equipment employing "spread spectrum" techniques, including "frequency hopping" techniques, other than those specified in 5A001.b.4. and having any of the following:
- a. User programmable spreading codes; or
- b. A total transmitted bandwidth which is 100 or more times the bandwidth of any one information channel and in excess of 50 kHz;
- Note: 5A001.b.3.b. does not control radio equipment specially designed for use with civil cellular radio-communications systems.
- Note: 5A001.b.3 does not control equipment designed to operate at an output power of 1 W or less.
4. Being radio equipment employing ultra-wideband modulation techniques, having user programmable channelising codes, scrambling codes or network identification codes and having any of the following:
- a. A bandwidth exceeding 500 MHz; or
- b. A "fractional bandwidth" of 20% or more;
5. Being digitally controlled radio receivers having all of the following:
- a. More than 1,000 channels;
- b. A "frequency switching time" of less than 1 ms;
- c. Automatic searching or scanning of a part of the electromagnetic spectrum; and
- d. Identification of the received signals or the type of transmitter; or
- Note: 5A001.b.5. does not control radio equipment specially designed for use with civil cellular radio-communications systems.
6. Employing functions of digital "signal processing" to provide 'voice coding' output at rates of less than 2,400 bit/s.
- Technical Notes:
1. For variable rate 'voice coding', 5A001.b.6. applies to the 'voice coding' output of continuous speech.
2. For the purposes of 5A001.b.6., 'voice coding' is defined as the technique to take samples of human voice and then convert these samples into a digital signal, taking into account specific characteristics of human speech.
- c. Optical fibre communication cables, optical fibres and accessories, as follows:
1. Optical fibres of more than 500 m in length, and specified by the manufacturer as being capable of withstanding a 'proof test' tensile stress of 2×10^9 N/m² or more;
- Technical Note:
'Proof Test': on-line or off-line production screen testing that dynamically applies a prescribed tensile stress over a 0.5 to 3 m length of fibre at a running rate of 2 to 5 m/s while passing between capstans approximately 150 mm in diameter. The ambient temperature is a nominal 293 K (20°C) and relative humidity 40%. Equivalent national standards may be used for executing the proof test.
- 5A001 c. continued
2. Optical fibre cables and accessories, designed for underwater use;
- Note: 5A001.c.2. does not control standard civil telecommunication cables and accessories.
- N.B. 1: For underwater umbilical cables, and connectors therefor, see 8A002.a.3.
- N.B. 2: For fibre-optic hull penetrators or connectors, see 8A002.c.
- d. "Electronically steerable phased array antennae" operating above 31.8 GHz;

Note: 5A001.d. does not control "electronically steerable phased array antennae" for landing systems with instruments meeting ICAO standards covering Microwave Landing Systems (MLS).

- e. Radio direction finding equipment operating at frequencies above 30 MHz and having all of the following, and specially designed components therefor:
 - 1. "Instantaneous bandwidth" of 10 MHz or more; and
 - 2. Capable of finding a Line Of Bearing (LOB) to non-cooperating radio transmitters with a signal duration of less than 1 ms;
- f. Jamming equipment specially designed or modified to intentionally and selectively interfere with, deny, inhibit, degrade or seduce mobile telecommunications services and perform any of the following, and specially designed components therefor:
 - 1. Simulate the functions of Radio Access Network (RAN) equipment;
 - 2. Detect and exploit specific characteristics of the mobile telecommunications protocol employed (e.g., GSM); or
 - 3. Exploit specific characteristics of the mobile telecommunications protocol employed (e.g., GSM);

N.B.: For GNSS jamming equipment see Military Goods Controls.

- g. Passive Coherent Location (PCL) systems or equipment, specially designed for detecting and tracking moving objects by measuring reflections of ambient radio frequency emissions, supplied by non-radar transmitters;

Technical Note:

Non-radar transmitters may include commercial radio, television or cellular telecommunications base stations.

Note: 5A001.g. does not control any of the following:

- a. Radio-astronomical equipment; or
- b. Systems or equipment, that require any radio transmission from the target.

- h. Electronic equipment designed or modified to prematurely activate or prevent the initiation of Radio Controlled Improvised Explosive Devices (RCIED).

N.B.: SEE ALSO MILITARY GOODS CONTROLS.

5A101 Telemetry and telecontrol equipment, including ground equipment, designed or modified for 'missiles'.

Technical Note:

In 5A101 'missile' means complete rocket systems and unmanned aerial vehicle systems capable of a range exceeding 300 km.

Note: 5A101 does not control:

- a. Equipment designed or modified for manned aircraft or satellites;
- b. Ground based equipment designed or modified for terrestrial or marine applications;
- c. Equipment designed for commercial, civil or 'Safety of Life' (e.g. data integrity, flight safety) GNSS services;

5B1 Test, Inspection and Production Equipment

5B001 Telecommunications test, inspection and production equipment, components and accessories, as follows:

- a. Equipment and specially designed components or accessories therefor, specially designed for the "development", "production" or "use" of equipment, functions or features, specified in 5A001;

Note: 5B001.a. does not control optical fibre characterization equipment.
- b. Equipment and specially designed components or accessories therefor, specially designed for the "development" of any of the following telecommunication transmission or switching equipment:
 1. Not used;
 2. Equipment employing a "laser" and having any of the following:
 - a. A transmission wavelength exceeding 1750 nm;
 - b. Performing "optical amplification" using praseodymium-doped fluoride fibre amplifiers (PDFFA);
 - c. Employing coherent optical transmission or coherent optical detection techniques (also called optical heterodyne or homodyne techniques); or
 - d. Employing analogue techniques and having a bandwidth exceeding 2.5 GHz;

Note: 5B001.b.2.d. does not control equipment specially designed for the "development" of commercial TV systems.
 3. Not used;
 4. Radio equipment employing Quadrature-Amplitude-Modulation (QAM) techniques above level 256; or
 5. Equipment employing "common channel signalling" operating in non-associated mode of operation.

5C1 Materials

None

5D1 Software

5D001 "Software" as follows:

- a. "Software" specially designed or modified for the "development", "production" or "use" of equipment, functions or features, specified in 5A001;
- b. "Software" specially designed or modified to support "technology" specified in 5E001;
- c. Specific "software" specially designed or modified to provide characteristics, functions or features of equipment, specified in 5A001 or 5B001;
- d. "Software" specially designed or modified for the "development" of any of the following telecommunication transmission or switching equipment:
 1. Not used;
 2. Equipment employing a "laser" and having any of the following:
 - a. A transmission wavelength exceeding 1,750 nm; or
 - b. Employing analogue techniques and having a bandwidth exceeding 2.5 GHz; or

Note: 5D001.d.2.b. does not control "software" specially designed or modified for the "development" of commercial TV systems.
 3. Not used;
 4. Radio equipment employing Quadrature-Amplitude-Modulation (QAM) techniques above level 256.

5D101 "Software" specially designed or modified for the "use" of equipment specified in 5A101.

5E1 Technology

5E001 "Technology" as follows:

- a. "Technology" according to the General Technology Note for the "development", "production" or "use" (excluding operation) of equipment, functions or features specified in 5A001 or "software" specified in 5D001.a.;
- b. Specific "technology" as follows:
 1. "Required" "technology" for the "development" or "production" of telecommunications equipment specially designed to be used on board satellites;
 2. "Technology" for the "development" or "use" of "laser" communication techniques with the capability of automatically acquiring and tracking signals and maintaining communications through exoatmosphere or sub-surface (water) media;
 3. "Technology" for the "development" of digital cellular radio base station receiving equipment whose reception capabilities that allow multi-band, multi-channel, multi-mode, multi-coding algorithm or multi-protocol operation can be modified by changes in "software";
 4. "Technology" for the "development" of "spread spectrum" techniques, including "frequency hopping" techniques;
- c. "Technology" according to the General Technology Note for the "development" or "production" of any of the following:
 1. Equipment employing digital techniques designed to operate at a "total digital transfer rate" exceeding 50 Gbit/s;
Technical Note:
For telecommunication switching equipment the "total digital transfer rate" is the unidirectional speed of a single interface, measured at the highest speed port or line.
 2. Equipment employing a "laser" and having any of the following:
 - a. A transmission wavelength exceeding 1,750 nm;
 - b. Performing "optical amplification" using Praseodymium-Doped Fluoride Fibre Amplifiers (PDFFA);
 - c. Employing coherent optical transmission or coherent optical detection techniques (also called optical heterodyne or homodyne techniques);
 - d. Employing wavelength division multiplexing techniques of optical carriers at less than 100 GHz spacing; or
 - e. Employing analogue techniques and having a bandwidth exceeding 2.5 GHz;
Note: 5E001.c.2.e. does not control "technology" for the "development" or "production" of commercial TV systems.

N.B.: For "technology" for the "development" or "production" of non-telecommunications equipment employing a laser, see 6E.
 3. Equipment employing "optical switching" and having a switching time less than 1 ms;

- 5E001 c. continued
4. Radio equipment having any of the following:
 - a. Quadrature-Amplitude-Modulation (QAM) techniques above level 256;
 - b. Operating at input or output frequencies exceeding 31.8 GHz; or
Note: 5E001.c.4.b. does not control "technology" for the "development" or "production" of equipment designed or modified for operation in any frequency band which is "allocated by the ITU" for radio-communications services, but not for radio-determination.
 - c. Operating in the 1.5 MHz to 87.5 MHz band and incorporating adaptive techniques providing more than 15 dB suppression of an interfering signal;
 5. Equipment employing "common channel signalling" operating in non-associated mode of operation; or
 6. Mobile equipment having all of the following:
 - a. Operating at an optical wavelength greater than or equal to 200 nm and less than or equal to 400 nm; and
 - b. Operating as a "local area network";
 - d. "Technology" according to the General Technology Note for the "development" or "production" of Microwave Monolithic Integrated Circuit (MMIC) power amplifiers specially designed for telecommunications and having any of the following:
 1. Rated for operation at frequencies exceeding 3.2 GHz up to and including 6 GHz and with an average output power greater than 4 W (36 dBm) with a "fractional bandwidth" greater than 15%;
 2. Rated for operation at frequencies exceeding 6 GHz up to and including 16 GHz and with an average output power greater than 1 W (30 dBm) with a "fractional bandwidth" greater than 10%;
 3. Rated for operation at frequencies exceeding 16 GHz up to and including 31.8 GHz and with an average output power greater than 0.8 W (29 dBm) with a "fractional bandwidth" greater than 10%;
 4. Rated for operation at frequencies exceeding 31.8 GHz up to and including 37.5 GHz;
 5. Rated for operation at frequencies exceeding 37.5 GHz up to and including 43.5 GHz and with an average output power greater than 0.25 W (24 dBm) with a "fractional bandwidth" greater than 10%; or
 6. Rated for operation at frequencies exceeding 43.5 GHz;
 - e. "Technology" according to the General Technology Note for the "development" or "production" of electronic devices and circuits, specially designed for telecommunications and containing components manufactured from "superconductive" materials, specially designed for operation at temperatures below the "critical temperature" of at least one of the "superconductive" constituents and having any of the following:
 1. Current switching for digital circuits using "superconductive" gates with a product of delay time per gate (in seconds) and power dissipation per gate (in watts) of less than 10^{-14} J; or
 2. Frequency selection at all frequencies using resonant circuits with Q-values exceeding 10,000.
- 5E101 "Technology" according to the General Technology Note for the "development", "production" or "use" of equipment specified in 5A101.

Part 2 - "INFORMATION SECURITY"

Note 1: *The control status of "information security" equipment, "software", systems, application specific "electronic assemblies", modules, integrated circuits, components or functions is determined in Category 5, Part 2 even if they are components or "electronic assemblies" of other equipment.*

Note 2: *Category 5 – Part 2 does not control products when accompanying their user for the user's personal use.*

Note 3: Cryptography Note

5A002 and 5D002 do not control goods that meet all of the following:

- a. *Generally available to the public by being sold, without restriction, from stock at retail selling points by means of any of the following:*
 1. *Over-the-counter transactions;*
 2. *Mail order transactions;*
 3. *Electronic transactions; or*
 4. *Telephone call transactions;*
- b. *The cryptographic functionality cannot easily be changed by the user;*
- c. *Designed for installation by the user without further substantial support by the supplier; and*
- d. *When necessary, details of the goods are accessible and will be provided, upon request, to the competent authorities of the Member State in which the exporter is established in order to ascertain compliance with conditions described in paragraphs a. to c. above.*

Note 4: *Category 5 – Part 2 does not control items incorporating or using "cryptography" and meeting all of the following:*

- a. *The primary function or set of functions is not any of the following:*
 1. *"Information security";*
 2. *A computer, including operating systems, parts and components therefor;*
 3. *Sending, receiving or storing information (except in support of entertainment, mass commercial broadcasts, digital rights management or medical records management); or*
 4. *Networking (includes operation, administration, management and provisioning);*
- b. *The cryptographic functionality is limited to supporting their primary function or set of functions; and*
- c. *When necessary, details of the items are accessible and will be provided, upon request, to the appropriate authority in the exporter's country in order to ascertain compliance with conditions described in paragraphs a. and b. above.*

Technical Note:

In Category 5 - Part 2, parity bits are not included in the key length.

5A2 Systems, Equipment and Components

5A002 "Information security" systems, equipment and components therefor, as follows:

- a. Systems, equipment, application specific "electronic assemblies", modules and integrated circuits for "information security", as follows, and components therefor specially designed for "information security":

N.B.: For the control of Global Navigation Satellite Systems (GNSS) receiving equipment containing or employing decryption, see 7A005.

1. Designed or modified to use "cryptography" employing digital techniques performing any cryptographic function other than authentication or digital signature and having any of the following:

Technical Notes:

1. Authentication and digital signature functions include their associated key management function.
2. Authentication includes all aspects of access control where there is no encryption of files or text except as directly related to the protection of passwords, Personal Identification Numbers (PINs) or similar data to prevent unauthorised access.
3. "Cryptography" does not include "fixed" data compression or coding techniques.

Note: 5A002.a.1. includes equipment designed or modified to use "cryptography" employing analogue principles when implemented with digital techniques.

- a. A "symmetric algorithm" employing a key length in excess of 56 bits; or
- b. An "asymmetric algorithm" where the security of the algorithm is based on any of the following:
 1. Factorisation of integers in excess of 512 bits (e.g., RSA);
 2. Computation of discrete logarithms in a multiplicative group of a finite field of size greater than 512 bits (e.g., Diffie-Hellman over Z/pZ); or
 3. Discrete logarithms in a group other than mentioned in 5A002.a.1.b.2. in excess of 112 bits (e.g., Diffie-Hellman over an elliptic curve);
2. Designed or modified to perform cryptanalytic functions;
3. Not used;
4. Specially designed or modified to reduce the compromising emanations of information-bearing signals beyond what is necessary for health, safety or electromagnetic interference standards;
5. Designed or modified to use cryptographic techniques to generate the spreading code for "spread spectrum" systems, other than those specified in 5A002.a.6., including the hopping code for "frequency hopping" systems;

5A002 a. continued

6. Designed or modified to use cryptographic techniques to generate channelising codes, scrambling codes or network identification codes, for systems using ultra-wideband modulation techniques and having any of the following:
 - a. A bandwidth exceeding 500 MHz; or
 - b. A "fractional bandwidth" of 20% or more;
7. Non-cryptographic information and communications technology (ICT) security systems and devices evaluated to an assurance level exceeding class EAL-6 (evaluation assurance level) of the Common Criteria (CC) or equivalent;
8. Communications cable systems designed or modified using mechanical, electrical or electronic means to detect surreptitious intrusion;
9. Designed or modified to use "quantum cryptography".
Technical Note:
 "Quantum cryptography" is also known as *Quantum Key Distribution (QKD)*.

Note: 5A002 does not control any of the following:

- a. Smart cards and smart card 'readers/writers' as follows:
 1. A smart card or an electronically readable personal document (e.g., token coin, e-passport) that meets any of the following:
 - a. The cryptographic capability is restricted for use in equipment or systems excluded from 5A002 by Note 4 in Category 5 – Part 2 or entries b. to i. of this Note, and cannot be reprogrammed for any other use; or
 - b. Having all of the following:
 1. It is specially designed and limited to allow protection of 'personal data' stored within;
 2. Has been, or can only be, personalized for public or commercial transactions or individual identification; and
 3. Where the cryptographic capability is not user-accessible;Technical Note:
 'Personal data' includes any data specific to a particular person or entity, such as the amount of money stored and data necessary for authentication.
 2. 'Readers/writers' specially designed or modified, and limited, for items specified by a.1. of this Note.
Technical Note:
 'Readers/writers' include equipment that communicates with smart cards or electronically readable documents through a network.
- b. Not used;
- c. Not used;

5A002 a continued

- d. *Cryptographic equipment specially designed and limited for banking use or 'money transactions';*
Technical Note:
'Money transactions' in 5A002 Note d. includes the collection and settlement of fares or credit functions.
- e. *Portable or mobile radiotelephones for civil use (e.g., for use with commercial civil cellular radio communication systems) that are not capable of transmitting encrypted data directly to another radiotelephone or equipment (other than Radio Access Network (RAN) equipment), nor of passing encrypted data through RAN equipment (e.g., Radio Network Controller (RNC) or Base Station Controller (BSC));*
- f. *Cordless telephone equipment not capable of end-to-end encryption where the maximum effective range of unboosted cordless operation (i.e. a single, unrelayed hop between terminal and home base station) is less than 400 metres according to the manufacturer's specifications; or*
- g. *Portable or mobile radiotelephones and similar client wireless devices for civil use, that implement only published or commercial cryptographic standards (except for anti-piracy functions, which may be non-published) and also meet the provisions of paragraphs b. to d. of the Cryptography Note (Note 3 in Category 5 - Part 2), that have been customised for a specific civil industry application with features that do not affect the cryptographic functionality of these original non-customised devices;*
- h. *Not used;*
- i. *Wireless "personal area network" equipment that implement only published or commercial cryptographic standards and where the cryptographic capability is limited to a nominal operating range not exceeding 30 metres according to the manufacturer's specifications.*

5B2 Test, Inspection and Production Equipment

5B002 "Information security" test, inspection and "production" equipment, as follows:

- a. Equipment specially designed for the "development" or "production" of equipment specified in 5A002 or 5B002.b.;
- b. Measuring equipment specially designed to evaluate and validate the "information security" functions of the equipment specified in 5A002 or "software" specified in 5D002.a. or 5D002.c.

5C2 Materials

None.

5D2 Software

5D002 "Software" as follows:

- a. "Software" specially designed or modified for the "development", "production" or "use" of equipment specified in 5A002 or "software" specified in 5D002.c.;
- b. "Software" specially designed or modified to support "technology" specified in 5E002;
- c. Specific "software", as follows:
 1. "Software" having the characteristics, or performing or simulating the functions of the equipment, specified in 5A002;
 2. "Software" to certify "software" specified in 5D002.c.1.

Note: 5D002 does not control "software" as follows:

- a. "Software" required for the "use" of equipment excluded from control by the Note to 5A002;
- b. "Software" providing any of the functions of equipment excluded from control by the Note to 5A002.

5E2 Technology

5E002 "Technology" according to the General Technology Note for the "development", "production" or "use" of equipment specified in 5A002, 5B002 or "software" specified in 5D002.a. or 5D002.c.

CATEGORY 6 - SENSORS AND LASERS

6A Systems, Equipment and Components

6A001 Acoustic systems, equipment and components, as follows:

- a. Marine acoustic systems, equipment and specially designed components therefor, as follows:
1. Active (transmitting or transmitting-and-receiving) systems, equipment and specially designed components therefor, as follows:

Note: 6A001.a.1. does not control equipment as follows:

- a. *Depth sounders operating vertically below the apparatus, not including a scanning function exceeding $\pm 20^\circ$, and limited to measuring the depth of water, the distance of submerged or buried objects or fish finding;*
 - b. *Acoustic beacons, as follows:*
 1. *Acoustic emergency beacons;*
 2. *Pingers specially designed for relocating or returning to an underwater position.*
- a. Bathymetric survey systems designed for sea bed topographic mapping and having all of the following:
1. Designed to take measurements at an angle exceeding 20° from the vertical;
 2. Designed to measure seabed topography at seabed depths exceeding 600 m; and
 3. Designed to provide any of the following:
 - a. Incorporation of multiple beams any of which is less than 1.9° ; or
 - b. Data accuracies of better than 0.3% of water depth across the swath averaged over the individual measurements within the swath;
- b. Object detection or location systems, having any of the following:
1. A transmitting frequency below 10 kHz;
 2. Sound pressure level exceeding 224 dB (reference 1 μ Pa at 1 m) for equipment with an operating frequency in the band from 10 kHz to 24 kHz inclusive;
 3. Sound pressure level exceeding 235 dB (reference 1 μ Pa at 1 m) for equipment with an operating frequency in the band between 24 kHz and 30 kHz;
 4. Forming beams of less than 1° on any axis and having an operating frequency of less than 100 kHz;
 5. Designed to operate with an unambiguous display range exceeding 5,120 m; or
 6. Designed to withstand pressure during normal operation at depths exceeding 1,000 m and having transducers with any of the following:
 - a. Dynamic compensation for pressure; or
 - b. Incorporating other than lead zirconate titanate as the transduction element;

6A001 a. 1. continued

- c. Acoustic projectors, including transducers, incorporating piezoelectric, magnetostrictive, electrostrictive, electrodynamic or hydraulic elements operating individually or in a designed combination and having any of the following:

Note 1: *The control status of acoustic projectors, including transducers, specially designed for other equipment is determined by the control status of the other equipment.*

Note 2: *6A001.a.1.c. does not control electronic sources which direct the sound vertically only, or mechanical (e.g., air gun or vapour-shock gun) or chemical (e.g., explosive) sources.*

1. An instantaneous radiated 'acoustic power density' exceeding $0.01 \text{ mW/mm}^2/\text{Hz}$ for devices operating at frequencies below 10 kHz;
2. A continuously radiated 'acoustic power density' exceeding $0.001 \text{ mW/mm}^2/\text{Hz}$ for devices operating at frequencies below 10 kHz; or

Technical Note:

'Acoustic power density' is obtained by dividing the output acoustic power by the product of the area of the radiating surface and the frequency of operation.

3. Side-lobe suppression exceeding 22 dB;

- d. Acoustic systems and equipment, designed to determine the position of surface vessels or underwater vehicles and having all the following, and specially designed components therefor:

1. Detection range exceeding 1,000 m; and
2. Positioning accuracy of less than 10 m rms (root mean square) when measured at a range of 1,000 m;

Note: *6A001.a.1.d. includes:*

- a. *Equipment using coherent "signal processing" between two or more beacons and the hydrophone unit carried by the surface vessel or underwater vehicle;*
- b. *Equipment capable of automatically correcting speed-of-sound propagation errors for calculation of a point.*

- e. Active individual sonars, specially designed or modified to detect, locate and automatically classify swimmers or divers, having all of the following:

1. Detection range exceeding 530 m;
2. Positioning accuracy of less than 15 m rms (root mean square) when measured at a range of 530 m; and
3. Transmitted pulse signal bandwidth exceeding 3 kHz;

N.B.: *For diver detection systems specially designed or modified for military use, see the Military Goods Controls.*

Technical Note:

For 6A001.a.1.e., where multiple detection ranges are specified for various environments, the greatest detection range is used.

6A001 a. continued

2. Passive (receiving, whether or not related in normal application to separate active equipment) systems, equipment and specially designed components therefor, as follows:

a. Hydrophones having any of the following:

Note: *The control status of hydrophones specially designed for other equipment is determined by the control status of the other equipment.*

1. Incorporating continuous flexible sensing elements;
2. Incorporating flexible assemblies of discrete sensing elements with either a diameter or length less than 20 mm and with a separation between elements of less than 20 mm;
3. Having any of the following sensing elements:
 - a. Optical fibres;
 - b. 'Piezoelectric polymer films' other than polyvinylidene-fluoride (PVDF) and its co-polymers {P(VDF-TrFE) and P(VDF-TFE)}; or
 - c. 'Flexible piezoelectric composites';
4. A 'hydrophone sensitivity' better than -180 dB at any depth with no acceleration compensation;
5. Designed to operate at depths exceeding 35 m with acceleration compensation; or
6. Designed for operation at depths exceeding 1,000 m;

Technical Notes:

1. 'Piezoelectric polymer film' sensing elements consist of polarised polymer film that is stretched over and attached to a supporting frame or spool (mandrel).
2. 'Flexible piezoelectric composite' sensing elements consist of piezoelectric ceramic particles or fibres combined with an electrically insulating, acoustically transparent rubber, polymer or epoxy compound, where the compound is an integral part of the sensing elements.
3. 'Hydrophone sensitivity' is defined as twenty times the logarithm to the base 10 of the ratio of rms output voltage to a 1 V rms reference, when the hydrophone sensor, without a pre-amplifier, is placed in a plane wave acoustic field with an rms pressure of 1 μ Pa. For example, a hydrophone of -160 dB (reference 1 V per μ Pa) would yield an output voltage of 10^{-8} V in such a field, while one of -180 dB sensitivity would yield only 10^{-9} V output. Thus, -160 dB is better than -180 dB.

- 6A001 a. 2. continued
- b. Towed acoustic hydrophone arrays having any of the following:
 - 1. Hydrophone group spacing of less than 12.5 m or 'able to be modified' to have hydrophone group spacing of less than 12.5 m;
 - 2. Designed or 'able to be modified' to operate at depths exceeding 35 m;
Technical Note:
'Able to be modified' in 6A001.a.2.b.1. and 2. means having provisions to allow a change of the wiring or interconnections to alter hydrophone group spacing or operating depth limits. These provisions are: spare wiring exceeding 10% of the number of wires, hydrophone group spacing adjustment blocks or internal depth limiting devices that are adjustable or that control more than one hydrophone group.
 - 3. Heading sensors specified in 6A001.a.2.d.;
 - 4. Longitudinally reinforced array hoses;
 - 5. An assembled array of less than 40 mm in diameter; or
 - 6. Not used;
 - 7. Hydrophone characteristics specified in 6A001.a.2.a.;
 - c. Processing equipment, specially designed for towed acoustic hydrophone arrays, having "user accessible programmability" and time or frequency domain processing and correlation, including spectral analysis, digital filtering and beamforming using Fast Fourier or other transforms or processes;
 - d. Heading sensors having all of the following:
 - 1. An accuracy of better than $\pm 0.5^\circ$; and
 - 2. Designed to operate at depths exceeding 35 m or having an adjustable or removable depth sensing device in order to operate at depths exceeding 35 m;
 - e. Bottom or bay cable systems, having any of the following:
 - 1. Incorporating hydrophones specified in 6A001.a.2.a.; or
 - 2. Incorporating multiplexed hydrophone group signal modules having all of the following characteristics:
 - a. Designed to operate at depths exceeding 35 m or having an adjustable or removable depth sensing device in order to operate at depths exceeding 35 m; and
 - b. Capable of being operationally interchanged with towed acoustic hydrophone array modules;
 - f. Processing equipment, specially designed for bottom or bay cable systems, having "user accessible programmability" and time or frequency domain processing and correlation, including spectral analysis, digital filtering and beamforming using Fast Fourier or other transforms or processes;

6A001 continued

- b. Correlation-velocity and Doppler-velocity sonar log equipment, designed to measure the horizontal speed of the equipment carrier relative to the sea bed, as follows:
1. Correlation-velocity sonar log equipment having any of the following characteristics:
 - a. Designed to operate at distances between the carrier and the sea bed exceeding 500 m; or
 - b. Having speed accuracy better than 1% of speed;
 2. Doppler-velocity sonar log equipment having speed accuracy better than 1% of speed.

Note 1: 6A001.b. does not control depth sounders limited to any of the following:

- a. Measuring the depth of water;
- b. Measuring the distance of submerged or buried objects; or
- c. Fish finding.

Note 2: 6A001.b. does not control equipment specially designed for installation on surface vessels.

- c. Diver deterrent acoustic systems specially designed or modified to disrupt divers and having a sound pressure level equal to or exceeding 190 dB (reference 1 μ Pa at 1 m) at frequencies of 200 Hz and below.

Note 1: 6A001.c. does not control diver deterrent systems based on underwater explosive devices, air guns or combustible sources.

Note 2: 6A001.c. includes diver deterrent acoustic systems that use spark gap sources, also known as plasma sound sources.

6A002

Optical sensors or equipment and components therefor, as follows:

N.B.: SEE ALSO 6A102.

a. Optical detectors as follows:

1. "Space-qualified" solid-state detectors as follows:

Note: For the purpose of 6A002.a.1., solid-state detectors include "focal plane arrays".

- a. "Space-qualified" solid-state detectors having all of the following:
 1. A peak response in the wavelength range exceeding 10 nm but not exceeding 300 nm; and
 2. A response of less than 0.1% relative to the peak response at a wavelength exceeding 400 nm;
- b. "Space-qualified" solid-state detectors having all of the following:
 1. A peak response in the wavelength range exceeding 900 nm but not exceeding 1,200 nm; and
 2. A response "time constant" of 95 ns or less;
- c. "Space-qualified" solid-state detectors having a peak response in the wavelength range exceeding 1,200 nm but not exceeding 30,000 nm;
- d. "Space-qualified" "focal plane arrays" having more than 2,048 elements per array and having a peak response in the wavelength range exceeding 300 nm but not exceeding 900 nm.

2. Image intensifier tubes and specially designed components therefor, as follows:

Note: 6A002.a.2. does not control non-imaging photomultiplier tubes having an electron sensing device in the vacuum space limited solely to any of the following:

- a. A single metal anode; or
- b. Metal anodes with a centre to centre spacing greater than 500 μm .

*Technical Note:**'Charge multiplication' is a form of electronic image amplification and is defined as the generation of charge carriers as a result of an impact ionization gain process. 'Charge multiplication' sensors may take the form of an image intensifier tube, solid state detector or "focal plane array".*

a. Image intensifier tubes having all of the following:

1. A peak response in the wavelength range exceeding 400 nm but not exceeding 1,050 nm;
2. Electron image amplification using any of the following:
 - a. A microchannel plate with a hole pitch (centre-to-centre spacing) of 12 μm or less; or
 - b. An electron sensing device with a non-binned pixel pitch of 500 μm or less, specially designed or modified to achieve 'charge multiplication' other than by a microchannel plate; and
3. Any of the following photocathodes:
 - a. Multialkali photocathodes (e.g., S-20 and S-25) having a luminous sensitivity exceeding 350 $\mu\text{A/lm}$;
 - b. GaAs or GaInAs photocathodes; or
 - c. Other "III/V compound" semiconductor photocathodes having a maximum radiant sensitivity exceeding 10 mA/W;

6A002 a. 2. continued

- b. Image intensifier tubes having all of the following:
1. A peak response in the wavelength range exceeding 1,050 nm but not exceeding 1,800 nm;
 2. Electron image amplification using any of the following:
 - a. A microchannel plate with a hole pitch (centre-to-centre spacing) of 12 μm or less; or
 - b. An electron sensing device with a non-binned pixel pitch of 500 μm or less, specially designed or modified to achieve 'charge multiplication' other than by a microchannel plate; and
 3. "III/V compound" semiconductor (e.g., GaAs or GaInAs) photocathodes and transferred electron photocathodes, having a maximum radiant sensitivity exceeding 15 mA/W;
- c. Specially designed components as follows:
1. Microchannel plates having a hole pitch (centre-to-centre spacing) of 12 μm or less;
 2. An electron sensing device with a non-binned pixel pitch of 500 μm or less, specially designed or modified to achieve 'charge multiplication' other than by a microchannel plate;
 3. "III/V compound" semiconductor (e.g., GaAs or GaInAs) photocathodes and transferred electron photocathodes;

Note: 6A002.a.2.c.3. does not control compound semiconductor photocathodes designed to achieve a maximum radiant sensitivity of any of the following:

- a. 10 mA/W or less at the peak response in the wavelength range exceeding 400 nm but not exceeding 1,050 nm; or
- b. 15 mA/W or less at the peak response in the wavelength range exceeding 1,050 nm but not exceeding 1,800 nm.

3. Non-"space-qualified" "focal plane arrays" as follows:

N.B.: 'Microbolometer' non-"space-qualified" "focal plane arrays" are only specified in 6A002.a.3.f.

Technical Note:

Linear or two-dimensional multi-element detector arrays are referred to as "focal plane arrays";

Note 1: 6A002.a.3. includes photoconductive arrays and photovoltaic arrays.

Note 2: 6A002.a.3. does not control:

- a. Multi-element (not to exceed 16 elements) encapsulated photoconductive cells using either lead sulphide or lead selenide;
- b. Pyroelectric detectors using any of the following:
 1. Triglycine sulphate and variants;
 2. Lead-lanthanum-zirconium titanate and variants;
 3. Lithium tantalate;
 4. Polyvinylidene fluoride and variants; or
 5. Strontium barium niobate and variants.

6A002 a. 3 Note 2 continued

- c. *"Focal plane arrays" specially designed or modified to achieve 'charge multiplication' and limited by design to have a maximum radiant sensitivity of 10 mA/W or less for wavelengths exceeding 760 nm, having all of the following:*
1. *Incorporating a response limiting mechanism designed not to be removed or modified; and*
 2. *Any of the following:*
 - a. *The response limiting mechanism is integral to or combined with the detector element; or*
 - b. *The "focal plane array" is only operable with the response limiting mechanism in place.*

Technical Note:

A response limiting mechanism integral to the detector element is designed not to be removed or modified without rendering the detector inoperable.

Technical Note:

'Charge multiplication' is a form of electronic image amplification and is defined as the generation of charge carriers as a result of an impact ionization gain process. 'Charge multiplication' sensors may take the form of an image intensifier tube, solid state detector or "focal plane array".

- a. Non-"space-qualified" "focal plane arrays" having all of the following:
 1. Individual elements with a peak response within the wavelength range exceeding 900 nm but not exceeding 1,050 nm; and
 2. Any of the following:
 - a. A response "time constant" of less than 0.5 ns; or
 - b. Specially designed or modified to achieve 'charge multiplication' and having a maximum radiant sensitivity exceeding 10 mA/W;
- b. Non-"space-qualified" "focal plane arrays" having all of the following:
 1. Individual elements with a peak response in the wavelength range exceeding 1,050 nm but not exceeding 1,200 nm; and
 2. Any of the following:
 - a. A response "time constant" of 95 ns or less; or
 - b. Specially designed or modified to achieve 'charge multiplication' and having a maximum radiant sensitivity exceeding 10 mA/W;
- c. Non-"space-qualified" non-linear (2-dimensional) "focal plane arrays" having individual elements with a peak response in the wavelength range exceeding 1,200 nm but not exceeding 30,000 nm;

N.B.: *Silicon and other material based 'microbolometer' non-"space-qualified" "focal plane arrays" are only specified in 6A002.a.3.f.*

6A002 a. 3. continued

- d. Non-"space-qualified" linear (1-dimensional) "focal plane arrays" having all of the following:
1. Individual elements with a peak response in the wavelength range exceeding 1,200 nm but not exceeding 3,000 nm; and
 2. Any of the following:
 - a. A ratio of 'scan direction' dimension of the detector element to the 'cross-scan direction' dimension of the detector element of less than 3.8; or
 - b. Signal Processing In The Element (SPRITE);

Note: 6A002.a.3.d. does not control "focal plane arrays" (not to exceed 32 elements) having detector elements limited solely to germanium material.

Technical Note:

For the purposes of 6A002.a.3.d., 'cross-scan direction' is defined as the axis parallel to the linear array of detector elements and the 'scan direction' is defined as the axis perpendicular to the linear array of detector elements.

- e. Non-"space-qualified" linear (1-dimensional) "focal plane arrays" having individual elements with a peak response in the wavelength range exceeding 3,000 nm but not exceeding 30,000 nm;
- f. Non-"space-qualified" non-linear (2-dimensional) infrared "focal plane arrays" based on 'microbolometer' material having individual elements with an unfiltered response in the wavelength range equal to or exceeding 8,000 nm but not exceeding 14,000 nm;

Technical Note:

For the purposes of 6A002.a.3.f., 'microbolometer' is defined as a thermal imaging detector that, as a result of a temperature change in the detector caused by the absorption of infrared radiation, is used to generate any usable signal.

- g. Non-"space-qualified" "focal plane arrays" having all of the following:
1. Individual detector elements with a peak response in the wavelength range exceeding 400 nm but not exceeding 900 nm;
 2. Specially designed or modified to achieve 'charge multiplication' and having a maximum radiant sensitivity exceeding 10 mA/W for wavelengths exceeding 760 nm; and
 3. Greater than 32 elements.

6A002 continued

- b. "Monospectral imaging sensors" and "multispectral imaging sensors", designed for remote sensing applications and having any of the following:
1. An Instantaneous-Field-Of-View (IFOV) of less than 200 μ rad (microradians); or
 2. Specified for operation in the wavelength range exceeding 400 nm but not exceeding 30,000 nm and having all the following:
 - a. Providing output imaging data in digital format; and
 - b. Having any of the following characteristics:
 1. "Space-qualified"; or
 2. Designed for airborne operation, using other than silicon detectors, and having an IFOV of less than 2.5 mrad (milliradians);

Note: 6A002.b.1. does not control "monospectral imaging sensors" with a peak response in the wavelength range exceeding 300 nm but not exceeding 900 nm and only incorporating any of the following non-"space-qualified" detectors or non-"space-qualified" "focal plane arrays":

1. Charge Coupled Devices (CCD) not designed or modified to achieve 'charge multiplication'; or
2. Complementary Metal Oxide Semiconductor (CMOS) devices not designed or modified to achieve 'charge multiplication'.

- c. 'Direct view' imaging equipment incorporating any of the following:
1. Image intensifier tubes specified in 6A002.a.2.a. or 6A002.a.2.b.;
 2. "Focal plane arrays" specified in 6A002.a.3.; or
 3. Solid state detectors specified in 6A002.a.1.;

Technical Note:

'Direct view' refers to imaging equipment that presents a visual image to a human observer without converting the image into an electronic signal for television display, and that cannot record or store the image photographically, electronically or by any other means.

Note: 6A002.c. does not control equipment as follows, when incorporating other than GaAs or GaInAs photocathodes:

- a. Industrial or civilian intrusion alarm, traffic or industrial movement control or counting systems;
- b. Medical equipment;
- c. Industrial equipment used for inspection, sorting or analysis of the properties of materials;
- d. Flame detectors for industrial furnaces;
- e. Equipment specially designed for laboratory use.

- d. Special support components for optical sensors, as follows:
1. "Space-qualified" cryocoolers;
 2. Non-"space-qualified" cryocoolers having a cooling source temperature below 218 K (-55°C), as follows:
 - a. Closed cycle type with a specified Mean-Time-To-Failure (MTTF) or Mean-Time-Between-Failures (MTBF), exceeding 2,500 hours;
 - b. Joule-Thomson (JT) self-regulating minicoolers having bore (outside) diameters of less than 8 mm;
 3. Optical sensing fibres specially fabricated either compositionally or structurally, or modified by coating, to be acoustically, thermally, inertially, electromagnetically or nuclear radiation sensitive;
- e. Not used.

6A003 Cameras, systems or equipment, and components therefor, as follows:

N.B.: SEE ALSO 6A203.

N.B.: For television and film-based photographic still cameras specially designed or modified for underwater use, see 8A002.d.1. and 8A002.e.

a. Instrumentation cameras and specially designed components therefor, as follows:

Note: Instrumentation cameras, specified in 6A003.a.3. to 6A003.a.5., with modular structures should be evaluated by their maximum capability, using plug-ins available according to the camera manufacturer's specifications.

1. High-speed cinema recording cameras using any film format from 8 mm to 16 mm inclusive, in which the film is continuously advanced throughout the recording period, and that are capable of recording at framing rates exceeding 13,150 frames/s;
Note: 6A003.a.1. does not control cinema recording cameras designed for civil purposes.
2. Mechanical high speed cameras, in which the film does not move, capable of recording at rates exceeding 1,000,000 frames/s for the full framing height of 35 mm film, or at proportionately higher rates for lesser frame heights, or at proportionately lower rates for greater frame heights;
3. Mechanical or electronic streak cameras, having writing speeds exceeding 10mm/μs;
4. Electronic framing cameras having a speed exceeding 1,000,000 frames/s;
5. Electronic cameras having all of the following:
 - a. An electronic shutter speed (gating capability) of less than 1 μs per full frame; and
 - b. A read out time allowing a framing rate of more than 125 full frames per second;
6. Plug-ins having all of the following characteristics:
 - a. Specially designed for instrumentation cameras which have modular structures and which are specified in 6A003.a.; and
 - b. Enabling these cameras to meet the characteristics specified in 6A003.a.3., 6A003.a.4., or 6A003.a.5., according to the manufacturer's specifications;

b. Imaging cameras as follows:

Note: 6A003.b. does not control television or video cameras, specially designed for television broadcasting.

1. Video cameras incorporating solid state sensors, having a peak response in the wavelength range exceeding 10 nm, but not exceeding 30,000 nm and having all of the following:
 - a. Having any of the following:
 1. More than 4×10^6 "active pixels" per solid state array for monochrome (black and white) cameras;
 2. More than 4×10^6 "active pixels" per solid state array for colour cameras incorporating three solid state arrays; or
 3. More than 12×10^6 "active pixels" for solid state array colour cameras incorporating one solid state array; and
 - b. Having any of the following:
 1. Optical mirrors specified in 6A004.a.;
 2. Optical control equipment specified in 6A004.d.; or
 3. The capability for annotating internally generated 'camera tracking data';

6A003 b. 1. continued

Technical Note:

1. For the purpose of this entry, digital video cameras should be evaluated by the maximum number of "active pixels" used for capturing moving images.
2. For the purpose of this entry, 'camera tracking data' is the information necessary to define camera line of sight orientation with respect to the earth. This includes: 1) the horizontal angle the camera line of sight makes with respect to the earth's magnetic field direction and; 2) the vertical angle between the camera line of sight and the earth's horizon.

2. Scanning cameras and scanning camera systems, having all of the following:
 - a. A peak response in the wavelength range exceeding 10 nm, but not exceeding 30,000 nm;
 - b. Linear detector arrays with more than 8,192 elements per array; and
 - c. Mechanical scanning in one direction;

Note: 6A003.b.2. does not control scanning cameras and scanning camera systems, specially designed for any of the following:

- a. Industrial or civilian photocopiers;
- b. Image scanners specially designed for civil, stationary, close proximity scanning applications (e.g., reproduction of images or print contained in documents, artwork or photographs); or
- c. Medical equipment.

3. Imaging cameras incorporating image intensifier tubes specified in 6A002.a.2.a. or 6A002.a.2.b.;

4. Imaging cameras incorporating "focal plane arrays" having any of the following:

- a. Incorporating "focal plane arrays" specified in 6A002.a.3.a. to 6A002.a.3.e.;
- b. Incorporating "focal plane arrays" specified in 6A002.a.3.f.; or
- c. Incorporating "focal plane arrays" specified in 6A002.a.3.g.;

Note 1: Imaging cameras specified in 6A003.b.4. include "focal plane arrays" combined with sufficient "signal processing" electronics, beyond the read out integrated circuit, to enable as a minimum the output of an analogue or digital signal once power is supplied.

Note 2: 6A003.b.4.a. does not control imaging cameras incorporating linear "focal plane arrays" with 12 elements or fewer, not employing time-delay-and-integration within the element and designed for any of the following:

- a. Industrial or civilian intrusion alarm, traffic or industrial movement control or counting systems;
- b. Industrial equipment used for inspection or monitoring of heat flows in buildings, equipment or industrial processes;
- c. Industrial equipment used for inspection, sorting or analysis of the properties of materials;
- d. Equipment specially designed for laboratory use; or
- e. Medical equipment.

6A003 b. 4. continued

- Note 3: 6A003.b.4.b. does not control imaging cameras having any of the following:
- a. A maximum frame rate equal to or less than 9 Hz ;
 - b. Having all of the following:
 1. Having a minimum horizontal or vertical 'Instantaneous-Field-of-View (IFOV)' of at least 10 mrad/pixel (milliradians/pixel);
 2. Incorporating a fixed focal-length lens that is not designed to be removed;
 3. Not incorporating a 'direct view' display, and
 4. Having any of the following:
 - a. No facility to obtain a viewable image of the detected field-of-view, or
 - b. The camera is designed for a single kind of application and designed not to be user modified; or
 - c. The camera is specially designed for installation into a civilian passenger land vehicle of less than 3 tonnes (gross vehicle weight) and having all of the following:
 1. Is only operable when installed in any of the following:
 - a. The civilian passenger land vehicle for which it was intended; or
 - b. A specially designed, authorized maintenance test facility; and
 2. Incorporates an active mechanism that forces the camera not to function when it is removed from the vehicle for which it was intended.

Technical Notes:

1. 'Instantaneous Field of View (IFOV)' specified in 6A003.b.4. Note 3.b. is the lesser figure of the 'Horizontal IFOV' or the 'Vertical IFOV'.
 'Horizontal IFOV' = horizontal Field of View (FOV) / number of horizontal detector elements
 'Vertical IFOV' = vertical Field of View (FOV) / number of vertical detector elements.
2. 'Direct view' in 6A003.b.4. Note 3.b. refers to an imaging camera operating in the infrared spectrum that presents a visual image to a human observer using a near-to-eye micro display incorporating any light-security mechanism.

6A003 b. 4 continued

- Note 4: 6A003.b.4.c. does not control imaging cameras having any of the following:
- a. Having all of the following:
 1. Where the camera is specially designed for installation as an integrated component into indoor and wall-plug-operated systems or equipment, limited by design for a single kind of application, as follows:
 - a. Industrial process monitoring, quality control, or analysis of the properties of materials;
 - b. Laboratory equipment specially designed for scientific research;
 - c. Medical equipment;
 - d. Financial fraud detection equipment; and
 2. Is only operable when installed in any of the following:
 - a. The system(s) or equipment for which it was intended; or
 - b. A specially designed, authorised maintenance facility; and
 3. Incorporates an active mechanism that forces the camera not to function when it is removed from the system(s) or equipment for which it was intended;
 - b. Where the camera is specially designed for installation into a civilian passenger land vehicle of less than three tonnes (gross vehicle weight), or passenger and vehicle ferries having a length overall (LOA) 65 m or greater, and having all of the following:
 1. Is only operable when installed in any of the following:
 - a. The civilian passenger land vehicle or passenger and vehicle ferry for which it was intended; or
 - b. A specially designed, authorised maintenance test facility; and
 2. Incorporates an active mechanism that forces the camera not to function when it is removed from the vehicle for which it was intended;
 - c. Limited by design to have a maximum radiant sensitivity of 10 mA/W or less for wavelengths exceeding 760 nm, having all of the following:
 1. Incorporating a response limiting mechanism designed not to be removed or modified;
 2. Incorporates an active mechanism that forces the camera not to function when the response limiting mechanism is removed; and
 3. Not specially designed or modified for underwater use: or
 - d. Having all of the following:
 1. Not incorporating a 'direct view' or electronic image display;
 2. Has no facility to output a viewable image of the detected field of view;
 3. The "focal plane array" is only operable when installed in the camera for which it was intended; and
 4. The "focal plane array" incorporates an active mechanism that forces it to be permanently inoperable when removed from the camera for which it was intended.

- 6A003 b. continued
5. Imaging cameras incorporating solid-state detectors specified in 6A002.a.1.
- 6A004 Optical equipment and components, as follows:
- a. Optical mirrors (reflectors) as follows:
N.B.: For optical mirrors specially designed for lithography equipment, see 3B001.
1. "Deformable mirrors" having either continuous or multi-element surfaces, and specially designed components therefor, capable of dynamically repositioning portions of the surface of the mirror at rates exceeding 100 Hz;
 2. Lightweight monolithic mirrors having an average "equivalent density" of less than 30 kg/m^2 and a total mass exceeding 10 kg;
 3. Lightweight "composite" or foam mirror structures having an average "equivalent density" of less than 30 kg/m^2 and a total mass exceeding 2 kg;
 4. Beam steering mirrors more than 100 mm in diameter or length of major axis, which maintain a flatness of $\lambda/2$ or better (λ is equal to 633 nm) having a control bandwidth exceeding 100 Hz;
- b. Optical components made from zinc selenide (ZnSe) or zinc sulphide (ZnS) with transmission in the wavelength range exceeding 3,000 nm but not exceeding 25,000 nm and having any of the following:
1. Exceeding 100 cm^3 in volume; *or*
 2. Exceeding 80 mm in diameter or length of major axis and 20 mm in thickness (depth);
- c. "Space-qualified" components for optical systems, as follows:
1. Components lightweighted to less than 20% "equivalent density" compared with a solid blank of the same aperture and thickness;
 2. Raw substrates, processed substrates having surface coatings (single-layer or multi-layer, metallic or dielectric, conducting, semiconducting or insulating) or having protective films;
 3. Segments or assemblies of mirrors designed to be assembled in space into an optical system with a collecting aperture equivalent to or larger than a single optic 1 m in diameter;
 4. Components manufactured from "composite" materials having a coefficient of linear thermal expansion equal to or less than 5×10^{-6} in any coordinate direction;
- d. Optical control equipment as follows:
1. Equipment specially designed to maintain the surface figure or orientation of the "space-qualified" components specified in 6A004.c.1. or 6A004.c.3.;
 2. Equipment having steering, tracking, stabilisation or resonator alignment bandwidths equal to or more than 100 Hz and an accuracy of 10 μrad (microradians) or less;

6A004

d. continued

3. Gimbals having all of the following:
 - a. A maximum slew exceeding 5° ;
 - b. A bandwidth of 100 Hz or more;
 - c. Angular pointing errors of $200 \mu\text{rad}$ (microradians) or less; and
 - d. Having any of the following:
 1. Exceeding 0.15 m but not exceeding 1 m in diameter or major axis length and capable of angular accelerations exceeding $2 \text{ rad (radians)}/\text{s}^2$; or
 2. Exceeding 1 m in diameter or major axis length and capable of angular accelerations exceeding $0.5 \text{ rad (radians)}/\text{s}^2$;
4. Specially designed to maintain the alignment of phased array or phased segment mirror systems consisting of mirrors with a segment diameter or major axis length of 1 m or more;
- e. 'Aspheric optical elements' having all of the following:
 1. Largest dimension of the optical-aperture greater than 400 mm;
 2. Surface roughness less than 1 nm (rms) for sampling lengths equal to or greater than 1 mm; and
 3. Coefficient of linear thermal expansion's absolute magnitude less than $3 \times 10^{-6}/\text{K}$ at 25°C .

Technical Notes:

1. An 'aspheric optical element' is any element used in an optical system whose imaging surface or surfaces are designed to depart from the shape of an ideal sphere.
2. Manufacturers are not required to measure the surface roughness listed in 6A004.e.2. unless the optical element was designed or manufactured with the intent to meet, or exceed, the control parameter.

Note

- 6A004.e. does not control 'aspheric optical elements' having any of the following:
- a. Largest optical-aperture dimension less than 1 m and focal length to aperture ratio equal to or greater than 4.5:1;
 - b. Largest optical-aperture dimension equal to or greater than 1 m and focal length to aperture ratio equal to or greater than 7:1;
 - c. Designed as Fresnel, flyeye, stripe, prism or diffractive optical elements;
 - d. Fabricated from borosilicate glass having a coefficient of linear thermal expansion greater than $2.5 \times 10^{-6}/\text{K}$ at 25°C ; or
 - e. An x-ray optical element having inner mirror capabilities (e.g., tube-type mirrors).

N.B.

For 'aspheric optical elements' specially designed for lithography equipment, see 3B001.

6A005 "Lasers", other than those specified in 0B001.g.5. or 0B001.h.6., components and optical equipment, as follows:

N.B.: SEE ALSO 6A205.

Note 1: Pulsed "lasers" include those that run in a continuous wave (CW) mode with pulses superimposed.

Note 2: Excimer, semiconductor, chemical, CO, CO₂, and non-repetitive pulsed Nd:glass "lasers" are only specified in 6A005.d.

Note 3: 6A005 includes fibre "lasers".

Note 4: The control status of "lasers" incorporating frequency conversion (i.e., wavelength change) by means other than one "laser" pumping another "laser" is determined by applying the control parameters for both the output of the source "laser" and the frequency-converted optical output.

Note 5: 6A005 does not control "lasers" as follows:

- Ruby with output energy below 20 J;
- Nitrogen;
- Krypton.

Technical Note:

In 6A005 'Wall-plug efficiency' is defined as the ratio of "laser" output power (or "average output power") to total electrical input power required to operate the "laser", including the power supply/conditioning and thermal conditioning/heat exchanger.

- Non-"tunable" continuous wave (CW) lasers" having any of the following:
 - Output wavelength less than 150 nm and output power exceeding 1 W;
 - Output wavelength of 150 nm or more but not exceeding 520 nm and output power exceeding 30 W;
Note: 6A005.a.2. does not control Argon "lasers" having an output power equal to or less than 50 W.
 - Output wavelength exceeding 520 nm but not exceeding 540 nm and any of the following:
 - Single transverse mode output and output power exceeding 50 W; or
 - Multiple transverse mode output and output power exceeding 150 W;
 - Output wavelength exceeding 540 nm but not exceeding 800 nm and output power exceeding 30 W;
 - Output wavelength exceeding 800 nm but not exceeding 975 nm and any of the following:
 - Single transverse mode output and output power exceeding 50 W; or
 - Multiple transverse mode output and output power exceeding 80 W;

- 6A005 a. continued
6. Output wavelength exceeding 975 nm but not exceeding 1,150 nm and any of the following:
 - a. Single transverse mode output and any of the following:
 1. 'Wall-plug efficiency' exceeding 12% and output power exceeding 100 W; or
 2. Output power exceeding 150 W; or
 - b. Multiple transverse mode output and any of the following:
 1. 'Wall-plug efficiency' exceeding 18% and output power exceeding 500 W; or
 2. Output power exceeding 2 kW;

Note: 6A005.a.6.b. does not control multiple transverse mode, industrial "lasers" with output power exceeding 2 kW and not exceeding 6 kW with a total mass greater than 1,200 kg. For the purpose of this note, total mass includes all components required to operate the "laser", e.g., "laser", power supply, heat exchanger, but excludes external optics for beam conditioning and/or delivery.
 7. Output wavelength exceeding 1,150 nm but not exceeding 1,555 nm and of the following:
 - a. Single transverse mode and output power exceeding 50 W; or
 - b. Multiple transverse mode and output power exceeding 80 W; or
 8. Output wavelength exceeding 1,555 nm and output power exceeding 1 W;
 - b. Non-"tunable" "pulsed lasers" having any of the following:
 1. Output wavelength less than 150 nm and any of the following:
 - a. Output energy exceeding 50 mJ per pulse and "peak power" exceeding 1 W; or
 - b. "Average output power" exceeding 1 W;
 2. Output wavelength of 150 nm or more but not exceeding 520 nm and any of the following:
 - a. Output energy exceeding 1.5 J per pulse and "peak power" exceeding 30 W; or
 - b. "Average output power" exceeding 30 W;

Note: 6A005.b.2.b. does not control Argon "lasers" having an "average output power" equal to or less than 50 W.
 3. Output wavelength exceeding 520 nm but not exceeding 540 nm and any of the following:
 - a. Single transverse mode output and any of the following:
 1. Output energy exceeding 1.5 J per pulse and "peak power" exceeding 50 W; or
 2. "Average output power" exceeding 50 W; or
 - b. Multiple transverse mode output and any of the following:
 1. Output energy exceeding 1.5 J per pulse and "peak power" exceeding 150 W; or
 2. "Average output power" exceeding 150 W;
 4. Output wavelength exceeding 540 nm but not exceeding 800 nm and any of the following:
 - a. Output energy exceeding 1.5 J per pulse and "peak power" exceeding 30 W; or
 - b. "Average output power" exceeding 30 W;

6A005

b. continued

5. Output wavelength exceeding 800 nm but not exceeding 975 nm and any of the following:
 - a. "Pulse duration" not exceeding 1 μ s and any of the following:
 1. Output energy exceeding 0.5 J per pulse and "peak power" exceeding 50 W;
 2. Single transverse mode output and "average output power" exceeding 20 W; or
 3. Multiple transverse mode output and "average output power" exceeding 50 W; or
 - b. "Pulse duration" exceeding 1 μ s and any of the following:
 1. Output energy exceeding 2 J per pulse and "peak power" exceeding 50 W;
 2. Single transverse mode output and "average output power" exceeding 50 W; or
 3. Multiple transverse mode output and "average output power" exceeding 80 W;
6. Output wavelength exceeding 975 nm but not exceeding 1,150 nm and any of the following:
 - a. "Pulse duration" of less than 1 ns and any of the following:
 1. Output "peak power" exceeding 5 GW per pulse;
 2. "Average output power" exceeding 10 W; or
 3. Output energy exceeding 0.1 J per pulse;
 - b. "Pulse duration" equal to or exceeding 1 ns but not exceeding 1 μ s, and any of the following:
 1. Single transverse mode output and any of the following:
 - a. "Peak power" exceeding 100 MW;
 - b. "Average output power" exceeding 20 W limited by design to a maximum pulse repetition frequency less than or equal to 1 kHz;
 - c. 'Wall-plug efficiency' exceeding 12%, "average output power" exceeding 100 W and capable of operating at a pulse repetition frequency greater than 1 kHz;
 - d. "Average output power" exceeding 150 W and capable of operating at a pulse repetition frequency greater than 1 kHz; or
 - e. Output energy exceeding 2 J per pulse; or
 2. Multiple transverse mode output and any of the following:
 - a. "Peak power" exceeding 400 MW;
 - b. 'Wall-plug efficiency' exceeding 18% and "average output power" exceeding 500 W;
 - c. "Average output power" exceeding 2 kW; or
 - d. Output energy exceeding 4 J per pulse; or
 - c. "Pulse duration" exceeding 1 μ s and any of the following:
 1. Single transverse mode output and any of the following:
 - a. "Peak power" exceeding 500 kW;
 - b. 'Wall-plug efficiency' exceeding 12% and "average output power" exceeding 100 W; or
 - c. "Average output power" exceeding 150 W; or
 2. Multiple transverse mode output and any of the following:
 - a. "Peak power" exceeding 1 MW;
 - b. 'Wall-plug efficiency' exceeding 18% and "average output power" exceeding 500 W; or
 - c. "Average output power" exceeding 2 kW;

6A005

b. continued

7. Output wavelength exceeding 1,150 nm but not exceeding 1,555 nm, and any of the following:
 - a. "Pulse duration" not exceeding 1 μ s and any of the following:
 1. Output energy exceeding 0.5 J per pulse and "peak power" exceeding 50 W;
 2. Single transverse mode output and "average output power" exceeding 20 W; or
 3. Multiple transverse mode output and "average output power" exceeding 50 W; or
 - b. "Pulse duration" exceeding 1 μ s and any of the following:
 1. Output energy exceeding 2 J per pulse and "peak power" exceeding 50 W;
 2. Single transverse mode output and "average output power" exceeding 50 W; or
 3. Multiple transverse mode output and "average output power" exceeding 80 W; or
8. Output wavelength exceeding 1,555 nm and any of the following:
 - a. Output energy exceeding 100 mJ per pulse and "peak power" exceeding 1 W; or
 - b. "Average output power" exceeding 1 W;
- c. "Tunable" "lasers" having any of the following:

Note: 6A005.c. includes titanium-sapphire (Ti: Al₂O₃), thulium-YAG (Tm: YAG), thulium-YSGG (Tm: YSGG), alexandrite (Cr: BeAl₂O₄), colour centre "lasers", dye "lasers", and liquid "lasers".

 1. Output wavelength less than 600 nm and any of the following:
 - a. Output energy exceeding 50 mJ per pulse and "peak power" exceeding 1 W; or
 - b. Average or CW output power exceeding 1 W;
 2. Output wavelength of 600 nm or more but not exceeding 1,400 nm, and any of the following:
 - a. Output energy exceeding 1 J per pulse and "peak power" exceeding 20 W; or
 - b. Average or CW output power exceeding 20 W; or
 3. Output wavelength exceeding 1,400 nm and any of the following:
 - a. Output energy exceeding 50 mJ per pulse and "peak power" exceeding 1 W; or
 - b. Average or CW output power exceeding 1 W;

6A005 continued

d. Other "lasers", not specified in 6A005.a., 6A005.b. or 6A005.c. as follows:

1. Semiconductor "lasers" as follows:

Note 1: 6A005.d.1. includes semiconductor "lasers" having optical output connectors (e.g., fibre optic pigtails).Note 2: The control status of semiconductor "lasers" specially designed for other equipment is determined by the control status of the other equipment.

- a. Individual single-transverse mode semiconductor "lasers" having any of the following:
 1. Wavelength equal to or less than 1,510 nm and average or CW output power, exceeding 1.5 W; or
 2. Wavelength greater than 1,510 nm and average or CW output power, exceeding 500 mW;
- b. Individual, multiple-transverse mode semiconductor "lasers" having any of the following:
 1. Wavelength of less than 1,400 nm and average or CW output power, exceeding 15W;
 2. Wavelength equal to or greater than 1,400 nm and less than 1,900 nm and average or CW output power, exceeding 2.5 W; or
 3. Wavelength equal to or greater than 1,900 nm and average or CW output power, exceeding 1 W;
- c. Individual semiconductor "laser" 'bars', having any of the following:
 1. Wavelength of less than 1,400 nm and average or CW output power, exceeding 100 W;
 2. Wavelength equal to or greater than 1,400 nm and less than 1,900 nm and average or CW output power, exceeding 25 W; or
 3. Wavelength equal to or greater than 1,900 nm and average or CW output power, exceeding 10 W;
- d. Semiconductor "laser" 'stacked arrays' (two-dimensional arrays) having any of the following:
 1. Wavelength less than 1,400 nm and having any of the following:
 - a. Average or CW total output power less than 3 kW and having average or CW output 'power density' greater than 500 W/cm²;
 - b. Average or CW total output power equal to or exceeding 3 kW but less than or equal to 5 kW, and having average or CW output 'power density' greater than 350 W/cm²;
 - c. Average or CW total output power exceeding 5 kW;
 - d. Peak pulsed 'power density' exceeding 2,500 W/cm²; or
 - e. Spatially coherent average or CW total output power, greater than 150 W;
 2. Wavelength greater than or equal to 1,400 nm but less than 1,900 nm, and having any of the following:
 - a. Average or CW total output power less than 250 W and average or CW output 'power density' greater than 150 W/cm²;
 - b. Average or CW total output power equal to or exceeding 250 W but less than or equal to 500 W, and having average or CW output 'power density' greater than 50 W/cm²;
 - c. Average or CW total output power exceeding 500 W;
 - d. Peak pulsed 'power density' exceeding 500 W/cm²; or
 - e. Spatially coherent average or CW total output power, exceeding 15 W;

6A005 d. 1. d. continued

3. Wavelength greater than or equal to 1,900 nm and having any of the following:
 - a. Average or CW output 'power density' greater than 50 W/cm²;
 - b. Average or CW output power greater than 10 W; or
 - c. Spatially coherent average or CW total output power, exceeding 1.5 W; or
4. At least one "laser" 'bar' specified in 6A005.d.1.c.;

Technical Note:

For the purposes of 6A005.d.1.d., 'power density' means the total "laser" output power divided by the emitter surface area of the 'stacked array'.

- e. Semiconductor "laser" 'stacked arrays', other than those specified in 6A005.d.1.d., having all of the following:
 1. Specially designed or modified to be combined with other 'stacked arrays' to form a larger 'stacked array'; and
 2. Integrated connections, common for both electronics and cooling;

Note 1: *'Stacked arrays', formed by combining semiconductor "laser" 'stacked arrays' specified by 6A005.d.1.e., that are not designed to be further combined or modified are specified by 6A005.d.1.d.*

Note 2: *'Stacked arrays', formed by combining semiconductor "laser" 'stacked arrays' specified by 6A005.d.1.e., that are designed to be further combined or modified are specified by 6A005.d.1.e.*

Note 3: *6A005.d.1.e. does not apply to modular assemblies of single 'bars' designed to be fabricated into end-to-end stacked linear arrays.*

Technical Notes:

1. Semiconductor "lasers" are commonly called "laser" diodes.
 2. A 'bar' (also called a semiconductor "laser" 'bar', a "laser" diode 'bar' or diode 'bar') consists of multiple semiconductor "lasers" in a one-dimensional array.
 3. A 'stacked array' consists of multiple 'bars' forming a two-dimensional array of semiconductor "lasers".
2. Carbon monoxide (CO) "lasers" having any of the following:
 - a. Output energy exceeding 2 J per pulse and "peak power" exceeding 5 kW; or
 - b. Average or CW output power exceeding 5 kW;
 3. Carbon dioxide (CO₂) "lasers" having any of the following:
 - a. CW output power exceeding 15 kW;
 - b. Pulsed output with a "pulse duration" exceeding 10 μs and any of the following:
 1. "Average output power" exceeding 10 kW; or
 2. "Peak power" exceeding 100 kW; or
 - c. Pulsed output with a "pulse duration" equal to or less than 10 μs and any of the following:
 1. Pulse energy exceeding 5 J per pulse; or
 2. "Average output power" exceeding 2.5 kW;

6A005 d. continued

4. Excimer "lasers" having any of the following:
 - a. Output wavelength not exceeding 150 nm and any of the following:
 1. Output energy exceeding 50 mJ per pulse; or
 2. "Average output power" exceeding 1 W;
 - b. Output wavelength exceeding 150 nm but not exceeding 190 nm and any of the following:
 1. Output energy exceeding 1.5 J per pulse; or
 2. "Average output power" exceeding 120 W;
 - c. Output wavelength exceeding 190 nm but not exceeding 360 nm and any of the following:
 1. Output energy exceeding 10 J per pulse; or
 2. "Average output power" exceeding 500 W; or
 - d. Output wavelength exceeding 360 nm and any of the following:
 1. Output energy exceeding 1.5 J per pulse; or
 2. "Average output power" exceeding 30 W;

N.B.: For excimer "lasers" specially designed for lithography equipment, see 3B001.

5. "Chemical lasers" as follows:
 - a. Hydrogen Fluoride (HF) "lasers";
 - b. Deuterium Fluoride (DF) "lasers";
 - c. "Transfer lasers" as follows:
 1. Oxygen Iodine (O₂-I) "lasers";
 2. Deuterium Fluoride-Carbon dioxide (DF-CO₂) "lasers";
6. 'Non-repetitive pulsed' Nd: glass "lasers" having any of the following:
 - a. "Pulse duration" not exceeding 1 μ s and output energy exceeding 50 J per pulse; or
 - b. "Pulse duration" exceeding 1 μ s and output energy exceeding 100 J per pulse;

Note: 'Non-repetitive pulsed' refers to "lasers" that produce either a single output pulse or that have a time interval between pulses exceeding one minute.

6A005 continued

e. Components as follows:

1. Mirrors cooled either by 'active cooling' or by heat pipe cooling;
Technical Note:
'Active cooling' is a cooling technique for optical components using flowing fluids within the subsurface (nominally less than 1 mm below the optical surface) of the optical component to remove heat from the optic.
2. Optical mirrors or transmissive or partially transmissive optical or electro-optical components, specially designed for use with specified "lasers";

f. Optical equipment as follows:

N.B.: For shared aperture optical elements, capable of operating in "Super-High Power Laser" ("SHPL") applications, see the Military Goods Controls.

1. Dynamic wavefront (phase) measuring equipment capable of mapping at least 50 positions on a beam wavefront and any of the following:
 - a. Frame rates equal to or more than 100 Hz and phase discrimination of at least 5% of the beam's wavelength; or
 - b. Frame rates equal to or more than 1,000 Hz and phase discrimination of at least 20% of the beam's wavelength;
2. "Laser" diagnostic equipment capable of measuring "SHPL" system angular beam steering errors of equal to or less than 10 μ rad;
3. Optical equipment and components, specially designed for a phased-array "SHPL" system for coherent beam combination to an accuracy of $\lambda/10$ at the designed wavelength, or 0.1 μ m, whichever is the smaller;
4. Projection telescopes specially designed for use with "SHPL" systems.

6A006

"Magnetometers", "magnetic gradiometers", "intrinsic magnetic gradiometers", underwater electric field sensors, "compensation systems", and specially designed components therefor, as follows:
Note: 6A006 does not control instruments specially designed for fishery applications or biomagnetic measurements for medical diagnostics.

- a. "Magnetometers" and subsystems as follows:
 1. "Magnetometers" using "superconductive" (SQUID) "technology" and having any of the following:
 - a. SQUID systems designed for stationary operation, without specially designed subsystems designed to reduce in-motion noise, and having a 'sensitivity' equal to or lower (better) than 50 fT (rms) per square root Hz at a frequency of 1 Hz; or
 - b. SQUID systems having an in-motion-magnetometer 'sensitivity' lower (better) than 20 pT (rms) per square root Hz at a frequency of 1 Hz and specially designed to reduce in-motion noise;
 2. "Magnetometers" using optically pumped or nuclear precession (proton/Overhauser) "technology" having a 'sensitivity' lower (better) than 20 pT (rms) per square root Hz at a frequency of 1 Hz;
 3. "Magnetometers" using fluxgate "technology" having a 'sensitivity' equal to or lower (better) than 10 pT (rms) per square root Hz at a frequency of 1 Hz;
 4. Induction coil "magnetometers" having a 'sensitivity' lower (better) than any of the following:
 - a. 0.05 nT (rms) per square root Hz at frequencies of less than 1 Hz;
 - b. 1×10^{-3} nT (rms) per square root Hz at frequencies of 1 Hz or more but not exceeding 10 Hz; or
 - c. 1×10^{-4} nT (rms) per square root Hz at frequencies exceeding 10 Hz;
 5. Fibre optic "magnetometers" having a 'sensitivity' lower (better) than 1 nT (rms) per square root Hz;
- b. Underwater electric field sensors having a 'sensitivity' lower (better) than 8 nanovolt per metre per square root Hz when measured at 1 Hz;
- c. "Magnetic gradiometers" as follows:
 1. "Magnetic gradiometers" using multiple "magnetometers" specified in 6A006.a.;
 2. Fibre optic "intrinsic magnetic gradiometers" having a magnetic gradient field 'sensitivity' lower (better) than 0.3 nT/m rms per square root Hz;
 3. "Intrinsic magnetic gradiometers", using "technology" other than fibre-optic "technology", having a magnetic gradient field 'sensitivity' lower (better) than 0.015 nT/m rms per square root Hz;
- d. "Compensation systems" for magnetic or underwater electric field sensors resulting in a performance equal to or better than the specified parameters of 6A006.a., 6A006.b. or 6A006.c.

Technical Note:

For the purposes of 6A006., 'sensitivity' (noise level) is the root mean square of the device-limited noise floor which is the lowest signal that can be measured.

6A007

Gravity meters (gravimeters) and gravity gradiometers, as follows:

N.B.: SEE ALSO 6A107.

- a. Gravity meters designed or modified for ground use and having a static accuracy of less (better) than 10 µgal;
Note: 6A007.a. does not control ground gravity meters of the quartz element (Worden) type.
- b. Gravity meters designed for mobile platforms and having all of the following:
 - 1. A static accuracy of less (better) than 0.7 mgal; and
 - 2. An in-service (operational) accuracy of less (better) than 0.7 mgal having a time-to-steady-state registration of less than 2 minutes under any combination of attendant corrective compensations and motional influences;
- c. Gravity gradiometers.

6A008

Radar systems, equipment and assemblies, having any of the following, and specially designed components therefor:

N.B.: SEE ALSO 6A108.*Note:* 6A008 does not control:

- Secondary surveillance radar (SSR);
- Civil Automotive Radar;
- Displays or monitors used for air traffic control (ATC);
- Meteorological (weather) radar;
- Precision approach radar (PAR) equipment conforming to ICAO standards and employing electronically steerable linear (1-dimensional) arrays or mechanically positioned passive antennae.

- a. Operating at frequencies from 40 GHz to 230 GHz and having any of the following:
 - 1. An average output power exceeding 100 mW; or
 - 2. Locating accuracy of 1 m or less (better) in range and 0.2 degree or less (better) in azimuth;
- b. A tunable bandwidth exceeding $\pm 6.25\%$ of the 'centre operating frequency';
Technical Note:
The 'centre operating frequency' equals one half of the sum of the highest plus the lowest specified operating frequencies.
- c. Capable of operating simultaneously on more than two carrier frequencies;
- d. Capable of operating in synthetic aperture (SAR), inverse synthetic aperture (ISAR) radar mode, or sidelooking airborne (SLAR) radar mode;
- e. Incorporating electronically steerable array antennae;
- f. Capable of heightfinding non-cooperative targets;
- g. Specially designed for airborne (balloon or airframe mounted) operation and having Doppler "signal processing" for the detection of moving targets;
- h. Employing processing of radar signals and using any of the following:
 - 1. "Radar spread spectrum" techniques; or
 - 2. "Radar frequency agility" techniques;

6A008 continued

- i. Providing ground-based operation with a maximum "instrumented range" exceeding 185 km;
Note: 6A008.i. does not control:
- a. Fishing ground surveillance radar;
 - b. Ground radar equipment specially designed for enroute air traffic control and having all the following:
 1. A maximum "instrumented range" of 500 km or less;
 2. Configured so that radar target data can be transmitted only one way from the radar site to one or more civil ATC centres;
 3. Contains no provisions for remote control of the radar scan rate from the enroute ATC centre; and
 4. Permanently installed;
 - c. Weather balloon tracking radars.
- j. Being "laser" radar or Light Detection and Ranging (LIDAR) equipment and having any of the following:
1. "Space-qualified";
 2. Employing coherent heterodyne or homodyne detection techniques and having an angular resolution of less (better) than 20 µrad (microradians); or
 3. Designed for carrying out airborne bathymetric littoral surveys to International Hydrographic Organization (IHO) Order 1a Standard (5th Edition February 2008) for Hydrographic Surveys or better, and using one or more lasers with a wavelength exceeding 400 nm but not exceeding 600 nm;
- Note 1: LIDAR equipment specially designed for surveying is only specified in 6A008.j.3.
Note 2: 6A008.j. does not control LIDAR equipment specially designed for meteorological observation.
Note 3: Parameters in the IHO Order 1a Standard 5th Edition February 2008 are summarized as follows:
- Horizontal Accuracy (95% Confidence Level) = 5 m + 5% of depth.
 - Depth Accuracy for Reduced Depths (95% confidence level) = $\pm\sqrt{a^2 + (b*d)^2}$, where:
 - $a = 0.5$ m = constant depth error,
i.e. the sum of all constant depth errors
 - $b = 0.013$ = factor of depth dependent error
 - $b*d$ = depth dependent error,
i.e. the sum of all depth dependent errors
 - d = depth
 - Feature Detection = Cubic features > 2 m in depths up to 40 m;
10% of depth beyond 40 m.
- k. Having "signal processing" sub-systems using "pulse compression" and having any of the following:
1. A "pulse compression" ratio exceeding 150; or
 2. A pulse width of less than 200 ns; or
- l. Having data processing sub-systems and having any of the following:
1. "Automatic target tracking" providing, at any antenna rotation, the predicted target position beyond the time of the next antenna beam passage;
Note: 6A008.l.1. does not control conflict alert capability in ATC systems, or marine or harbour radar.
 2. Calculation of target velocity from primary radar having non-periodic (variable) scanning rates;

- 6A008 i. continued
3. Processing for automatic pattern recognition (feature extraction) and comparison with target characteristic data bases (waveforms or imagery) to identify or classify targets; or
 4. Superposition and correlation, or fusion, of target data in real time from two or more "geographically dispersed" radar sensors to improve the aggregate performance beyond that of any single sensor.
- Note:* 6A008.i.4. does not control systems, equipment and assemblies used for marine traffic control.
- 6A102 Radiation hardened 'detectors', other than those specified in 6A002, specially designed or modified for protecting against nuclear effects (e.g. electromagnetic pulse (EMP), X-rays, combined blast and thermal effects) and usable for "missiles", designed or rated to withstand radiation levels which meet or exceed a total irradiation dose of 5×10^5 rads (silicon).
- Technical Note:*
In 6A102, a 'detector' is defined as a mechanical, electrical, optical or chemical device that automatically identifies and records, or registers a stimulus such as an environmental change in pressure or temperature, an electrical or electromagnetic signal or radiation from a radioactive material. This includes devices that sense by one time operation or failure.
- 6A107 Gravity meters (gravimeters) and components for gravity meters and gravity gradiometers, as follows:
- a. Gravity meters, other than those specified in 6A007.b, designed or modified for airborne or marine use, and having a static or operational accuracy of 7×10^{-6} m/s² (0.7 milligal) or less (better), and having a time-to-steady-state registration of two minutes or less;
 - b. Specially designed components for gravity meters specified in 6A007.b or 6A107.a. and gravity gradiometers specified in 6A007.c.
- 6A108 Radar systems and tracking systems, other than those specified in entry 6A008, as follows:
- a. Radar and laser radar systems designed or modified for use in space launch vehicles specified in 9A004 or sounding rockets specified in 9A104;

Note: 6A108.a. includes the following:

 - a. Terrain contour mapping equipment;
 - b. Imaging sensor equipment;
 - c. Scene mapping and correlation (both digital and analogue) equipment;
 - d. Doppler navigation radar equipment.
 - b. Precision tracking systems, usable for 'missiles', as follows:
 1. Tracking systems which use a code translator in conjunction with either surface or airborne references or navigation satellite systems to provide real-time measurements of in-flight position and velocity;

- 6A108 b. continued
2. Range instrumentation radars including associated optical/infrared trackers with all of the following capabilities:
- Angular resolution better than 1.5 milliradians;
 - Range of 30 km or greater with a range resolution better than 10 m rms;
 - Velocity resolution better than 3 m/s.
- Technical Note:*
In 6A108.b. 'missile' means complete rocket systems and unmanned aerial vehicle systems capable of a range exceeding 300 km.
- 6A202 Photomultiplier tubes having both of the following characteristics:
- Photocathode area of greater than 20 cm²; and
 - Anode pulse rise time of less than 1 ns.
- 6A203 Cameras and components, other than those specified in 6A003, as follows:
- Mechanical rotating mirror cameras, as follows, and specially designed components therefor:
 - Framing cameras with recording rates greater than 225,000 frames per second;
 - Streak cameras with writing speeds greater than 0.5 mm per microsecond;

Note: *In 6A203.a. components of such cameras include their synchronizing electronics units and rotor assemblies consisting of turbines, mirrors and bearings.*
 - Electronic streak cameras, electronic framing cameras, tubes and devices, as follows:
 - Electronic streak cameras capable of 50 ns or less time resolution;
 - Streak tubes for cameras specified in 6A203.b.1.;
 - Electronic (or electronically shuttered) framing cameras capable of 50 ns or less frame exposure time;
 - Framing tubes and solid-state imaging devices for use with cameras specified in 6A203.b.3., as follows:
 - Proximity focused image intensifier tubes having the photocathode deposited on a transparent conductive coating to decrease photocathode sheet resistance;
 - Gate silicon intensifier target (SIT) videocon tubes, where a fast system allows gating the photoelectrons from the photocathode before they impinge on the SIT plate;
 - Kerr or Pockels cell electro-optical shuttering;
 - Other framing tubes and solid-state imaging devices having a fast-image gating time of less than 50 ns specially designed for cameras specified in 6A203.b.3.;
 - Radiation-hardened TV cameras, or lenses therefor, specially designed or rated as radiation hardened to withstand a total radiation dose greater than 50 x 10³ Gy(silicon) (5 x 10⁶ rad (silicon)) without operational degradation.
- Technical Note:*
The term Gy(silicon) refers to the energy in Joules per kilogram absorbed by an unshielded silicon sample when exposed to ionising radiation.

- 6A205 "Lasers", "laser" amplifiers and oscillators, other than those specified in 0B001.g.5., 0B001.h.6. and 6A005; as follows:
N.B.: For copper vapour lasers, see 6A005.b.
- a. Argon ion "lasers" having both of the following characteristics:
 - 1. Operating at wavelengths between 400 nm and 515 nm; and
 - 2. An average output power greater than 40 W;
 - b. Tunable pulsed single-mode dye laser oscillators having all of the following characteristics:
 - 1. Operating at wavelengths between 300 nm and 800 nm;
 - 2. An average output power greater than 1 W;
 - 3. A repetition rate greater than 1 kHz; and
 - 4. Pulse width less than 100 ns;
 - c. Tunable pulsed dye laser amplifiers and oscillators, having all of the following characteristics:
 - 1. Operating at wavelengths between 300 nm and 800 nm;
 - 2. An average output power greater than 30 W;
 - 3. A repetition rate greater than 1 kHz; and
 - 4. Pulse width less than 100 ns;

Note: 6A205.c. does not control single mode oscillators;
 - d. Pulsed carbon dioxide "lasers" having all of the following characteristics:
 - 1. Operating at wavelengths between 9,000 nm and 11,000 nm;
 - 2. A repetition rate greater than 250 Hz;
 - 3. An average output power greater than 500 W; and
 - 4. Pulse width of less than 200 ns;
 - e. Para-hydrogen Raman shifters designed to operate at 16 micrometre output wavelength and at a repetition rate greater than 250 Hz;
 - f. Neodymium-doped (other than glass) "lasers" with an output wavelength between 1000 and 1100 nm having either of the following:
 - 1. Pulse-excited and Q-switched with a pulse duration equal to or more than 1 ns, and having either of the following:
 - a. A single-transverse mode output with an average output power greater than 40W; or
 - b. A multiple-transverse mode output having an average power greater than 50 W; or
 - 2. Incorporating frequency doubling to give an output wavelength between 500 and 550 nm with an average output power of more than 40 W.
- 6A225 Velocity interferometers for measuring velocities exceeding 1 km/s during time intervals of less than 10 microseconds.
Note: 6A225 includes velocity interferometers such as VISARs (Velocity interferometer systems for any reflector) and DLIs (Doppler laser interferometers).
- 6A226 Pressure sensors, as follows:
- a. Manganin gauges for pressures greater than 10 GPa;
 - b. Quartz pressure transducers for pressures greater than 10 GPa.

6B Test, Inspection and Production Equipment

6B004 Optical equipment as follows:

- a. Equipment for measuring absolute reflectance to an accuracy of $\pm 0.1\%$ of the reflectance value;
- b. Equipment other than optical surface scattering measurement equipment, having an unobscured aperture of more than 10 cm, specially designed for the non-contact optical measurement of a non-planar optical surface figure (profile) to an "accuracy" of 2 nm or less (better) against the required profile.

Note: 6B004 does not control microscopes.

6B007 Equipment to produce, align and calibrate land-based gravity meters with a static accuracy of better than 0.1 mgal.

6B008 Pulse radar cross-section measurement systems having transmit pulse widths of 100 ns or less, and specially designed components therefor.
N.B.: SEE ALSO 6B108.

6B108 Systems, other than those specified in 6B008, specially designed for radar cross section measurement usable for 'missiles' and their subsystems.

Technical Note:

In 6B108 'missile' means complete rocket systems and unmanned aerial vehicle systems capable of a range exceeding 300 km.

6C Materials

6C002 Optical sensor materials as follows:

- a. Elemental tellurium (Te) of purity levels of 99.9995% or more;
- b. Single crystals (including epitaxial wafers) of any of the following:
 1. Cadmium zinc telluride (CdZnTe), with zinc content of less than 6% by 'mole fraction';
 2. Cadmium telluride (CdTe) of any purity level; or
 3. Mercury cadmium telluride (HgCdTe) of any purity level.

Technical Note:
'Mole fraction' is defined as the ratio of moles of ZnTe to the sum of moles of CdTe and ZnTe present in the crystal.

6C004 Optical materials as follows:

- a. Zinc selenide (ZnSe) and zinc sulphide (ZnS) "substrate blanks", produced by the chemical vapour deposition process and having any of the following:
 1. A volume greater than 100 cm³; or
 2. A diameter greater than 80 mm and a thickness of 20 mm or more;
- b. Boules of any of the following electro-optic materials:
 1. Potassium titanyl arsenate (KTA) (CAS 59400-80-5);
 2. Silver gallium selenide (AgGaSe₂) (CAS 12002-67-4); or
 3. Thallium arsenic selenide (Tl₃AsSe₃, also known as TAS) (CAS 16142-89-5);
- c. Non-linear optical materials having all of the following:
 1. Third order susceptibility (χ^3) of $10^{-6} \text{ m}^2/\text{V}^2$ or more; and
 2. A response time of less than 1 ms;
- d. "Substrate blanks" of silicon carbide or beryllium beryllium (Be/Be) deposited materials, exceeding 300 mm in diameter or major axis length;
- e. Glass, including fused silica, phosphate glass, fluorophosphate glass, zirconium fluoride (ZrF₄) (CAS 7783-64-4) and hafnium fluoride (HfF₄) (CAS 13709-52-9) and having all of the following:
 1. A hydroxyl ion (OH⁻) concentration of less than 5 ppm;
 2. Integrated metallic purity levels of less than 1 ppm; and
 3. High homogeneity (index of refraction variance) less than 5×10^{-6} ;
- f. Synthetically produced diamond material with an absorption of less than 10^{-5} cm^{-1} for wavelengths exceeding 200 nm but not exceeding 14,000 nm.

6C005 Synthetic crystalline "laser" host material in unfinished form as follows:

- a. Titanium doped sapphire;
- b. Alexandrite.

6D Software

- 6D001 "Software" specially designed for the "development" or "production" of equipment specified in 6A004, 6A005, 6A008 or 6B008.
- 6D002 "Software" specially designed for the "use" of equipment specified in 6A002.b., 6A008 or 6B008.
- 6D003 Other "software" as follows:
- a. "Software" as follows:
 1. "Software" specially designed for acoustic beam forming for the "real time processing" of acoustic data for passive reception using towed hydrophone arrays;
 2. "Source code" for the "real time processing" of acoustic data for passive reception using towed hydrophone arrays;
 3. "Software" specially designed for acoustic beam forming for "real time processing" of acoustic data for passive reception using bottom or bay cable systems;
 4. "Source code" for "real time processing" of acoustic data for passive reception using bottom or bay cable systems;
 5. "Software" or "source code", specially designed for all of the following:
 - a. "Real time processing" of acoustic data from sonar systems specified by 6A001.a.1.e.;
and
 - b. Automatically detecting, classifying and determining the location of divers or swimmers;
N.B.: *For diver detection "software" or "source code", specially designed or modified for military use, see the Military Goods Controls.*
 - b. Not used;
 - c. "Software" designed or modified for cameras incorporating "focal plane arrays" specified in 6A002.a.3.f. and designed or modified to remove a frame rate restriction and allow the camera to exceed the frame rate specified in 6A003.b.4. Note 3.a.
 - d. Not used;
 - e. Not used;
 - f. "Software" as follows:
 1. "Software" specially designed for magnetic and electric field "compensation systems" for magnetic sensors designed to operate on mobile platforms;
 2. "Software" specially designed for magnetic and electric field anomaly detection on mobile platforms;
 - g. "Software" specially designed to correct motional influences of gravity meters or gravity gradiometers;

6D003 continued

h. "Software" as follows:

1. Air Traffic Control (ATC) "software" application "programmes" hosted on general purpose computers located at Air Traffic Control centres and capable of accepting radar target data from more than four primary radars;
2. "Software" for the design or "production" of radomes and having all of the following:
 - a. Specially designed to protect the "electronically steerable phased array antennae" specified in 6A008.e.; and
 - b. Resulting in an antenna pattern having an 'average side lobe level' more than 40 dB below the peak of the main beam level.

Technical Note:

'Average side lobe level' in 6D003.h.2.b. is measured over the entire array excluding the angular extent of the main beam and the first two side lobes on either side of the main beam.

6D102 "Software" specially designed or modified for the "use" of goods specified in 6A108.

6D103 "Software" which processes post-flight, recorded data, enabling determination of vehicle position throughout its flight path, specially designed or modified for 'missiles'.

Technical Note:

In 6D103 'missile' means complete rocket systems and unmanned aerial vehicle systems capable of a range exceeding 300 km.

6E Technology

- 6E001 "Technology" according to the General Technology Note for the "development" of equipment, materials or "software" specified in 6A, 6B, 6C or 6D.
- 6E002 "Technology" according to the General Technology Note for the "production" of equipment or materials specified in 6A, 6B or 6C.
- 6E003 Other "technology" as follows:
- a. "Technology" as follows:
 1. Optical surface coating and treatment "technology", "required" to achieve uniformity of 99.5% or better for optical coatings 500 mm or more in diameter or major axis length and with a total loss (absorption and scatter) of less than 5×10^{-3} ;
N.B.: See also 2E003.f.
 2. Optical fabrication "technology" using single point diamond turning techniques to produce surface finish accuracies of better than 10 nm rms on non-planar surfaces exceeding 0.5 m^2 ;
 - b. "Technology" "required" for the "development", "production" or "use" of specially designed diagnostic instruments or targets in test facilities for "SHPL" testing or testing or evaluation of materials irradiated by "SHPL" beams;
- 6E101 "Technology" according to the General Technology Note for the "use" of equipment or "software" specified in 6A002, 6A007.b. and c., 6A008, 6A102, 6A107, 6A108, 6B108, 6D102 or 6D103.
Note: 6E101 only specifies "technology" for equipment specified in 6A008 when it is designed for airborne applications and is usable in "missiles".
- 6E201 "Technology" according to the General Technology Note for the "use" of equipment specified in 6A003, 6A005.a.2., 6A005.b.2., 6A005.b.3., 6A005.b.4., 6A005.b.6., 6A005.c.2., 6A005.d.3.c., 6A005.d.4.c., 6A202, 6A203, 6A205, 6A225 or 6A226.

CATEGORY 7 - NAVIGATION AND AVIONICS

7A Systems, Equipment and Components

N.B.: For automatic pilots for underwater vehicles, see Category 8.
For radar, see Category 6.

7A001 Accelerometers as follows and specially designed components therefor:
N.B.: SEE ALSO 7A101.

N.B.: For angular or rotational accelerometers, see 7A001.b.

- a. Linear accelerometers having any of the following:
 1. Specified to function at linear acceleration levels less than or equal to 15 g and having any of the following:
 - a. A "bias" "stability" of less (better) than 130 micro g with respect to a fixed calibration value over a period of one year; or
 - b. A "scale factor" "stability" of less (better) than 130 ppm with respect to a fixed calibration value over a period of one year;
 2. Specified to function at linear acceleration levels exceeding 15 g and having all of the following:
 - a. A "bias" "repeatability" of less (better) than 5,000 micro g over a period of one year; and
 - b. A "scale factor" "repeatability" of less (better) than 2,500 ppm over a period of one year; or
 3. Designed for use in inertial navigation or guidance systems and specified to function at linear acceleration levels exceeding 100 g;
- b. Angular or rotational accelerometers, specified to function at linear acceleration levels exceeding 100 g.

7A002 Gyros, and angular rate sensors, having any of the following and specially designed components therefor:

N.B.: SEE ALSO 7A102.

N.B.: For angular or rotational accelerometers, see 7A001.b.

- a. A "bias" "stability", when measured in a 1 g environment over a period of one month, and with respect to a fixed calibration value of less (better) than 0.5 degree per hour when specified to function at linear acceleration levels up to and including 100 g;
- b. An "angle random walk" of less (better) than or equal to 0.0035 degree per square root hour; or
Note: 7A002.b. does not control 'spinning mass gyros'.
Technical Note:
'Spinning mass gyros' are gyros which use a continually rotating mass to sense angular motion.

7A002 continued

- c. A rate range greater than or equal to 500 degrees per second and having any of the following:
 - 1. A "bias" "stability", when measured in a 1 g environment over a period of three minutes, and with respect to a fixed calibration value of less (better) than 40 degrees per hour; or
 - 2. An "angle random walk" of less (better) than or equal to 0.2 degree per square root hour; or
- d. Specified to function at linear acceleration levels exceeding 100 g.

7A003 Inertial systems and specially designed components, as follows:

N.B.: SEE ALSO 7A103.

- a. Inertial Navigation Systems (INS) (gimballed or strapdown) and inertial equipment, designed for "aircraft", land vehicle, vessels (surface or underwater) or "spacecraft" for navigation, attitude, guidance or control and having any of the following and specially designed components therefor:
 - 1. Navigation error (free inertial) subsequent to normal alignment of 0.8 nautical mile per hour (nm/hr) 'Circular Error Probable' ('CEP') or less (better); or
 - 2. Specified to function at linear acceleration levels exceeding 10 g;
- b. Hybrid Inertial Navigation Systems embedded with Global Navigation Satellite Systems(s) (GNSS) or with "Data-Based Referenced Navigation" ("DBRN") System(s) for navigation, attitude, guidance or control, subsequent to normal alignment and having an INS navigation position accuracy, after loss of GNSS or "DBRN" for a period of up to four minutes, of less (better) than 10 metres 'Circular Error Probable' ('CEP');
- c. Inertial Measurement equipment for heading or True North determination and having any of the following and specially designed components therefor:
 - 1. Designed to have heading or True North determination accuracy equal to or less (better) than 0.07 deg sec(Lat) (equivalent to 6 arc minutes rms at 45 degrees latitude); or
 - 2. Designed to have a non-operating shock level of 900 g or greater at a duration of 1 msec or greater;
- d. Inertial measurement equipment including Inertial Measurement Units (IMU) and Inertial Reference Systems (IRS), incorporating accelerometers or gyros specified in 7A001 or 7A002, and specially designed components therefor.

Note 1: *The parameters of 7A003.a. and 7A003.b. are applicable with any of the following environmental conditions:*

- a. *Input random vibration with an overall magnitude of 7.7 g rms in the first 0.5 hour and a total test duration of 1.5 hour per axis in each of the 3 perpendicular axes, when the random vibration meets all the following:*
 - 1. *A constant Power Spectral Density (PSD) value of $0.04 \text{ g}^2/\text{Hz}$ over a frequency interval of 15 to 1,000 Hz; and*
 - 2. *The PSD attenuates with frequency from $0.04 \text{ g}^2/\text{Hz}$ to $0.01 \text{ g}^2/\text{Hz}$ over a frequency interval from 1,000 to 2,000 Hz;*
- b. *An angular rate capability about one or more axes of equal to or more than +2.62 rad/s (150 deg/s); or*
- c. *According to national standards equivalent to a. or b. above.*

7A003 continued

Note 2: 7A003 does not control inertial navigation systems which are certified for use on "civil aircraft" by civil authorities of a "participating state".

Note 3: 7A003.c.1. does not control theodolite systems incorporating inertial equipment specially designed for civil surveying purposes.

Technical Notes:

1. 7A003.b. refers to systems in which an INS and other independent navigation aids are built into a single unit (embedded) in order to achieve improved performance.
2. 'Circular Error Probable' (CEP) – In a circular normal distribution, the radius of the circle containing 50% of the individual measurements being made, or the radius of the circle within which there is a 50% probability of being located.

7A004 Gyro-astro compasses and other devices which derive position or orientation by means of automatically tracking celestial bodies or satellites, with an azimuth accuracy of equal to or less (better) than 5 seconds of arc.

N.B.: SEE ALSO 7A104.

7A005 Global Navigation Satellite Systems (GNSS) receiving equipment having any of the following and specially designed components therefor:

N.B.: SEE ALSO 7A105.

N.B.: For equipment specially designed for military use, see Military Goods Controls.

- a. Employing a decryption algorithm specially designed or modified for government use to access the ranging code for position and time; or
- b. Employing 'adaptive antenna systems'.

Note: 7A005.b. does not control GNSS receiving equipment that only uses components designed to filter, switch, or combine signals from multiple omni-directional antennae that do not implement adaptive antenna techniques.

Technical Note:

For the purposes of 7A005.b 'adaptive antenna systems' dynamically generate one or more spatial nulls in an antenna array pattern by signal processing in the time domain or frequency domain.

- 7A006 Airborne altimeters operating at frequencies other than 4.2 to 4.4 GHz inclusive and having any of the following:
N.B.: SEE ALSO 7A106.
- a. "Power management"; or
 - b. Using phase shift key modulation.
- 7A008 Underwater sonar navigation systems using doppler velocity or correlation velocity logs integrated with a heading source and having a positioning accuracy of equal to or less (better) than 3% of distance travelled 'Circular Error Probable' ('CEP') and specially designed components therefor.
- Note: 7A008 does not control systems specially designed for installation on surface vessels or systems requiring acoustic beacons or buoys to provide positioning data.
- N.B.: See 6A001.a. for acoustic systems, and 6A001.b. for correlation-velocity and Doppler-velocity sonar log equipment.
See 8A002 for other marine systems.
- 7A101 Linear accelerometers, other than those specified in 7A001, designed for use in inertial navigation systems or in guidance systems of all types, usable in 'missiles', having all the following characteristics, and specially designed components therefor:
- a. A "bias" "repeatability" of less (better) than 1250 micro g; and
 - b. A "scale factor" "repeatability" of less (better) than 1250 ppm;
- Note: 7A101 does not control accelerometers specially designed and developed as Measurement While Drilling (MWD) Sensors for use in downhole well service operations.
- Technical Notes:
1. In 7A101 'missile' means complete rocket systems and unmanned aerial vehicle systems capable of a range exceeding 300 km;
 2. In 7A101 the measurement of "bias" and "scale factor" refers to a one sigma standard deviation with respect to a fixed calibration over a period of one year;

- 7A102 All types of gyros, other than those specified in 7A002, usable in 'missiles', with a rated "drift rate" 'stability' of less than 0.5° (1 sigma or rms) per hour in a 1 g environment and specially designed components therefor.
- Technical Notes:
1. In 7A102 'missile' means complete rocket systems and unmanned aerial vehicle systems capable of a range exceeding 300 km.
 2. In 7A102 'stability' is defined as a measure of the ability of a specific mechanism or performance coefficient to remain invariant when continuously exposed to a fixed operating condition (IEEE STD 528-2001 paragraph 2.247).
- 7A103 Instrumentation, navigation equipment and systems, other than those specified in 7A003, as follows; and specially designed components therefor:
- a. Inertial or other equipment, using accelerometers or gyros as follows, and systems incorporating such equipment:
 1. Accelerometers specified in 7A001.a.3., 7A001.b. or 7A101 or gyros specified in 7A002 or 7A102; or
 2. Accelerometers specified in 7A001.a.1. or 7A001.a.2. and having all of the following:
 - a. Designed for use in inertial navigation systems or in guidance systems of all types and usable in 'missiles';
 - b. A "bias" "repeatability" of less (better) than 1250 micro g; and
 - c. A "scale factor" "repeatability" of less (better) than 1250 ppm;

Note: 7A103.a. does not specify equipment containing accelerometers specified in 7A001 where such accelerometers are specially designed and developed as MWD (Measurement While Drilling) sensors for use in down-hole well services operations.
 - b. Integrated flight instrument systems which include gyrostabilisers or automatic pilots, designed or modified for use in 'missiles';
 - c. 'Integrated navigation systems', designed or modified for 'missiles' and capable of providing a navigational accuracy of 200 m Circle of Equal Probability (CEP) or less;

Technical Note:

An 'integrated navigation system' typically incorporates the following components:

 1. An inertial measurement device (e.g., an attitude and heading reference system, inertial reference unit, or inertial navigation system);
 2. One or more external sensors used to update the position and/or velocity, either periodically or continuously throughout the flight (e.g., satellite navigation receiver, radar altimeter, and/or Doppler radar); and
 3. Integration hardware and software;
 - d. Three axis magnetic heading sensors, designed or modified to be integrated with flight control and navigation systems, having all the following characteristics, and specially designed components therefor;
 1. Internal tilt compensation in pitch (± 90 degrees) and roll (± 180 degrees) axes;
 2. Capable of providing azimuthal accuracy better (less) than 0.5 degrees rms at latitude of ± 80 degrees, reference to local magnetic field.

Note: Flight control and navigation systems in 7A103.d. include gyrostabilizers, automatic pilots and inertial navigation systems.

Technical Note:

In 7A103 'missile' means complete rocket systems and unmanned aerial vehicle systems capable of a range exceeding 300 km.
- 7A104 Gyro-astro compasses and other devices, other than those specified in 7A004, which derive position or orientation by means of automatically tracking celestial bodies or satellites and specially designed components therefor.

7A105 Receiving equipment for Global Navigation Satellite Systems (GNSS; e.g. GPS, GLONASS, or Galileo), having any of the following characteristics, and specially designed components therefor:

- a. Designed or modified for use in space launch vehicles specified in 9A004, unmanned aerial vehicles specified in 9A012 or sounding rockets specified in 9A104; or
- b. Designed or modified for airborne applications and having any of the following:
 1. Capable of providing navigation information at speeds in excess of 600 m/s;
 2. Employing decryption, designed or modified for military or governmental services, to gain access to GNSS secured signal/data; or
 3. Being specially designed to employ anti-jam features (e.g. null steering antenna or electronically steerable antenna) to function in an environment of active or passive countermeasures.

Note: 7A105.b.2. and 7A105.b.3. do not control equipment designed for commercial, civil or 'Safety of Life' (e.g., data integrity, flight safety) GNSS services.

7A106 Altimeters, other than those specified in 7A006, of radar or laser radar type, designed or modified for use in space launch vehicles specified in 9A004 or sounding rockets specified in 9A104.

7A115 Passive sensors for determining bearing to specific electromagnetic source (direction finding equipment) or terrain characteristics, designed or modified for use in space launch vehicles specified in 9A004 or sounding rockets specified in 9A104.

Note: 7A115 includes sensors for the following equipment:

- a. Terrain contour mapping equipment;
- b. Imaging sensor equipment (both active and passive);
- c. Passive interferometer equipment.

7A116 Flight control systems and servo valves, as follows; designed or modified for use in space launch vehicles specified in 9A004 or sounding rockets specified in 9A104.

- a. Hydraulic, mechanical, electro-optical, or electro-mechanical flight control systems (including fly-by-wire types);
- b. Attitude control equipment;
- c. Flight control servo valves designed or modified for the systems specified in 7A116.a. or 7A116.b., and designed or modified to operate in a vibration environment greater than 10 g rms between 20 Hz and 2 kHz.

7A117 "Guidance sets", usable in "missiles" capable of achieving system accuracy of 3.33% or less of the range (e.g., a "CEP" of 10 km or less at a range of 300 km).

7B Test, Inspection and Production Equipment

7B001 Test, calibration or alignment equipment, specially designed for equipment specified in 7A.

Note: 7B001 does not control test, calibration or alignment equipment for 'Maintenance Level I' or 'Maintenance Level II'.

Technical Notes:1. 'Maintenance Level I'

The failure of an inertial navigation unit is detected on the aircraft by indications from the Control and Display Unit (CDU) or by the status message from the corresponding sub-system. By following the manufacturer's manual, the cause of the failure may be localised at the level of the malfunctioning Line Replaceable Unit (LRU). The operator then removes the LRU and replaces it with a spare.

2. 'Maintenance Level II'

The defective LRU is sent to the maintenance workshop (the manufacturer's or that of the operator responsible for level II maintenance). At the maintenance workshop, the malfunctioning LRU is tested by various appropriate means to verify and localise the defective Shop Replaceable Assembly (SRA) module responsible for the failure. This SRA is removed and replaced by an operative spare. The defective SRA (or possibly the complete LRU) is then shipped to the manufacturer. 'Maintenance Level II' does not include the disassembly or repair of controlled accelerometers or gyro sensors.

7B002 Equipment specially designed to characterize mirrors for ring "laser" gyros, as follows:
N.B.: SEE ALSO 7B102.

- a. Scatterometers having a measurement accuracy of 10 ppm or less (better);
- b. Profilometers having a measurement accuracy of 0.5 nm (5 angstrom) or less (better).

7B003 Equipment specially designed for the "production" of equipment specified in 7A.

Note: 7B003 includes:

- Gyro tuning test stations;
- Gyro dynamic balance stations;
- Gyro run-in/motor test stations;
- Gyro evacuation and fill stations;
- Centrifuge fixtures for gyro bearings;
- Accelerometer axis align stations;
- Fibre optic gyro coil winding machines.

- 7B102 Reflectometers specially designed to characterise mirrors, for "laser" gyros, having a measurement accuracy of 50 ppm or less (better).
- 7B103 "Production facilities" and "production equipment" as follows:
- a. "Production facilities" specially designed for equipment specified in 7A117;
 - b. "Production equipment", and other test, calibration and alignment equipment, other than that specified in 7B001 to 7B003, designed or modified to be used with equipment specified in 7A.

7C Materials

None.

7D Software

7D001 "Software" specially designed or modified for the "development" or "production" of equipment specified in 7A. or 7B.

7D002 "Source code" for the "use" of any inertial navigation equipment, including inertial equipment not specified in 7A003 or 7A004, or Attitude and Heading Reference Systems ('AHRS').

Note: 7D002 does not control "source code" for the "use" of gimballed 'AHRS'.

Technical Note:

'AHRS' generally differ from Inertial Navigation Systems (INS) in that an 'AHRS' provides attitude and heading information and normally does not provide the acceleration, velocity and position information associated with an INS.

7D003 Other "software" as follows:

- a. "Software" specially designed or modified to improve the operational performance or reduce the navigational error of systems to the levels specified in 7A003, 7A004 or 7A008;
- b. "Source code" for hybrid integrated systems which improves the operational performance or reduces the navigational error of systems to the level specified in 7A003 or 7A008 by continuously combining heading data with any of the following:
 1. Doppler radar or sonar velocity data;
 2. Global Navigation Satellite Systems (GNSS) reference data; or
 3. Data from "Data-Based Referenced Navigation" ("DBRN") systems;

7D003 continued

- c. "Source code" for integrated avionics or mission systems which combine sensor data and employ "expert systems";
- d. "Source code" for the "development" of any of the following:
 - 1. Digital flight management systems for "total control of flight";
 - 2. Integrated propulsion and flight control systems;
 - 3. Fly-by-wire or fly-by-light control systems;
 - 4. Fault-tolerant or self-reconfiguring "active flight control systems";
 - 5. Airborne automatic direction finding equipment;
 - 6. Air data systems based on surface static data; or
 - 7. Raster-type head-up displays or three dimensional displays;
- e. Computer-Aided-Design (CAD) "software" specially designed for the "development" of "active flight control systems", helicopter multi-axis fly-by-wire or fly-by-light controllers or helicopter "circulation controlled anti-torque or circulation-controlled direction control systems", whose "technology" is specified in 7E004.b., 7E004.c.1. or 7E004.c.2.

7D101 "Software" specially designed or modified for the "use" of equipment specified in 7A001 to 7A006, 7A101 to 7A106, 7A115, 7A116.a., 7A116.b., 7B001, 7B002, 7B003, 7B102 or 7B103.

7D102 Integration "software" as follows:

- a. Integration "software" for the equipment specified in 7A103.b.;
- b. Integration "software" specially designed for the equipment specified in 7A003 or 7A103.a.
- c. Integration "software" designed or modified for the equipment specified in 7A103.c.
Note: *A common form of integration "software" employs Kalman filtering.*

7D103 "Software" specially designed for modelling or simulation of the "guidance sets" specified in 7A117 or for their design integration with the space launch vehicles specified in 9A004 or sounding rockets specified in 9A104.

Note: *"Software" specified in 7D103 remains controlled when combined with specially designed hardware specified in 4A102.*

7E Technology

7E001 "Technology" according to the General Technology Note for the "development" of equipment or "software", specified in 7A, 7B or 7D.

7E002 "Technology" according to the General Technology Note for the "production" of equipment specified in 7A or 7B.

7E003 "Technology" according to the General Technology Note for the repair, refurbishing or overhaul of equipment specified in 7A001 to 7A004.

Note: 7E003 does not control maintenance "technology" directly associated with calibration, removal or replacement of damaged or unserviceable LRUs and SRAs of a "civil aircraft" as described in 'Maintenance Level I' or 'Maintenance Level II'.

N.B.: See Technical Notes to 7B001.

7E004 Other "technology" as follows:

- a. "Technology" for the "development" or "production" of any of the following:
 1. Airborne automatic direction finding equipment operating at frequencies exceeding 5 MHz;
 2. Air data systems based on surface static data only, i.e., which dispense with conventional air data probes;
 3. Raster-type head-up displays or three dimensional displays, for "aircraft";
 4. Inertial navigation systems or gyro-astro compasses, containing accelerometers or gyros, specified in 7A001 or 7A002;
 5. Electric actuators (i.e., electromechanical, electrohydrostatic and integrated actuator package) specially designed for "primary flight control";
 6. "Flight control optical sensor array" specially designed for implementing "active flight control systems"; or
 7. "DBRN" systems designed to navigate underwater, using sonar or gravity databases, that provide a positioning accuracy equal to or less (better) than 0.4 nautical miles;
- b. "Development" "technology", as follows, for "active flight control systems" (including fly-by-wire or fly-by-light):
 1. Configuration design for interconnecting multiple microelectronic processing elements (on-board computers) to achieve "real time processing" for control law implementation;
 2. Control law compensation for sensor location or dynamic airframe loads, i.e., compensation for sensor vibration environment or for variation of sensor location from the centre of gravity;
 3. Electronic management of data redundancy or systems redundancy for fault detection, fault tolerance, fault isolation or reconfiguration;

Note: 7E004.b.3. does not control "technology" for the design of physical redundancy.

- 7E004 b. continued
4. Flight controls which permit inflight reconfiguration of force and moment controls for real time autonomous air vehicle control;
 5. Integration of digital flight control, navigation and propulsion control data, into a digital flight management system for "total control of flight";
Note: 7E004.b.5. does not control:
 - a. "Development" "technology" for integration of digital flight control, navigation and propulsion control data, into a digital flight management system for "flight path optimisation";
 - b. "Development" "technology" for "aircraft" flight instrument systems integrated solely for VOR, DME, ILS or MLS navigation or approaches.
 6. Full authority digital flight control or multisensor mission management systems, employing "expert systems";
N.B.: For "technology" for Full Authority Digital Engine Control Systems ("FADEC Systems"), see 9E003.h.
- c. "Technology" for the "development" of helicopter systems, as follows:
1. Multi-axis fly-by-wire or fly-by-light controllers, which combine the functions of at least two of the following into one controlling element:
 - a. Collective controls;
 - b. Cyclic controls;
 - c. Yaw controls;
 2. "Circulation-controlled anti-torque or circulation-controlled directional control systems";
 3. Rotor blades incorporating "variable geometry airfoils", for use in systems using individual blade control.
- 7E101 "Technology" according to the General Technology Note for the "use" of equipment specified in 7A001 to 7A006, 7A101 to 7A106, 7A115 to 7A117, 7B001, 7B002, 7B003, 7B102, 7B103, 7D101 to 7D103.
- 7E102 "Technology" for protection of avionics and electrical subsystems against electromagnetic pulse (EMP) and electromagnetic interference (EMI) hazards, from external sources, as follows:
- a. Design "technology" for shielding systems;
 - b. Design "technology" for the configuration of hardened electrical circuits and subsystems;
 - c. Design "technology" for the determination of hardening criteria of 7E102.a. and 7E102.b.
- 7E104 "Technology" for the integration of the flight control, guidance, and propulsion data into a flight management system for optimization of rocket system trajectory.

CATEGORY 8 - MARINE

8A Systems, Equipment and Components

8A001 Submersible vehicles and surface vessels, as follows:

- Note: For the control status of equipment for submersible vehicles, see:
- Category 5, Part 2 "Information Security" for encrypted communication equipment;
 - Category 6 for sensors;
 - Categories 7 and 8 for navigation equipment;
 - Category 8A for underwater equipment.

- a. Manned, tethered submersible vehicles designed to operate at depths exceeding 1,000 m;
- b. Manned, untethered submersible vehicles having any of the following:
 1. Designed to 'operate autonomously' and having a lifting capacity of all the following:
 - a. 10% or more of their weight in air; and
 - b. 15 kN or more;
 2. Designed to operate at depths exceeding 1,000 m; or
 3. Having all of the following:
 - a. Designed to continuously 'operate autonomously' for 10 hours or more; and
 - b. 'Range' of 25 nautical miles or more;

Technical Notes:

1. For the purposes of 8A001.b., 'operate autonomously' means fully submerged, without snorkel, all systems working and cruising at minimum speed at which the submersible can safely control its depth dynamically by using its depth planes only, with no need for a support vessel or support base on the surface, sea-bed or shore, and containing a propulsion system for submerged or surface use.
 2. For the purposes of 8A001.b., 'range' means half the maximum distance a submersible vehicle can 'operate autonomously'.
- c. Unmanned, tethered submersible vehicles designed to operate at depths exceeding 1,000 m and having any of the following:
 1. Designed for self-propelled manoeuvre using propulsion motors or thrusters specified in 8A002.a.2.; or
 2. Fibre optic data link;
 - d. Unmanned, untethered submersible vehicles having any of the following:
 1. Designed for deciding a course relative to any geographical reference without real-time human assistance;
 2. Acoustic data or command link; or
 3. Fibre optic data or command link exceeding 1,000 m;

8A001 continued

- e. Ocean salvage systems with a lifting capacity exceeding 5 MN for salvaging objects from depths exceeding 250 m and having any of the following:
 - 1. Dynamic positioning systems capable of position keeping within 20 m of a given point provided by the navigation system; or
 - 2. Seafloor navigation and navigation integration systems, for depths exceeding 1,000 m and with positioning accuracies to within 10 m of a predetermined point;
- f. Surface-effect vehicles (fully skirted variety) having all of the following:
 - 1. Maximum design speed, fully loaded, exceeding 30 knots in a significant wave height of 1.25 m (Sea State 3) or more;
 - 2. Cushion pressure exceeding 3,830 Pa; and
 - 3. Light-ship-to-full-load displacement ratio of less than 0.70;
- g. Surface-effect vehicles (rigid sidewalls) with a maximum design speed, fully loaded, exceeding 40 knots in a significant wave height of 3.25 m (Sea State 5) or more;
- h. Hydrofoil vessels with active systems for automatically controlling foil systems, with a maximum design speed, fully loaded, of 40 knots or more in a significant wave height of 3.25 m (Sea State 5) or more;
- i. 'Small waterplane area vessels' having any of the following:
 - 1. Full load displacement exceeding 500 tonnes with a maximum design speed, fully loaded, exceeding 35 knots in a significant wave height of 3.25 m (Sea State 5) or more; or
 - 2. Full load displacement exceeding 1,500 tonnes with a maximum design speed, fully loaded, exceeding 25 knots in a significant wave height of 4 m (Sea State 6) or more.

Technical Note:

A 'small waterplane area vessel' is defined by the following formula: waterplane area at an operational design draught less than $2x$ (displaced volume at the operational design draught)^{2/3}.

8A002 Marine systems, equipment and components, as follows:

Note: *For underwater communications systems, see Category 5, Part 1 - Telecommunications.*

- a. Systems, equipment and components, specially designed or modified for submersible vehicles and designed to operate at depths exceeding 1,000 m, as follows:
 - 1. Pressure housings or pressure hulls with a maximum inside chamber diameter exceeding 1.5 m;
 - 2. Direct current propulsion motors or thrusters;
 - 3. Umbilical cables, and connectors therefor, using optical fibre and having synthetic strength members;
 - 4. Components manufactured from material specified in 8C001;

Technical Note:

The objective of 8A002.a.4. should not be defeated by the export of 'syntactic foam' specified in 8C001 when an intermediate stage of manufacture has been performed and it is not yet in the final component form.

8A002 continued

- b. Systems specially designed or modified for the automated control of the motion of submersible vehicles specified in 8A001, using navigation data, having closed loop servo-controls and having any of the following:
 - 1. Enabling a vehicle to move within 10 m of a predetermined point in the water column;
 - 2. Maintaining the position of the vehicle within 10 m of a predetermined point in the water column; or
 - 3. Maintaining the position of the vehicle within 10 m while following a cable on or under the seabed;
- c. Fibre optic hull penetrators or connectors;
- d. Underwater vision systems as follows:
 - 1. Television systems and television cameras, as follows:
 - a. Television systems (comprising camera, monitoring and signal transmission equipment) having a 'limiting resolution' when measured in air of more than 800 lines and specially designed or modified for remote operation with a submersible vehicle;
 - b. Underwater television cameras having a 'limiting resolution' when measured in air of more than 1,100 lines;
 - c. Low light level television cameras specially designed or modified for underwater use and having all of the following:
 - 1. Image intensifier tubes specified in 6A002.a.2.a.; and
 - 2. More than 150,000 "active pixels" per solid state area array;
 - Technical Note:*
'Limiting resolution' is a measure of horizontal resolution usually expressed in terms of the maximum number of lines per picture height discriminated on a test chart, using IEEE Standard 208/1960 or any equivalent standard.
 - 2. Systems specially designed or modified for remote operation with an underwater vehicle, employing techniques to minimise the effects of back scatter and including range-gated illuminators or "laser" systems;
- e. Photographic still cameras specially designed or modified for underwater use below 150 m, with a film format of 35 mm or larger and having any of the following:
 - 1. Annotation of the film with data provided by a source external to the camera;
 - 2. Automatic back focal distance correction; or
 - 3. Automatic compensation control specially designed to permit an underwater camera housing to be usable at depths exceeding 1,000 m;
- f. Not used;
- g. Light systems specially designed or modified for underwater use, as follows:
 - 1. Stroboscopic light systems capable of a light output energy of more than 300 J per flash and a flash rate of more than 5 flashes per second;
 - 2. Argon arc light systems specially designed for use below 1,000 m;

8A002 continued

- h. "Robots" specially designed for underwater use, controlled by using a dedicated computer and having any of the following:
 - 1. Systems that control the "robot" using information from sensors which measure force or torque applied to an external object, distance to an external object, or tactile sense between the "robot" and an external object; or
 - 2. The ability to exert a force of 250 N or more or a torque of 250 Nm or more and using titanium based alloys or "composite" "fibrous or filamentary materials" in their structural members;

- i. Remotely controlled articulated manipulators specially designed or modified for use with submersible vehicles and having any of the following:
 - 1. Systems which control the manipulator using the information from sensors which measure the torque or force applied to an external object, or tactile sense between the manipulator and an external object; or
 - 2. Controlled by proportional master-slave techniques or by using a dedicated computer and having 5 degrees of 'freedom of movement' or more;
Technical Note:
Only functions having proportional control using positional feedback or by using a dedicated computer are counted when determining the number of degrees of 'freedom of movement'.

- j. Air independent power systems specially designed for underwater use, as follows:
 - 1. Brayton or Rankine cycle engine air independent power systems having any of the following:
 - a. Chemical scrubber or absorber systems, specially designed to remove carbon dioxide, carbon monoxide and particulates from recirculated engine exhaust;
 - b. Systems specially designed to use a monoatomic gas;
 - c. Devices or enclosures, specially designed for underwater noise reduction in frequencies below 10 kHz, or special mounting devices for shock mitigation; or
 - d. Systems having all of the following:
 - 1. Specially designed to pressurise the products of reaction or for fuel reformation;
 - 2. Specially designed to store the products of the reaction; and
 - 3. Specially designed to discharge the products of the reaction against a pressure of 100 kPa or more;

 - 2. Diesel cycle engine air independent systems having all of the following:
 - a. Chemical scrubber or absorber systems, specially designed to remove carbon dioxide, carbon monoxide and particulates from recirculated engine exhaust;
 - b. Systems specially designed to use a monoatomic gas;
 - c. Devices or enclosures, specially designed for underwater noise reduction in frequencies below 10 kHz, or special mounting devices for shock mitigation; and
 - d. Specially designed exhaust systems that do not exhaust continuously the products of combustion;

- 8A002 j. continued
3. "Fuel cell" air independent power systems with an output exceeding 2 kW and having any of the following:
 - a. Devices or enclosures, specially designed for underwater noise reduction in frequencies below 10 kHz, or special mounting devices for shock mitigation; or
 - b. Systems having all of the following:
 1. Specially designed to pressurise the products of reaction or for fuel reformation;
 2. Specially designed to store the products of the reaction; and
 3. Specially designed to discharge the products of the reaction against a pressure of 100 kPa or more;
 4. Stirling cycle engine air independent power systems having all of the following:
 - a. Devices or enclosures, specially designed for underwater noise reduction in frequencies below 10 kHz, or special mounting devices for shock mitigation; and
 - b. Specially designed exhaust systems which discharge the products of combustion against a pressure of 100 kPa or more;
 - k. Skirts, seals and fingers, having any of the following:
 1. Designed for cushion pressures of 3,830 Pa or more, operating in a significant wave height of 1.25 m (Sea State 3) or more and specially designed for surface effect vehicles (fully skirted variety) specified in 8A001.f.; or
 2. Designed for cushion pressures of 6,224 Pa or more, operating in a significant wave height of 3.25 m (Sea State 5) or more and specially designed for surface effect vehicles (rigid sidewalls) specified in 8A001.g.;
 - l. Lift fans rated at more than 400 kW and specially designed for surface effect vehicles specified in 8A001.f. or 8A001.g.;
 - m. Fully submerged subcavitating or supercavitating hydrofoils, specially designed for vessels specified in 8A001.h.;
 - n. Active systems specially designed or modified to control automatically the sea-induced motion of vehicles or vessels, specified in 8A001.f., 8A001.g., 8A001.h. or 8A001.i.;
 - o. Propellers, power transmission systems, power generation systems and noise reduction systems, as follows:
 1. Water-screw propeller or power transmission systems, as follows, specially designed for surface effect vehicles (fully skirted or rigid sidewall variety), hydrofoils or 'small waterplane area vessels' specified in 8A001.f., 8A001.g., 8A001.h. or 8A001.i., as follows:
 - a. Supercavitating, super-ventilated, partially-submerged or surface piercing propellers, rated at more than 7.5 MW;
 - b. Contrarotating propeller systems rated at more than 15 MW;
 - c. Systems employing pre-swirl or post-swirl techniques, for smoothing the flow into a propeller;
 - d. Light-weight, high capacity (K factor exceeding 300) reduction gearing;
 - e. Power transmission shaft systems incorporating "composite" material components and capable of transmitting more than 1 MW;

- 8A002 o. continued
2. Water-screw propeller, power generation systems or transmission systems, designed for use on vessels, as follows:
 - a. Controllable-pitch propellers and hub assemblies, rated at more than 30 MW;
 - b. Internally liquid-cooled electric propulsion engines with a power output exceeding 2.5 MW;
 - c. "Superconductive" propulsion engines or permanent magnet electric propulsion engines, with a power output exceeding 0.1 MW;
 - d. Power transmission shaft systems incorporating "composite" material components and capable of transmitting more than 2 MW;
 - e. Ventilated or base-ventilated propeller systems, rated at more than 2.5 MW;
 3. Noise reduction systems designed for use on vessels of 1,000 tonnes displacement or more, as follows:
 - a. Systems that attenuate underwater noise at frequencies below 500 Hz and consist of compound acoustic mounts for the acoustic isolation of diesel engines, diesel generator sets, gas turbines, gas turbine generator sets, propulsion motors or propulsion reduction gears, specially designed for sound or vibration isolation and having an intermediate mass exceeding 30% of the equipment to be mounted;
 - b. Active noise reduction or cancellation systems, or magnetic bearings, specially designed for power transmission systems, and incorporating electronic control systems capable of actively reducing equipment vibration by the generation of anti-noise or anti-vibration signals directly to the source;
 - p. Pumpjet propulsion systems having a power output exceeding 2.5 MW using divergent nozzle and flow conditioning vane techniques to improve propulsive efficiency or reduce propulsion-generated underwater-radiated noise;
 - q. Self-contained, closed or semi-closed circuit (rebreathing) diving and underwater swimming apparatus.
Note: 8A002.q. does not control an individual apparatus for personal use when accompanying its user.

8B Test, Inspection and Production Equipment

- 8B001 Water tunnels having a background noise of less than 100 dB (reference 1 μ Pa, 1 Hz), in the frequency range from 0 to 500 Hz and designed for measuring acoustic fields generated by a hydro-flow around propulsion system models.

8C Materials

8C001 'Syntactic foam' designed for underwater use and having all of the following:

N.B.: See also 8A002.a.4.

- a. Designed for marine depths exceeding 1,000 m; and
- b. A density less than 561 kg/m³.

Technical Note:

'Syntactic foam' consists of hollow spheres of plastic or glass embedded in a resin matrix.

8D Software

8D001 "Software" specially designed or modified for the "development", "production" or "use" of equipment or materials, specified in 8A, 8B or 8C.

8D002 Specific "software" specially designed or modified for the "development", "production", repair, overhaul or refurbishing (re-machining) of propellers specially designed for underwater noise reduction.

8E Technology

8E001 "Technology" according to the General Technology Note for the "development" or "production" of equipment or materials, specified in 8A, 8B or 8C.

8E002 Other "technology" as follows:

- a. "Technology" for the "development", "production", repair, overhaul or refurbishing (re-machining) of propellers specially designed for underwater noise reduction;
- b. "Technology" for the overhaul or refurbishing of equipment specified in 8A001, 8A002.b., 8A002.j., 8A002.o. or 8A002.p.

CATEGORY 9 – AEROSPACE AND PROPULSION

9A Systems, Equipment and Components

N.B.: For propulsion systems designed or rated against neutron or transient ionizing radiation, see the Military Goods Controls.

9A001 Aero gas turbine engines having any of the following:
N.B.: SEE ALSO 9A101.

- a. Incorporating any of the "technologies" specified in 9E003.a. or 9E003.h.; or
Note: 9A001.a. does not control aero gas turbine engines which meet all of the following:
- a. Certified by the civil aviation authority in a "participating state"; and
 - b. Intended to power non-military manned aircraft for which any of the following has been issued by a "participating state" for the aircraft with this specific engine type:
 1. A civil type certificate; or
 2. An equivalent document recognized by the International Civil Aviation Organisation (ICAO).
- b. Designed to power an aircraft to cruise at Mach 1 or higher, for more than thirty minutes.

9A002 'Marine gas turbine engines' with an ISO standard continuous power rating of 24,245 kW or more and a specific fuel consumption not exceeding 0.219 kg/kWh in the power range from 35 to 100%, and specially designed assemblies and components therefor.

Note: The term 'marine gas turbine engines' includes those industrial, or aero-derivative, gas turbine engines adapted for a ship's electric power generation or propulsion.

9A003 Specially designed assemblies and components, incorporating any of the "technologies" specified in 9E003.a. or 9E003.h., for gas turbine engine propulsion systems having any of the following:

- a. Specified in 9A001; or
- b. Whose design or production origins are either non-"participating states" or unknown to the manufacturer.

9A004 Space launch vehicles and "spacecraft".
N.B.: SEE ALSO 9A104.

Note: 9A004 does not control payloads.

N.B.: For the control status of products contained in "spacecraft" payloads, see the appropriate Categories.

- 9A005 Liquid rocket propulsion systems containing any of the systems or components, specified in 9A006 .
N.B.: SEE ALSO 9A105 AND 9A119.
- 9A006 Systems and components, specially designed for liquid rocket propulsion systems, as follows:
N.B.: SEE ALSO 9A106, 9A108 AND 9A120.
- a. Cryogenic refrigerators, flightweight dewars, cryogenic heat pipes or cryogenic systems, specially designed for use in space vehicles and capable of restricting cryogenic fluid losses to less than 30% per year;
 - b. Cryogenic containers or closed-cycle refrigeration systems, capable of providing temperatures of 100 K (-173°C) or less for "aircraft" capable of sustained flight at speeds exceeding Mach 3, launch vehicles or "spacecraft";
 - c. Slush hydrogen storage or transfer systems;
 - d. High pressure (exceeding 17.5 MPa) turbo pumps, pump components or their associated gas generator or expander cycle turbine drive systems;
 - e. High-pressure (exceeding 10.6 MPa) thrust chambers and nozzles therefor;
 - f. Propellant storage systems using the principle of capillary containment or positive expulsion (i.e., with flexible bladders);
 - g. Liquid propellant injectors with individual orifices of 0.381 mm or smaller in diameter (an area of $1.14 \times 10^{-3} \text{ cm}^2$ or smaller for non-circular orifices) and specially designed for liquid rocket engines;
 - h. One-piece carbon-carbon thrust chambers or one-piece carbon-carbon exit cones, with densities exceeding 1.4 g/cm^3 and tensile strengths exceeding 48 MPa.
- 9A007 Solid rocket propulsion systems having any of the following:
N.B.: SEE ALSO 9A107 AND 9A119.
- a. Total impulse capacity exceeding 1.1 MNs;
 - b. Specific impulse of 2.4 kNs/kg or more, when the nozzle flow is expanded to ambient sea level conditions for an adjusted chamber pressure of 7 MPa;
 - c. Stage mass fractions exceeding 88% and propellant solid loadings exceeding 86%;
 - d. Components specified in 9A008; or
 - e. Insulation and propellant bonding systems, using direct-bonded motor designs to provide a 'strong mechanical bond' or a barrier to chemical migration between the solid propellant and case insulation material.
Technical Note:
'Strong mechanical bond' means bond strength equal to or more than propellant strength.

- 9A008 Components specially designed for solid rocket propulsion systems, as follows:
N.B.: SEE ALSO 9A108.
- a. Insulation and propellant bonding systems, using liners to provide a 'strong mechanical bond' or a barrier to chemical migration between the solid propellant and case insulation material;
Technical Note:
'Strong mechanical bond' means bond strength equal to or more than propellant strength.
 - b. Filament-wound "composite" motor cases exceeding 0.61 m in diameter or having 'structural efficiency ratios (PV/W)' exceeding 25 km;
Technical Note:
'Structural efficiency ratio (PV/W)' is the burst pressure (P) multiplied by the vessel volume (V) divided by the total pressure vessel weight (W).
 - c. Nozzles with thrust levels exceeding 45 kN or nozzle throat erosion rates of less than 0.075 mm/s;
 - d. Movable nozzle or secondary fluid injection thrust vector control systems, capable of any of the following:
 1. Omni-axial movement exceeding $\pm 5^\circ$;
 2. Angular vector rotations of $20^\circ/\text{s}$ or more; or
 3. Angular vector accelerations of $40^\circ/\text{s}^2$ or more.
- 9A009 Hybrid rocket propulsion systems having any of the following:
N.B.: SEE ALSO 9A109 AND 9A119.
- a. Total impulse capacity exceeding 1.1 MNs; or
 - b. Thrust levels exceeding 220 kN in vacuum exit conditions.
- 9A010 Specially designed components, systems and structures, for launch vehicles, launch vehicle propulsion systems or "spacecraft", as follows:
N.B.: SEE ALSO 1A002 AND 9A110.
- a. Components and structures, each exceeding 10 kg and specially designed for launch vehicles manufactured using metal "matrix", "composite", organic "composite", ceramic "matrix" or intermetallic reinforced materials specified in 1C007 or 1C010;
Note: *The weight cut-off is not relevant for nose cones.*
 - b. Components and structures, specially designed for launch vehicle propulsion systems specified in 9A005 to 9A009 manufactured using metal "matrix", "composite", organic "composite", ceramic "matrix" or intermetallic reinforced materials, specified in 1C007 or 1C010;
 - c. Structural components and isolation systems, specially designed to control actively the dynamic response or distortion of "spacecraft" structures;
 - d. Pulsed liquid rocket engines with thrust-to-weight ratios equal to or more than 1 kN/kg and a response time (the time required to achieve 90% of total rated thrust from start-up) of less than 30 ms.

- 9A011 Ramjet, scramjet or combined cycle engines, and specially designed components therefor.
N.B.: SEE ALSO 9A111 AND 9A118.
- 9A012 "Unmanned aerial vehicles" ("UAVs"), associated systems, equipment and components, as follows:
- a. "UAVs" having any of the following:
 1. An autonomous flight control and navigation capability (e.g., an autopilot with an Inertial Navigation System); or
 2. Capability of controlled-flight out of the direct vision range involving a human operator (e.g., televisual remote control);
 - b. Associated systems, equipment and components, as follows:
 1. Equipment specially designed for remotely controlling the "UAVs" specified in 9A012.a.;
 2. Systems for navigation, attitude, guidance or control, other than those specified in 7A and specially designed to provide autonomous flight control or navigation capability to "UAVs" specified in 9A012.a.;
 3. Equipment and components, specially designed to convert a manned "aircraft" to a "UAV" specified in 9A012.a.;
 4. Air breathing reciprocating or rotary internal combustion type engines, specially designed or modified to propel "UAVs" at altitudes above 50,000 feet (15,240 metres).
- 9A101 Turbojet and turbofan engines, other than those specified in 9A001, as follows;
- a. Engines having both of the following characteristics:
 1. Maximum thrust value greater than 400 N (achieved un-installed) excluding civil certified engines with a maximum thrust value greater than 8,890 N (achieved un-installed), and
 2. Specific fuel consumption of 0.15 kg/N/hr or less (at maximum continuous power at sea level static and standard conditions);
 - b. Engines designed or modified for use in "missiles" or unmanned aerial vehicles specified in 9A012,
- 9A102 'Turboprop engine systems' specially designed for unmanned aerial vehicles specified in 9A012, and specially designed components therefor, having a 'maximum power' greater than 10 kW.

Note: 9A102 does not control civil certified engines.

Technical Notes:

1. For the purposes of 9A102 a 'turboprop engine system' incorporates all of the following:
 - a. Turbohaft engine; and
 - b. Power transmission system to transfer the power to a propeller.
2. For the purposes of 9A102 the 'maximum power' is achieved uninstalled at sea level standard conditions.

- 9A104 Sounding rockets, capable of a range of at least 300 km.
N.B.: SEE ALSO 9A004.
- 9A105 Liquid propellant rocket engines, as follows:
N.B.: SEE ALSO 9A119.
- a. Liquid propellant rocket engines usable in "missiles", other than those specified in 9A005, having a total impulse capacity equal to or greater than 1.1 MNs;
 - b. Liquid propellant rocket engines, usable in complete rocket systems or unmanned aerial vehicles, capable of a range of 300 km, other than those specified in 9A005 or 9A105.a., having a total impulse capacity equal to or greater than 0.841 MNs.
- 9A106 Systems or components, other than those specified in 9A006 as follows, specially designed for liquid rocket propulsion systems:
- a. Ablative liners for thrust or combustion chambers, usable in "missiles", space launch vehicles specified in 9A004 or sounding rockets specified in 9A104;
 - b. Rocket nozzles, usable in "missiles", space launch vehicles specified in 9A004 or sounding rockets specified in 9A104;
 - c. Thrust vector control sub-systems, usable in "missiles";
Technical Note:
Examples of methods of achieving thrust vector control specified in 9A106.c. are:
 1. Flexible nozzle;
 2. Fluid or secondary gas injection;
 3. Movable engine or nozzle;
 4. Deflection of exhaust gas stream (jet vanes or probes); or
 5. Thrust tabs.
 - d. Liquid and slurry propellant (including oxidisers) control systems, and specially designed components therefor, usable in "missiles", designed or modified to operate in vibration environments greater than 10 g rms between 20 Hz and 2 kHz.
Note: *The only servo valves and pumps specified in 9A106.d., are the following:*
 - a. Servo valves designed for flow rates equal to or greater than 24 litres per minute, at an absolute pressure equal to or greater than 7 MPa, that have an actuator response time of less than 100 ms;
 - b. Pumps, for liquid propellants, with shaft speeds equal to or greater than 8,000 r.p.m. or with discharge pressures equal to or greater than 7 MPa.
- 9A107 Solid propellant rocket engines, usable in complete rocket systems or unmanned aerial vehicles, capable of a range of 300 km, other than those specified in 9A007, having total impulse capacity equal to or greater than 0.841 MNs.
N.B.: SEE ALSO 9A119.

- 9A108 Components, other than those specified in 9A008, as follows, specially designed for solid rocket propulsion systems:
- a. Rocket motor cases and "insulation" components therefor, usable in "missiles", space launch vehicles specified in 9A004 or sounding rockets specified in 9A104;
 - b. Rocket nozzles, usable in "missiles", space launch vehicles specified in 9A004 or sounding rockets specified in 9A104;
 - c. Thrust vector control sub-systems, usable in "missiles".
- Technical Note:*
Examples of methods of achieving thrust vector control specified in 9A108.c. are:
1. Flexible nozzle;
 2. Fluid or secondary gas injection;
 3. Movable engine or nozzle;
 4. Deflection of exhaust gas stream (jet vanes or probes); or
 5. Thrust tabs.
- 9A109 Hybrid rocket motors, usable in 'missiles', other than those specified in 9A009, and specially designed components therefor.
N.B.: SEE ALSO 9A119.
Technical Note:
In 9A109 'missile' means complete rocket systems and unmanned aerial vehicle systems capable of a range exceeding 300 km.
- 9A110 Composite structures, laminates and manufactures thereof, other than those specified in 9A010, specially designed for use in 'missiles' or the subsystems specified in 9A005, 9A007, 9A105, 9A106.c., 9A107, 9A108.c., 9A116 or 9A119.
N.B.: SEE ALSO 1A002.
Technical Note:
In 9A110 'missile' means complete rocket systems and unmanned aerial vehicle systems capable of a range exceeding 300 km.
- 9A111 Pulse jet engines, usable in "missiles" or unmanned aerial vehicles specified in 9A012, and specially designed components therefor.
N.B.: SEE ALSO 9A011 AND 9A118.
- 9A115 Launch support equipment as follows:
- a. Apparatus and devices for handling, control, activation or launching, designed or modified for space launch vehicles specified in 9A004, unmanned aerial vehicles specified in 9A012 or sounding rockets specified in 9A104;
 - b. Vehicles for transport, handling, control, activation or launching, designed or modified for space launch vehicles specified in 9A004 or sounding rockets specified in 9A104.

- 9A116 Reentry vehicles, usable in "missiles", and equipment designed or modified therefor, as follows:
- a. Reentry vehicles;
 - b. Heat shields and components therefor, fabricated of ceramic or ablative materials;
 - c. Heat sinks and components therefor, fabricated of light-weight, high heat capacity materials;
 - d. Electronic equipment specially designed for reentry vehicles.
- 9A117 Staging mechanisms, separation mechanisms, and interstages, usable in "missiles".
- 9A118 Devices to regulate combustion usable in engines, which are usable in "missiles" or unmanned aerial vehicles specified in 9A012, specified in 9A011 or 9A111.
- 9A119 Individual rocket stages, usable in complete rocket systems or unmanned aerial vehicles, capable of a range of 300 km, other than those specified in 9A005, 9A007, 9A009, 9A105, 9A107 and 9A109.
- 9A120 Liquid propellant tanks, other than those specified in 9A006, specially designed for propellants specified in 1C111 or 'other liquid propellants', used in rocket systems capable of delivering at least a 500 kg payload to a range of at least 300 km.

Note: In 9A120 'other liquid propellants' includes, but is not limited to, propellants specified in the Military Goods Controls.

- 9A350 Spraying or fogging systems, specially designed or modified for fitting to aircraft, "lighter-than-air vehicles" or unmanned aerial vehicles, and specially designed components therefor, as follows:
- a. Complete spraying or fogging systems capable of delivering, from a liquid suspension, an initial droplet 'VMD' of less than 50 µm at a flow rate of greater than two litres per minute;
 - b. Spray booms or arrays of aerosol generating units capable of delivering, from a liquid suspension, an initial droplet 'VMD' of less than 50 µm at a flow rate of greater than two litres per minute;
 - c. Aerosol generating units specially designed for fitting to systems specified in 9A350.a. and b.
Note: Aerosol generating units are devices specially designed or modified for fitting to aircraft such as nozzles, rotary drum atomizers and similar devices.
- Note:* 9A350 does not control spraying or fogging systems and components that are demonstrated not to be capable of delivering biological agents in the form of infectious aerosols.
- Technical Notes:
1. Droplet size for spray equipment or nozzles specially designed for use on aircraft, "lighter-than-air vehicles" or unmanned aerial vehicles should be measured using either of the following:
 - a. Doppler laser method;
 - b. Forward laser diffraction method.
 2. In 9A350 'VMD' means Volume Median Diameter and for water-based systems this equates to Mass Median Diameter (MMD).

9B Test, Inspection and Production Equipment

- 9B001 Equipment, tooling and fixtures, specially designed for manufacturing gas turbine blades, vanes or tip shroud castings, as follows:
- a. Directional solidification or single crystal casting equipment;
 - b. Ceramic cores or shells;
- 9B002 On-line (real time) control systems, instrumentation (including sensors) or automated data acquisition and processing equipment, specially designed for the "development" of gas turbine engines, assemblies or components and incorporating "technologies" specified in 9E003.a. or 9E003.h.
- 9B003 Equipment specially designed for the "production" or test of gas turbine brush seals designed to operate at tip speeds exceeding 335 m/s and temperatures in excess of 773 K (500°C), and specially designed components or accessories therefor.

- 9B004 Tools, dies or fixtures, for the solid state joining of "superalloy", titanium or intermetallic airfoil-to-disk combinations described in 9E003.a.3. or 9E003.a.6. for gas turbines.
- 9B005 On-line (real time) control systems, instrumentation (including sensors) or automated data acquisition and processing equipment, specially designed for use with any of the following:
N.B.: SEE ALSO 9B105.
- a. Wind tunnels designed for speeds of Mach 1.2 or more;
Note: 9B005.a. does not control wind tunnels specially designed for educational purposes and having a 'test section size' (measured laterally) of less than 250 mm.
Technical Note:
'Test section size' means the diameter of the circle, or the side of the square, or the longest side of the rectangle, at the largest test section location.
 - b. Devices for simulating flow-environments at speeds exceeding Mach 5, including hot-shot tunnels, plasma arc tunnels, shock tubes, shock tunnels, gas tunnels and light gas guns; or
 - c. Wind tunnels or devices, other than two-dimensional sections, capable of simulating Reynolds number flows exceeding 25×10^6 .
- 9B006 Acoustic vibration test equipment capable of producing sound pressure levels of 160 dB or more (referenced to 20 μ Pa) with a rated output of 4 kW or more at a test cell temperature exceeding 1,273 K (1,000°C), and specially designed quartz heaters therefor.
N.B.: SEE ALSO 9B106.
- 9B007 Equipment specially designed for inspecting the integrity of rocket motors and using Non-Destructive Test (NDT) techniques other than planar x-ray or basic physical or chemical analysis.
- 9B008 Transducers specially designed for the direct measurement of the wall skin friction of the test flow with a stagnation temperature exceeding 833 K (560°C).
- 9B009 Tooling specially designed for producing turbine engine powder metallurgy rotor components capable of operating at stress levels of 60% of Ultimate Tensile Strength (UTS) or more and metal temperatures of 873 K (600°C) or more.
- 9B010 Equipment specially designed for the production of "UAVs" and associated systems, equipment and components, specified in 9A012.

- 9B105 Wind tunnels for speeds of Mach 0.9 or more, usable for 'missiles' and their subsystems.
N.B.: SEE ALSO 9B005.
Technical Note:
In 9B105 'missile' means complete rocket systems and unmanned aerial vehicle systems capable of a range exceeding 300 km.
- 9B106 Environmental chambers and anechoic chambers, as follows:
- a. Environmental chambers capable of simulating all the following flight conditions:
 1. Having any of the following:
 - a. Altitude equal to or greater than 15 km; or
 - b. Temperature range from below 223 K (-50°C) to above 398 K (+125°C);
 2. Incorporating, or 'designed or modified' to incorporate, a shaker unit or other vibration test equipment to produce vibration environments equal to or greater than 10 g rms, measured 'bare table', between 20 Hz and 2 kHz imparting forces equal to or greater than 5 kN;

Technical Notes:

 1. *9B106.a.2. describes systems that are capable of generating a vibration environment with a single wave (e.g., a sine wave) and systems capable of generating a broad band random vibration (i.e., power spectrum).*
 2. *In 9B106.a.2., 'designed or modified' means the environmental chamber provides appropriate interfaces (e.g., sealing devices) to incorporate a shaker unit or other vibration test equipment as specified in 2B116.*
 3. *In 9B106.a.2. 'bare table' means a flat table, or surface, with no fixture or fittings.*
 - b. Environmental chambers capable of simulating the following flight conditions:
 1. Acoustic environments at an overall sound pressure level of 140 dB or greater (referenced to 20 µPa) or with a total rated acoustic power output of 4 kW or greater; and
 2. Altitude equal to or greater than 15 km; or
 3. Temperature range from below 223 K (-50°C) to above 398 K (+125°C).
- 9B115 Specially designed "production equipment" for the systems, sub-systems and components specified in 9A005 to 9A009, 9A011, 9A101, 9A102, 9A105 to 9A109, 9A111, 9A116 to 9A120.
- 9B116 Specially designed "production facilities" for the space launch vehicles specified in 9A004, or systems, sub-systems, and components specified in 9A005 to 9A009, 9A011, 9A101, 9A102, 9A104 to 9A109, 9A111, or 9A116 to 9A120.
- 9B117 Test benches and test stands for solid or liquid propellant rockets or rocket motors, having either of the following characteristics:
 - a. The capacity to handle more than 68 kN of thrust; or
 - b. Capable of simultaneously measuring the three axial thrust components.

9C Materials

9C108 "Insulation" material in bulk form and "interior lining", other than those specified in 9A008, for rocket motor cases usable in "missiles" or specially designed for 'missiles'.

Technical Note:

In 9C108 'missile' means complete rocket systems and unmanned aerial vehicle systems capable of a range exceeding 300 km.

9C110 Resin impregnated fibre prepregs and metal coated fibre preforms therefor, for composite structures, laminates and manufactures specified in 9A110, made either with organic matrix or metal matrix utilising fibrous or filamentary reinforcements having a "specific tensile strength" greater than 7.62×10^4 m and a "specific modulus" greater than 3.18×10^6 m.

N.B.: SEE ALSO 1C010 AND 1C210.

Note: *The only resin impregnated fibre prepregs specified in entry 9C110 are those using resins with a glass transition temperature (T_g), after cure, exceeding 418 K (145°C) as determined by ASTM D4065 or equivalent.*

9D Software

9D001 "Software" specially designed or modified for the "development" of equipment or "technology", specified in 9A001 to 9A119, 9B or 9E003.

9D002 "Software" specially designed or modified for the "production" of equipment specified in 9A001 to 9A119 or 9B.

9D003 "Software" specially designed or modified for the "use" of "Full Authority Digital Electronic Engine Control Systems" ("FADEC Systems") for propulsion systems specified in 9A or equipment specified in 9B, as follows:

- a. "Software" in digital electronic controls for propulsion systems, aerospace test facilities or air breathing aero-engine test facilities;
- b. Fault-tolerant "software" used in "FADEC systems" for propulsion systems and associated test facilities.

9D004 Other "software" as follows:

- a. 2D or 3D viscous "software", validated with wind tunnel or flight test data required for detailed engine flow modelling;
- b. "Software" for testing aero gas turbine engines, assemblies or components, specially designed to collect, reduce and analyse data in real time and capable of feedback control, including the dynamic adjustment of test articles or test conditions, as the test is in progress;

- 9D004 continued
- c. "Software" specially designed to control directional solidification or single crystal casting;
 - d. "Software" in "source code", "object code" or machine code, required for the "use" of active compensating systems for rotor blade tip clearance control;
Note: 9D004.d. does not control "software" embedded in equipment not specified in Annex I or required for maintenance activities associated with the calibration or repair or updates to the active compensating clearance control system.
 - e. "Software" specially designed or modified for the "use" of "UAVs" and associated systems, equipment and components, specified in 9A012;
 - f. "Software" specially designed to design the internal cooling passages of aero gas turbine blades, vans and tip shrouds;
 - g. "Software" having all of the following:
 1. Specially designed to predict aero thermal, aeromechanical and combustion conditions in aero gas turbine engines; and
 2. Theoretical modelling predictions of the aero thermal, aeromechanical and combustion conditions, which have been validated with actual aero gas turbine engine (experimental or production) performance data.
- 9D101 "Software" specially designed or modified for the "use" of goods specified in 9B105, 9B106, 9B116 or 9B117.
- 9D103 "Software" specially designed for modelling, simulation or design integration of the space launch vehicles specified in 9A004 or sounding rockets specified in 9A104, or the subsystems specified in 9A005, 9A007, 9A105, 9A106.c., 9A107, 9A108.c., 9A116 or 9A119.
Note: "Software" specified in 9D103 remains controlled when combined with specially designed hardware specified in 4A102.
- 9D104 "Software" specially designed or modified for the "use" of goods specified in 9A001, 9A005, 9A006.d., 9A006.g., 9A007.a., 9A008.d., 9A009.a., 9A010.d., 9A011, 9A101, 9A102, 9A105, 9A106.c., 9A106.d., 9A107, 9A108.c., 9A109, 9A111, 9A115.a., 9A116.d., 9A117 or 9A118.
- 9D105 "Software" which coordinates the function of more than one subsystem, specially designed or modified for "use" in space launch vehicles specified in 9A004 or sounding rockets specified in 9A104.

9E Technology

Note: "Development" or "production" "technology" specified in 9E001 to 9E003 for gas turbine engines remains controlled when used as "use" "technology" for repair, rebuild and overhaul. Excluded from control are: technical data, drawings or documentation for maintenance activities directly associated with calibration, removal or replacement of damaged or unserviceable line replaceable units, including replacement of whole engines or engine modules.

9E001 "Technology" according to the General Technology Note for the "development" of equipment or "software", specified in 9A001.b., 9A004 to 9A012, 9A350, 9B or 9D.

9E002 "Technology" according to the General Technology Note for the "production" of equipment specified in 9A001.b., 9A004 to 9A011, 9A350 or 9B.

N.B.: For "technology" for the repair of controlled structures, laminates or materials, see 1E002.f.

9E003 Other "technology" as follows:

- a. "Technology" "required" for the "development" or "production" of any of the following gas turbine engine components or systems:
 1. Gas turbine blades, vanes or tip shrouds, made from directionally solidified (DS) or single crystal (SC) alloys and having (in the 001 Miller Index Direction) a stress-rupture life exceeding 400 hours at 1,273 K (1,000°C) at a stress of 200 MPa, based on the average property values;
 2. Multiple domed combustors operating at average burner outlet temperatures exceeding 1,813 K (1,540°C) or combustors incorporating thermally decoupled combustion liners, non-metallic liners or non-metallic shells;
 3. Components manufactured from any of the following:
 - a. Organic "composite" materials designed to operate above 588 K (315°C);
 - b. Metal "matrix" "composite", ceramic "matrix", intermetallic or intermetallic reinforced materials, specified in 1C007; or
 - c. "Composite" material specified in 1C010 and manufactured with resins specified in 1C008;
 4. Uncooled turbine blades, vanes, tip-shrouds or other components, designed to operate at gas path total (stagnation) temperatures of 1,323 K (1,050°C) or more at sea-level static take-off (ISA) in a 'steady state mode' of engine operation;
 5. Cooled turbine blades, vanes or tip-shrouds, other than those described in 9E003.a.1., exposed to gas path total (stagnation) temperatures of 1,643 K (1,370°C) or more at sea-level static take-off (ISA) in a 'steady state mode' of engine operation;

9E003 a. continued

Technical Note:

The term 'steady state mode' defines engine operation conditions, where the engine parameters, such as thrust/power, rpm and others, have no appreciable fluctuations, when the ambient air temperature and pressure at the engine inlet are constant.

6. Airfoil-to-disk blade combinations using solid state joining;
7. Gas turbine engine components using "diffusion bonding" "technology" specified in 2E003.b.;
8. Damage tolerant gas turbine engine rotating components using powder metallurgy materials specified in 1C002.b.;
9. Not used;
10. Adjustable flow path geometry and associated control systems for:
 - a. Gas generator turbines;
 - b. Fan or power turbines;
 - c. Propelling nozzles;

Note 1: *Adjustable flow path geometry and associated control systems in 9E003.a.10. do not include inlet guide vanes, variable pitch fans, variable stators or bleed valves, for compressors.*

Note 2: *9E003.a.10. does not control "development" or "production" "technology" for adjustable flow path geometry for reverse thrust.*

11. Hollow fan blades;
- b. "Technology" "required" for the "development" or "production" of any of the following:
 1. Wind tunnel aero-models equipped with non-intrusive sensors capable of transmitting data from the sensors to the data acquisition system; or
 2. "Composite" propeller blades or propfans, capable of absorbing more than 2,000 kW at flight speeds exceeding Mach 0.55;
- c. "Technology" "required" for the "development" or "production" of gas turbine engine components using "laser", water jet, Electro-Chemical Machining (ECM) or Electrical Discharge Machines (EDM) hole drilling processes to produce holes having any of the following:
 1. All of the following:
 - a. Depths more than four times their diameter;
 - b. Diameters less than 0.76 mm; and
 - c. 'Incidence angles' equal to or less than 25°; or
 2. All of the following:
 - a. Depths more than five times their diameter;
 - b. Diameters less than 0.4 mm; and
 - c. 'Incidence angles' of more than 25°;

Technical Note:

For the purposes of 9E003.c., 'incidence angle' is measured from a plane tangential to the airfoil surface at the point where the hole axis enters the airfoil surface.

9E003 continued

- d. "Technology" "required" for the "development" or "production" of helicopter power transfer systems or tilt rotor or tilt wing "aircraft" power transfer systems;
- e. "Technology" for the "development" or "production" of reciprocating diesel engine ground vehicle propulsion systems having all of the following:
 - 1. 'Box volume' of 1.2 m^3 or less;
 - 2. An overall power output of more than 750 kW based on 80/1269/EEC, ISO 2534 or national equivalents; and
 - 3. Power density of more than 700 kW/m^3 of 'box volume';

Technical Note:

'Box volume' in 9E003.e. is the product of three perpendicular dimensions measured in the following way:

Length: The length of the crankshaft from front flange to flywheel face;

Width: The widest of any of the following:

- a. The outside dimension from valve cover to valve cover;
- b. The dimensions of the outside edges of the cylinder heads; or
- c. The diameter of the flywheel housing;

Height: The largest of any of the following:

- a. The dimension of the crankshaft centre-line to the top plane of the valve cover (or cylinder head) plus twice the stroke; or
- b. The diameter of the flywheel housing.

- f. "Technology" "required" for the "production" of specially designed components for high output diesel engines, as follows:
 - 1. "Technology" "required" for the "production" of engine systems having all of the following components employing ceramics materials specified in 1C007:
 - a. Cylinder liners;
 - b. Pistons;
 - c. Cylinder heads; and
 - d. One or more other components (including exhaust ports, turbochargers, valve guides, valve assemblies or insulated fuel injectors);
 - 2. "Technology" "required" for the "production" of turbocharger systems with single-stage compressors and having all of the following:
 - a. Operating at pressure ratios of 4:1 or higher;
 - b. Mass flow in the range from 30 to 130 kg per minute; and
 - c. Variable flow area capability within the compressor or turbine sections;
 - 3. "Technology" "required" for the "production" of fuel injection systems with a specially designed multifuel (e.g., diesel or jet fuel) capability covering a viscosity range from diesel fuel (2.5 cSt at 310.8 K (37.8°C)) down to gasoline fuel (0.5 cSt at 310.8 K (37.8°C)) and having all of the following:
 - a. Injection amount in excess of 230 mm^3 per injection per cylinder; and
 - b. Electronic control features specially designed for switching governor characteristics automatically depending on fuel property to provide the same torque characteristics by using the appropriate sensors;

9E003

continued

- g. "Technology" "required" for the "development" or "production" of 'high output diesel engines' for solid, gas phase or liquid film (or combinations thereof) cylinder wall lubrication and permitting operation to temperatures exceeding 723 K (450°C), measured on the cylinder wall at the top limit of travel of the top ring of the piston;

Technical Note:

'High output diesel engines' are diesel engines with a specified brake mean effective pressure of 1.8 MPa or more at a speed of 2,300 r.p.m., provided the rated speed is 2,300 r.p.m. or more.

- h. "Technology" for gas turbine engine "FADEC systems" as follows:
1. "Development" "technology" for deriving the functional requirements for the components necessary for the "FADEC system" to regulate engine thrust or shaft power (e.g., feedback sensor time constants and accuracies, fuel valve slew rate);
 2. "Development" or "production" "technology" for control and diagnostic components unique to the "FADEC system" and used to regulate engine thrust or shaft power;
 3. "Development" "technology" for the control law algorithms, including "source code", unique to the "FADEC system" and used to regulate engine thrust or shaft power.

Note: *9E003.h. does not control technical data related to engine-aircraft integration required by the civil aviation certification authorities to be published for general airline use (e.g., installation manuals, operating instructions, instructions for continued airworthiness) or interface functions (e.g., input/output processing, airframe thrust or shaft power demand).*

9E101

- a. "Technology" according to the General Technology Note for the "development" of goods specified in 9A101, 9A102, 9A104 to 9A111 or 9A115 to 9A119.
- b. "Technology" according to the General Technology Note for the "production" of 'UAV's specified in 9A012 or goods specified in 9A101, 9A102, 9A104 to 9A111 or 9A115 to 9A119.

Technical Note:

In 9E101.b. 'UAV' means unmanned aerial vehicle systems capable of a range exceeding 300 km.

9E102

"Technology" according to the General Technology Note for the "use" of space launch vehicles specified in 9A004, goods specified in 9A005 to 9A011, 'UAV's specified in 9A012 or goods specified in 9A101, 9A102, 9A104 to 9A111, 9A115 to 9A119, 9B105, 9B106, 9B115, 9B116, 9B117, 9D101 or 9D103.

Technical Note:

In 9E102 'UAV' means unmanned aerial vehicle systems capable of a range exceeding 300 km.'

ANNEX II

COMMUNITY GENERAL EXPORT AUTHORISATION No EU001

(referred to in Article 9 of this Regulation)

Issuing authority: European Community

Part 1

This export authorisation covers the following items:

All dual-use items specified in any entry in Annex I of this Regulation except those listed in Part 2 of this Annex.

Part 2

- All items specified in Annex IV.
- 0C001 "Natural uranium" or "depleted uranium" or thorium in the form of metal, alloy, chemical compound or concentrate and any other material containing one or more of the foregoing.
- 0C002 "Special fissile materials" other than those specified in Annex IV.
- 0D001 "Software" specially designed or modified for the "development", "production" or "use" of goods specified in Category 0, insofar as it relates to 0C001 or to those items of 0C002 that are excluded from Annex IV.
- 0E001 "Technology" according to the Nuclear Technology Note for the "development", "production" or "use" of goods specified in Category 0, insofar as it relates to 0C001 or to those items of 0C002 that are excluded from Annex IV.
- 1A102 Resaturated pyrolysed carbon-carbon components designed for space launch vehicles specified in 9A004 or sounding rockets specified in 9A104.
- 1C351 Human pathogens, zoonoses and "toxins".
- 1C352 Animal pathogens.
- 1C353 Genetic elements and genetically modified organisms.
- 1C354 Plant pathogens.
- 7E104 "Technology" for the integration of the flight control, guidance, and propulsion data into a flight management system for optimisation of rocket system trajectory.
- 9A009.a. Hybrid rocket propulsion systems with total impulse capacity exceeding 1.1 MNs.
- 9A117 Staging mechanisms, separation mechanisms, and interstages, usable in "missiles".

Part 3

This export authorisation is valid throughout the Community for exports to the following destinations:

- Australia
- Canada
- Japan
- New Zealand
- Norway
- Switzerland
- United States of America

Conditions and requirements for use of this authorisation

1. Exporters that use the Community General Export Authorisation (EU 001) shall notify the competent authorities of the Member State where they are established of their first use of the Community General Export Authorisation no later than 30 days after the date when the first export took place.

Exporters shall also report in the Single Administrative Document the fact that they are using this authorisation EU 001 by indicating in box 44 the reference X002.

2. The Community General Export Authorisation may not be used if:
 - the exporter has been informed by the competent authorities of the Member State in which he is established that the items in question are or may be intended, in their entirety or in part, for use in connection with the development, production, handling, operation, maintenance, storage, detection, identification or dissemination of chemical, biological or nuclear weapons or other nuclear explosive devices or the development, production, maintenance or storage of missiles capable of delivering such weapons, or if the exporter is aware that the items in question are intended for such use;
 - the exporter has been informed by the competent authorities of the Member State in which he is established that the items in question are or may be intended for a military end use as defined in Article 4(2) of this Regulation in a country subject to an arms embargo decided by a common position or joint action adopted by the Council or a decision of the OSCE or an arms embargo imposed by a binding resolution of the Security Council of the United Nations, or if the exporter is aware that the items in question are intended for the above mentioned uses;
 - the relevant items are exported to a customs free zone or free warehouse which is located in a destination covered by this authorisation.
3. Reporting requirements attached to the use of this Community General Export Authorisation and the additional information that the Member State from which the export is made might require on items exported under this authorisation are defined by Member States.

A Member State may require the exporters established in that Member State to register prior to the first use of this Community General Export Authorisation. Registration shall be automatic and acknowledged by the competent authorities to the exporter without delay and in any case within ten working days of receipt.

Where applicable the requirements set out in the first two paragraphs of this point shall be based on those defined for the use of national general export authorisations granted by those Member States which provide for such authorisations.

ANNEX IIIa

(model for individual or global export authorisation forms)

(referred to in Article 14(1) of this Regulation)

When granting the export authorisations, Member States will strive to ensure the visibility of the nature of the authorisation (individual or global) on the form issued.

This is an export authorisation valid in all Member States of the European Union until its expiry date.

EUROPEAN COMMUNITY EXPORT OF DUAL-USE ITEMS (Reg. (EC) No 428/2009)

| | | | | | | |
|---|-------------|--|---|--|--------------------------------|--|
| LICENCE | 1 | 1. Exporter | No | 2. Identification number | 3. Expiry date (if applicable) | |
| | | | | 4. Contact point details | | |
| | | 5. Consignee | | 6. Issuing authority | | |
| | | 7. Agent/Representative (if different from exporter) | No | 8. Country of origin | Code (*) | |
| | | | | 9. Country of consignment | Code (*) | |
| | | 10. End user (if different from consignee) | | 11. Member State of current or future location of the items | Code (*) | |
| | | | | 12. Member State of intended entry into the customs export procedure | Code (*) | |
| | | | | 13. Country of final destination | Code (*) | |
| | 1 | 14. Description of the items (*) | 15. Harmonised System or Combined Nomenclature Code (if applicable with 8 digit; CAS number if available) | | Code | 16. Control list no (for listed items) |
| | | | 17. Currency and Value | | 18. Quantity of the items | |
| | 19. End use | | 20. Contract date (if applicable) | 21. Customs export procedure | | |
| 22. Additional information required by national legislation (to be specified on the form) | | | | | | |
| Available for pre-printed information At discretion of Member States | | | | | | |
| For completion by issuing authority Signature _____ Stamp _____ Issuing Authority _____ Date _____ | | | | | | |

(*) See Regulation (EC) No 1172/95 (OJ L 118, 25.5.1995, p. 10).

(?) If needed, this description may be given in one or more attachments to this form (1bis). In this case, indicate the exact number of attachments in this box. The description should be as precise as possible and integrate, where relevant, the CAS or other references for chemical items in particular.

ANNEX IIIb

(model for brokering services authorisation forms)

(referred to in Article 14(1) of this Regulation)

| EUROPEAN COMMUNITY | | PROVISION OF BROKERING SERVICES (Reg. (EC) No 428/2009) | | | |
|---|---|--|----------------------------------|---|--------------------------------|
| LICENCE | 1 | 1. Broker/Applicant | No | 2. Identification number | 3. Expiry date (if applicable) |
| | | 4. Contact point details | | | |
| | | 5. Exporter in originating third country | 6. Issuing authority | | |
| | | 7. Consignee in third country of destination | No | 8. Member State in which the broker is resident or established | |
| | | | | | Code (*) |
| | | | | 9. Originating third country/Third country of location of the items subject of brokering services | Code (*) |
| | | 10. End user in third country of destination (if different from consignee) | 11. Third country of destination | | Code (*) |
| | | | | 12. Third parties involved, e.g. agents (if applicable) | |
| | | | | | |
| | 1 | 13. Description of the items. | | 14. Harmonised System or Combined Nomenclature Code (if applicable) | 15. Control list no |
| | | | 16. Currency and Value | 17. Quantity of the items | |
| 18. End use | | | | | |
| 19. Additional information required by national legislation (to be specified on the form) | | | | | |
| Available for pre-printed information At discretion of Member States | | | | | |
| For completion by issuing authority | | | | | |
| | | | Signature | Stamp | |
| | | | Issuing Authority | | |
| | | | Date | | |

(*) See Regulation (EC) No 1172/95 (OJ L 118, 25.5.1995, p. 10).

ANNEX IIIc

**COMMON ELEMENTS FOR PUBLICATION OF NATIONAL GENERAL EXPORT AUTHORISATIONS IN
NATIONAL OFFICIAL JOURNALS**

(referred to in Article 9(4)(b) of this Regulation)

1. Title of general export authorisation
2. Authority issuing the authorisation
3. EC validity. The following text shall be used:

"This is a general export authorisation under the terms of Article 9(2) of Regulation (EC) No 428/2009. This authorisation, in accordance with Article 9(2) of that Regulation, is valid in all Member States of the European Union."

Validity: according to national practices.

4. Items concerned: the following introductory text shall be used:
- "This export authorisation covers the following items"*
5. Destinations concerned: the following introductory text shall be used:

"This export authorisation is valid for exports to the following destinations"

6. Conditions and requirements

ANNEX IV

(List referred to in Article 22(1) of this Regulation)

The entries do not always cover the complete description of the item and the related notes in Annex I ⁽¹⁾. Only Annex I provides for the complete description of the items.

The mention of an item in this Annex does not affect the application of the provisions concerning mass-market products in Annex I.

PART I

(possibility of National General Authorisation for intra-Community trade)

Items of stealth technology

- 1C001 Materials specially designed for use as absorbers of electromagnetic waves, or intrinsically conductive polymers.
- N.B.: SEE ALSO 1C101**
- 1C101 Materials or devices for reduced observables such as radar reflectivity, ultraviolet/infrared signatures and acoustic signatures; other than those specified in 1C001, usable in 'missiles', "missile" subsystems or unmanned aerial vehicles specified in 9A012.
- Note:* 1C101 does not control materials if such goods are formulated solely for civil applications.
- Technical Note:*
- In 1C101 'missile' means complete rocket systems and unmanned aerial vehicle systems capable of a range exceeding 300 km.
- 1D103 "Software" specially designed for analysis of reduced observables such as radar reflectivity, ultraviolet/infrared signatures and acoustic signatures.
- 1E101 "Technology" according to the GTN for the "use" of goods specified in 1C101 or 1D103.
- 1E102 "Technology" according to the GTN for the "development" of "software" specified in 1D103.
- 6B008 Pulse radar cross-section measurement systems having transmit pulse widths of 100 ns or less and specially designed components therefor.
- N.B.: SEE ALSO 6B108**
- 6B108 Systems specially designed for radar cross section measurement usable for "missiles" and their subsystems.

Items of the Community strategic control

- 1A007 Equipment and devices, specially designed to initiate charges and devices containing energetic materials, by electrical means, as follows:
- N.B.: SEE ALSO MILITARY GOODS CONTROLS, 3A229 AND 3A232.**
- a. Explosive detonator firing sets designed to drive **multiple controlled** detonators specified in 1A007.b. **below**;
 - b. Electrically driven explosive detonators as follows:
 1. Exploding bridge (EB);
 2. Exploding bridge wire (EBW);
 3. Slapper;
 4. Exploding foil initiators (EFI).

Note: 1A007.b. does not control detonators using only primary explosives, such as lead azide.

⁽¹⁾ The differences in the wordings/scopes between Annex I and Annex IV are indicated with bold italic text.

- 1C239 High explosives, other than those specified in the military goods controls, or substances or mixtures containing more than 2 % thereof, with a crystal density greater than 1,8 g/cm³ and having a detonation velocity greater than 8 000 m/s.
- 1E201 "Technology" according to the General Technology Note for the "use" of goods specified in 1C239.
- 3A229 High-current pulse generators, as follows ...
N.B.: SEE ALSO MILITARY GOODS CONTROLS
- 3A232 Multipoint initiation systems, other than those specified in 1A007 *above*, as follows ...
N.B.: SEE ALSO MILITARY GOODS CONTROLS
- 3E201 "Technology" according to the General Technology Note for the "use" of equipment specified in 3A228.a., 3A228.b. or 3A231.
- 6A001 Acoustics, limited to the following:
- 6A001.a.1.b. Object detection or location systems having any of the following:
1. A transmitting frequency **below 5 kHz**;
 6. Designed to withstand ...;
- 6A001.a.2.a.2. Hydrophones ... Incorporating ...
- 6A001.a.2.a.3. Hydrophones ... Having any ...
- 6A001.a.2.a.6. Hydrophones ... Designed for ...
- 6A001.a.2.b. Towed acoustic hydrophone arrays ...
- 6A001.a.2.c. Processing equipment, specially designed for **real time application with** towed acoustic hydrophone arrays, having "user-accessible programmability" and time or frequency domain processing and correlation, including spectral analysis, digital filtering and beamforming using Fast Fourier or other transforms or processes;
- 6A001.a.2.e. Bottom or bay cable systems having any of the following:
1. Incorporating hydrophones ..., or
 2. Incorporating multiplexed hydrophone group signal modules ...;
- 6A001.a.2.f. Processing equipment, specially designed for **real time application with** bottom or bay cable systems, having "user-accessible programmability" and time or frequency domain processing and correlation, including spectral analysis, digital filtering and beamforming using Fast Fourier or other transforms or processes;
- 6D003.a. "Software" for the "real time processing" of acoustic data;
- 8A002.o.3. Noise reduction systems designed for use on vessels of 1 000 tonnes displacement or more, as follows:
- b. Active noise reduction or cancellation systems, or magnetic bearings, specially designed for power transmission systems, and incorporating electronic control systems capable of actively reducing equipment vibration by the generation of anti-noise or anti-vibration signals directly to the source;
- 8E002.a. "Technology" for the "development", "production", repair, overhaul or refurbishing (re-machining) of propellers specially designed for underwater noise reduction.

Items of the Community strategic control — Cryptography — Category 5 Part 2

- 5A002.a.2. Equipment designed or modified to perform cryptanalytic functions.
- 5D002.c.1. Only software having the characteristics, or performing or simulating the functions, of equipment specified in 5A002.a.2.
- 5E002. Only "technology" for the "development", "production" or "use" of the goods specified in 5A002.a.2. or 5D002.c.1. above.

Items of the MTCR technology

- 7A117 "Guidance sets", usable in "missiles" capable of achieving system accuracy of 3,33 % or less of the range (e.g., a "CEP" of 10 km or less at a range of 300 km), **except "guidance sets" designed for missiles with a range under 300 km or manned aircraft.**
- 7B001 Test, calibration or alignment equipment specially designed for equipment specified in **7A117 above**.
Note: 7B001 does not control test, calibration or alignment equipment for Maintenance Level I or Maintenance Level II.
- 7B003 Equipment specially designed for the "production" of equipment specified in **7A117 above**.
- 7B103 "Production facilities" specially designed for equipment specified in **7A117 above**.
- 7D101 "Software" specially designed for the "use" of equipment specified in 7B003 or 7B103 **above**.
- 7E001 "Technology" according to the General Technology Note for the "development" of equipment or "software" specified in 7A117, 7B003, 7B103 or 7D101 **above**.
- 7E002 "Technology" according to the General Technology Note for the "production" of equipment specified in 7A117, 7B003 and 7B103 **above**.
- 7E101 "Technology" according to the General Technology Note for the "use" of equipment specified in 7A117, 7B003, 7B103 and 7D101 **above**.
- 9A004 Space launch vehicles **capable of delivering at least a 500 kg payload to a range of at least 300 km**.
N.B.: SEE ALSO 9A104.
Note 1: 9A004 does not control payloads.
- 9A005 Liquid rocket propulsion systems containing any of the systems or components specified in 9A006 **usable for space launch vehicles specified in 9A004 above or sounding rockets specified in 9A104 below**.
N.B.: SEE ALSO 9A105 and 9A119.
- 9A007.a. Solid rocket propulsion systems, **usable for space launch vehicles specified in 9A004 above or sounding rockets specified in 9A104 below**, with any of the following:
N.B.: SEE ALSO 9A119.
- a. Total impulse capacity exceeding 1,1 MNs;
- 9A008.d. Components, as follows, specially designed for solid rocket propulsion systems:
N.B.: SEE ALSO 9A108.c.
- d. Movable nozzle or secondary fluid injection thrust vector control systems, **usable for space launch vehicles specified in 9A004 above or sounding rockets specified in 9A104 below**, capable of any of the following:
1. Omni-axial movement exceeding $\pm 5^\circ$;
 2. Angular vector rotations of $20^\circ/\text{s}$ or more; or
 3. Angular vector accelerations of $40^\circ/\text{s}^2$ or more.
- 9A104 Sounding rockets, capable of **delivering at least a 500 kg payload to a range of at least 300 km**.
N.B.: SEE ALSO 9A004.

- 9A105.a. Liquid propellant rocket engines, as follows:
- N.B.: SEE ALSO 9A119.**
- a. Liquid propellant rocket engines usable in "missiles", other than those specified in 9A005, having a total impulse capacity equal to or greater than 1,1 MN; **except liquid propellant apogee engines designed or modified for satellite applications and having all of the following:**
1. **nozzle throat diameter of 20 mm or less; and**
 2. **combustion chamber pressure of 15 bar or less.**
- 9A106.c. Systems or components, other than those specified in 9A006, usable in "missiles", as follows, specially designed for liquid rocket propulsion systems:
- c. Thrust vector control sub-systems, **except those designed for rocket systems that are not capable of delivering at least a 500 kg payload to a range of at least 300 km.**
- Technical Note:
- Examples of methods of achieving thrust vector control specified in 9A106.c. are:
1. Flexible nozzle;
 2. Fluid or secondary gas injection;
 3. Movable engine or nozzle;
 4. Deflection of exhaust gas stream (jet vanes or probes); or
 5. Thrust tabs.
- 9A108.c. Components, other than those specified in 9A008, usable in "missiles" as follows, specially designed for solid rocket propulsion systems:
- c. Thrust vector control sub-systems, **except those designed for rocket systems that are not capable of delivering at least a 500 kg payload to a range of at least 300 km.**
- Technical Note:
- Examples of methods of achieving thrust vector control specified in 9A108.c. are:
1. Flexible nozzle;
 2. Fluid or secondary gas injection;
 3. Movable engine or nozzle;
 4. Deflection of exhaust gas stream (jet vanes or probes); or
 5. Thrust tabs.
- 9A116. Reentry vehicles, usable in "missiles", and equipment designed or modified therefor, as follows, **except for reentry vehicles designed for non-weapon payloads:**
- a. Reentry vehicles;
 - b. Heat shields and components therefor fabricated of ceramic or ablative materials;
 - c. Heat sinks and components therefor fabricated of light-weight, high heat capacity materials;
 - d. Electronic equipment specially designed for reentry vehicles.
- 9A119. Individual rocket stages, usable in complete rocket systems or unmanned aerial vehicles, capable of **delivering at least a 500 kg payload to a range of 300 km**, other than those specified in 9A005 or 9A007.a. **above**
- 9B115. Specially designed "production equipment" for the systems, sub-systems and components specified in 9A005, 9A007.a., 9A008.d., 9A105.a., 9A106.c., 9A108.c., 9A116 or 9A119 **above**.
- 9B116. Specially designed "production facilities" for the space launch vehicles specified in 9A004, or systems, sub-systems, and components specified in 9A005, 9A007.a., 9A008.d., 9A104, 9A105.a., 9A106.c., 9A108.c., 9A116 or 9A119 **above**.

- 9D101 "Software" specially designed for the "use" of goods specified in 9B116 **above**.
- 9E001 "Technology" according to the General Technology Note for the "development" of equipment or "software" specified in 9A004, 9A005, 9A007.a., 9A008.d., 9B115, 9B116 or 9D101 **above**.
- 9E002 "Technology" according to the General Technology Note for the "production" of equipment specified in 9A004, 9A005, 9A007.a., 9A008.d., 9B115 or 9B116 **above**.
- Note: For "technology" for the repair of controlled structures, laminates or materials, see 1E002.f.*
- 9E101 "Technology" according to the General Technology Note for the "development" or "production" of goods specified in 9A104, 9A105.a., 9A106.c., 9A108.c., 9A116 or 9A119 **above**.
- 9E102 "Technology" according to the General Technology Note for the "use" of space launch vehicles specified in 9A004, 9A005, 9A007.a., 9A008.d., 9A104, 9A105.a., 9A106.c., 9A108.c., 9A116, 9A119, 9B115, 9B116 or 9D101 **above**.

Exemptions:

Annex IV does not control the following items of the MTCR technology:

1. that are transferred on the basis of orders pursuant to a contractual relationship placed by the European Space Agency (ESA) or that are transferred by ESA to accomplish its official tasks;
2. that are transferred on the basis of orders pursuant to a contractual relationship placed by a Member State's national space organisation or that are transferred by it to accomplish its official tasks;
3. that are transferred on the basis of orders pursuant to a contractual relationship placed in connection with a Community space launch development and production programme signed by two or more European governments;
4. that are transferred to a State-controlled space launching site in the territory of a Member State, unless that Member State controls such transfers within the terms of this Regulation.

PART II

(no National General Authorisation for intra-Community trade)

Items of the CWC (Chemical Weapons Convention)

- 1C351.d.4. Ricin
- 1C351.d.5. Saxitoxin

Items of the NSG technology

All Category 0 of Annex I is included in Annex IV, subject to the following:

- 0C001: this item is not included in Annex IV.
- 0C002: this item is not included in Annex IV, with the exception of special fissile materials as follows:
 - (a) separated plutonium;
 - (b) "uranium enriched in the isotopes 235 or 233" to more than 20 %.
- 0D001 (software) is included in Annex IV except insofar as it relates to 0C001 or to those items of 0C002 that are excluded from Annex IV.
- 0E001 (technology) is included in Annex IV except insofar as these related to 0C001 or to those items of 0C002 that are excluded from Annex IV.

N.B.: For **0C003** and **0C004**, only if for use in a "nuclear reactor" (within 0A001.a.).

- 1B226 Electromagnetic isotope separators designed for, or equipped with, single or multiple ion sources capable of providing a total ion beam current of 50 mA or greater.

Note: 1B226 includes separators:

- a. Capable of enriching stable isotopes;
- b. With the ion sources and collectors both in the magnetic field and those configurations in which they are external to the field.

- 1C012 Materials as follows:
Technical Note:
These materials are typically used for nuclear heat sources.
- b. "Previously separated" neptunium-237 in any form.
Note: 1C012.b. does not control shipments with a neptunium-237 content of 1 g or less.
- 1B231 Tritium facilities or plants, and equipment therefor, as follows:
- a. Facilities or plants for the production, recovery, extraction, concentration, or handling of tritium;
- b. Equipment for tritium facilities or plants, as follows:
1. Hydrogen or helium refrigeration units capable of cooling to 23 K (– 250 °C) or less, with heat removal capacity greater than 150 W;
 2. Hydrogen isotope storage or purification systems using metal hydrides as the storage or purification medium.
- 1B233 Lithium isotope separation facilities or plants, and equipment therefor, as follows:
- a. Facilities or plants for the separation of lithium isotopes;
- b. Equipment for the separation of lithium isotopes, as follows:
1. Packed liquid-liquid exchange columns specially designed for lithium amalgams;
 2. Mercury or lithium amalgam pumps;
 3. Lithium amalgam electrolysis cells;
 4. Evaporators for concentrated lithium hydroxide solution.
- 1C233 Lithium enriched in the lithium-6 (⁶Li) isotope to greater than its natural isotopic abundance, and products or devices containing enriched lithium, as follows: elemental lithium, alloys, compounds, mixtures containing lithium, manufactures thereof, waste or scrap of any of the foregoing.
Note: 1C233 does not control thermoluminescent dosimeters.
Technical Note:
The natural isotopic abundance of lithium-6 is approximately 6,5 weight % (7,5 atom %).
- 1C235 Tritium, tritium compounds, mixtures containing tritium in which the ratio of tritium to hydrogen atoms exceeds 1 part in 1 000, and products or devices containing any of the foregoing.
Note: 1C235 does not control a product or device containing less than $1,48 \times 10^3$ GBq (40 Ci) of tritium.
- 1E001 "Technology" according to the General Technology Note for the "development" or "production" of equipment or materials specified in 1C012.b.
- 1E201 "Technology" according to the General Technology Note for the "use" of goods specified in 1B226, 1B231, 1B233, 1C233 or 1C235.
- 3A228 Switching devices, as follows:
- a. Cold-cathode tubes, whether gas filled or not, operating similarly to a spark gap, having all of the following characteristics:
1. Containing three or more electrodes;
 2. Anode peak voltage rating of 2,5 kV or more;
 3. Anode peak current rating of 100 A or more; and
 4. Anode delay time of 10 µs or less;
- Note:* 3A228 includes gas krytron tubes and vacuum spytron tubes.
- b. Triggered spark-gaps having both of the following characteristics:
1. An anode delay time of 15 µs or less; and
 2. Rated for a peak current of 500 A or more;

- 3A231 Neutron generator systems, including tubes, having both of the following characteristics:
- a. Designed for operation without an external vacuum system; and
 - b. Utilizing electrostatic acceleration to induce a tritium-deuterium nuclear reaction
- 3E201 "Technology" according to the General Technology Note for the "use" of equipment specified in 3A229 or 3A232.
- 6A203 Cameras and components, other than those specified in 6A003, as follows:
- a. Mechanical rotating mirror cameras, as follows, and specially designed components therefor:
 1. Framing cameras with recording rates greater than 225 000 frames per second;
 2. Streak cameras with writing speeds greater than 0,5 mm per microsecond;

Note: In 6A203.a. components of such cameras include their synchronizing electronics units and rotor assemblies consisting of turbines, mirrors and bearings.
- 6A225 Velocity interferometers for measuring velocities exceeding 1 km/s during time intervals of less than 10 microseconds.
- Note: 6A225 includes velocity interferometers such as VISARs (Velocity interferometer systems for any reflector) and DLIs (Doppler laser interferometers).*
- 6A226 Pressure sensors, as follows:
- a. Manganin gauges for pressures greater than 10 GPa;
 - b. Quartz pressure transducers for pressures greater than 10 GPa.
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ANNEX V

Repealed Regulation with its successive amendments

| | |
|--------------------------------------|-------------------------------|
| Council Regulation (EC) No 1334/2000 | (OJ L 159, 30.6.2000, p. 1) |
| Council Regulation (EC) No 2889/2000 | (OJ L 336, 30.12.2000, p. 14) |
| Council Regulation (EC) No 458/2001 | (OJ L 65, 7.3.2001, p. 19) |
| Council Regulation (EC) No 2432/2001 | (OJ L 338, 20.12.2001, p. 1) |
| Council Regulation (EC) No 880/2002 | (OJ L 139, 29.5.2002, p. 7) |
| Council Regulation (EC) No 149/2003 | (OJ L 30, 5.2.2003, p. 1) |
| Council Regulation (EC) No 1504/2004 | (OJ L 281, 31.8.2004, p. 1) |
| Council Regulation (EC) No 394/2006 | (OJ L 74, 13.3.2006, p. 1) |
| Council Regulation (EC) No 1183/2007 | (OJ L 278, 22.10.2007, p. 1) |
| Council Regulation (EC) No 1167/2008 | (OJ L 325, 3.12.2008, p. 1) |

ANNEX VI

Correlation Table

| Regulation (EC) No 1334/2000 | This Regulation |
|------------------------------------|------------------------------------|
| Article 1 | Article 1 |
| Article 2, introductory wording | Article 2, introductory wording |
| Article 2(a) | Article 2(1) |
| Article 2(b), introductory wording | Article 2(2), introductory wording |
| Article 2(b)(i) | Article 2(2)(i) |
| Article 2(b)(ii) | Article 2(2)(ii) |
| Article 2(b)(iii) | Article 2(2)(iii) |
| — | Article 2(2)(iv) |
| Article 2(c)(i) | Article 2(3)(i) |
| Article 2(c)(ii) | Article 2(3)(ii) |
| Article 2(d) | Article 2(4) |
| — | Article 2(5) to (13) |
| Article 3(1) | Article 3(1) |
| Article 3(2) | Article 3(2) |
| Article 3(3) | Article 7 |
| Article 3(4) | — |
| Article 4 | Article 4 |
| Article 5 | Article 8 |
| Article 6(1) | Article 9(1) |
| Article 6(2) | Article 9(2) |
| Article 6(3) | Article 9(4)(a) |
| — | Article 9(4)(b) |
| Article 6(4) | Article 9(4)(c) |
| Article 6(5) | Article 9(5) |
| Article 6(6) | Article 9(6) |
| Article 7 | Article 11 |
| Article 8 | Article 12(1) |
| — | Article 12(2) |
| Article 9(1) | Article 9(2), third subparagraph |
| Article 9(2) | Article 13(1) |
| — | Article 13(2) |
| — | Article 13(3) |
| — | Article 13(4) |
| Article 9(3) | Article 13(5) |
| — | Article 13(6) |
| — | Article 13(7) |
| Article 10(1) | Article 14(1) |
| Article 10(2) | Article 14(2) |
| Article 10(3) | Article 9(4)(b) |
| Article 11 | Article 15(1) and (2) |
| Article 12 | Article 16 |

| Regulation (EC) No 1334/2000 | This Regulation |
|---------------------------------|----------------------------|
| Article 13 | Article 17 |
| Article 14 | Article 18 |
| Article 15(1) | Article 19(1) |
| Article 15(2) | Article 19(2) |
| Article 15(3) | Article 19(3) |
| — | Article 19(4) to (6) |
| Article 16(1) | Article 20(1) |
| — | Article 20(2) |
| Article 16(2) | Article 20(3) |
| Article 17 | Article 21 |
| Article 18 | Article 23 |
| Article 19 | Article 24 |
| Article 20 | Article 25 |
| Article 21 | Article 22 |
| Article 22 | Article 26 |
| Article 23 | Article 27 |
| Article 24 | Article 28 |
| Annex I | Annex I |
| Annex II Part 1 | Annex II Part 1 |
| Annex II Part 2 | Annex II Part 2 |
| Annex II Part 3(1), (2) and (3) | Annex II Part 3(2) |
| Annex II Part 3(4) | Annex II Part 3(1) and (3) |
| Annex IIIa | Annex IIIa |
| Annex IIIb | Annex IIIb |
| — | Annex IIIc |
| Annex IV | Annex IV |
| — | Annex V |
| — | Annex VI |

Fylgiskjal 2.**Tilskipun Evrópuþingsins og ráðsins 2009/43/EB**

frá 6. maí 2009

um að einfalda skilmála og skilyrði vegna tilflutnings varnartengdra vara innan Bandalagsins.

(Texti sem varðar EES)

EVROPUÞINGIÐ OG RÁÐ EVRÓPU-SAMBANDSINS HAFA,

með hliðsjón af stofnsáttmála Evrópubandalagsins, einkum 95. gr.,

með hliðsjón af tillögu framkvæmdastjórnarinnar,

með hliðsjón af álit efnahags- og félagsmálanefndar Evrópusambandsins ⁽¹⁾,í samræmi við málsmeðferðina sem mælt er fyrir um í 251. gr. sáttmálans ⁽²⁾,*og að teknu tilliti til eftirfarandi:*

- 1) Sáttmálinn kveður á um stofnun innri markaðar, m.a. um afnám hindrana í vegi frjálsra vöruflutninga og frjálsrar þjónustustarfsemi milli aðildarríkjanna, ennfremur um að koma á fyrirkomulagi sem tryggir að samkeppni á innri markaðinum sé ekki raskað.
- 2) Ákvæði sáttmálans um stofnun innri markaðarins gilda um allar vörur og þjónustu, sem eru afhentar gegn greiðslu, þ.m.t. varnartengdar vörur, en útiloka ekki að aðildarríki geti, við vissar aðstæður, gert aðrar ráðstafanir í einstökum tilvikum telji þau það nauðsynlegt til að verja bryna öryggishagsmunum sína.
- 3) Í lögum og stjórnáslufyrirmælum í aðildarríkjunum, sem fjalla um tilflutning varnartengdra vara innan Bandalagsins, er

misræmi sem kann að hindra flutning slíkra vara og raska samkeppni á innri markaðinum og þannig hamla á móti nýsköpun, samvinnu á sviði iðnaðar og samkeppnishæfni iðnaðar á sviði varna innan Evrópusambandsins.

- 4) Meðal þeirra markmiða sem lög og reglugerðir aðildarríkjanna þjóna í almennu tilliti er að varðveita mannréttindi, frið, öryggi og stöðugleika með ströngu fyrirkomulagi eftirlits og takmarkana á útflutningi og útbreiðslu varnartengdra vara til þriðju landa sem og til annarra aðildarríkja.
- 5) Almennt er ekki unnt að afnema þessar takmarkanir á flutningi varnartengdra vara innan Bandalagsins með því beita grunnreglum um frjálsa vöruflutninga og frjálsa þjónustustarfsemi, sem sáttmálinn mælir fyrir um, þar eð umræddar takmarkanir geta helgast, í hverju tilviki fyrir sig, af ákvæðum 30. eða 296. gr. sáttmálans, sem halda gildi sínu gagnvart aðildarríkjunum, að því gefnu að skilyrðum þeirra sé fullnægt.
- 6) Því ber nauðsyn til að samræma viðkomandi lög og reglugerðir aðildarríkjanna þannig að tilflutningur varnartengdra vara innan Bandalagsins sé einfaldaður til þess að tryggt sé að starfsemi innri markaðarins sé með eðlilegum hætti. Tilskipun þessi tekur aðeins til reglna og tilhögunar varðandi varnartengdar vörur og hefur, þar af leiðandi, engin áhrif á stefnumál aðildarríkjanna um tilflutning varnartengdra vara.
- 7) Samræming viðkomandi laga og reglugerða aðildarríkja ætti hvorki að hafa áhrif á alþjóðlegar skuldbindingar og skyldur aðildarríkjanna né ákvörðunarrétt þeirra að

⁽¹⁾ Álit var skilað 23. október 2008 (hefur enn ekki verið birt í Stjórnartíðindunum).

⁽²⁾ Álit Evrópuþingsins frá 16. desember 2008 (hefur enn ekki verið birt í Stjórnartíðindum ESB) og ákvörðun ráðsins frá 23. apríl 2009.

- því er varðar stefnu þeirra varðandi útflutning varnartengdra vara.
- 8) Aðildarríkjum ber, eftir sem áður, réttur til að leggja sig eftir milliríkjasamstarfi og þróa það enn frekar, jafnframt því að fara að ákvæðum tilskipunar þessarar.
- 9) Tilskipun þessi ætti ekki að gilda um varnartengdar vörur, sem einungis fara um yfirráðasvæði Bandalagsins, þ.e. um þær vörur sem ekki fá lögmæta tollmeðferð eða önnur not en afgreiðslu vegna viðkomu utanlands frá eða sem komið er fyrir á frísvæði eða í tollfrjálsri vörugæmslu eingöngu og ekki þarf að færa í viðurkennda birgðaskrá.
- 10) Tilskipun þessi ætti að taka til allra varnartengdra vara sem svara til þeirra sem eru á Sameiginlegum hergagnalista Evrópusambandsins ⁽¹⁾, þ.m.t. ihlutir þeirra og tækni.
- 11) Tilskipun þessi ætti hvorki að hafa áhrif á framkvæmd sameiginlegrar aðgerðar 97/817/SSUÖ (sameiginleg stefna í utanríkis- og öryggismálum) frá 28. nóvember 1997, sem ráðið samþykkti á grunni greinar J.3 í sáttmálanum um Evrópusambandið, um jarðsprengjur gegn liðsafla ⁽²⁾ né spilla fyrir því að aðildarríkin fullgildi samninginn um klasasprengjur, sem var undirritaður í Ósló 3. desember 2008, og framkvæmi ákvæði hans.
- 12) Til að ná þeim markmiðum að varðveita mannréttindi, frið, öryggi og stöðugleika, sem lög og reglugerðir aðildarríkjanna þjóna í almennu tilliti, sem aftur takmarka tilflutning varnartengdra vara, er nauðsynlegt að tilflutningur þeirra vara innan bandalagsins verði áfram háður leyfi af hálfu viðkomandi upprunaaðildarríkja og að viðtökuaðildarríkin ábyrgist hann.
- 13) Í ljósi þeirra ráðstafana sem tilskipun þessi mælir fyrir um til verndar þessum markmiðum þurfa aðildarríkin ekki lengur
- að innleiða eða viðhalda öðrum takmörkunum með tilliti til þeirra, sbr. þó 30. og 296. gr. sáttmálans.
- 14) Tilskipun þessi ætti ekki að raska beitingu ákvæða sem eru nauðsynleg vegna allsherjarreglu eða almannaöryggis. Hliðsjón af allsherjarreglu, t.d. öryggi flutninga, geymsluöryggi, hætta á að hlutir komist í hendur rangra aðila og það að sporna við glæpum er, í ljósi eðlis og gerðar varnartengdra vara, sérstaklega mikilvæg með tilliti til tilskipunar þessarar.
- 15) Tilskipun þessi hefur ekki áhrif á beitingu tilskipunar ráðsins 91/477/EBE frá 18. júní 1991 um eftirlit með öflun og eign vopna ⁽³⁾, einkum formsatriði í tengslum við flutning vopna innan Bandalagsins. Tilskipun þessi hefur ekki heldur áhrif á beitingu tilskipunar ráðsins 93/15/EBE frá 5. apríl 1993 um samhæfingu ákvæða um markaðssetningu og eftirlit með sprengiefnum til almennra nota ⁽⁴⁾, einkum ákvæðanna um tilflutning skotfæra.
- 16) Allur tilflutningur varnartengdra vara innan Bandalagsins ætti að vera háður leyfi fyrirfram í formi almennra, heildar- eða einstakra tilflutningsleyfa sem aðildarríkið, sem það yfirráðasvæði tilheyrir þaðan sem viðkomandi birgir vill flytja varnartengdar vörur, veitir eða birtir. Aðildarríkjunum ætti að vera kleift að undanskilja tilflutning varnartengdra vara leyfisskyldunni fyrirfram í sérstökum tilfellum sem talin eru upp í tilskipun þessari.
- 17) Aðildarríkjunum ætti að vera frjálst að neita um eða veita leyfi fyrirfram. Slíkt leyfi ætti að gilda alls staðar í Bandalaginu, í samræmi við meginreglurnar um stofnun innri markaðarins, og frekari leyfi fyrir gegnumferð í öðrum aðildarríkjum eða komu inn á yfirráðasvæði annarra aðildarríkja ættu ekki að vera nauðsynleg.
- 18) Aðildarríkin ættu að ákvarða þá gerð tilflutningsleyfis fyrir varnartengdar vörur

⁽¹⁾ Stjtið. ESB L 88, 2.3.2007, bls. 58.

⁽²⁾ Stjtið. ESB L 338, 2.3.2007, bls. 1.

⁽³⁾ Stjtið. ESB L 256, 2.3.2007, bls. 51.

⁽⁴⁾ Stjtið. EB L 121, 27.7.1993, bls. 20.

- eða flokka varnartengdra vara sem hæfir hverri tegund tilflutnings og hvaða skilmálar og skilyrði ætti að fylgja hverju og einu tilflutningsleyfi, að teknu tilliti til þess hversu viðkvæmur tilflutningurinn er.
- 19) Aðildarríkin skulu, að því er varðar íhluti, forðast að setja útflutningstakmarkanir en samþykkja þess í stað yfirlýsingu viðtakanda um notkun, um leið og tekið er tillit til þess í hve ríkum mæli íhlutirnir eru felldir inn í eigin vörur viðtakandans.
- 20) Aðildarríkjum ber að tilgreina viðtakendur tilflutningsleyfa án mismununar, nema annað sé þeim nauðsynlegt til verndar grundvallaröryggishagsmuna hvers og eins.
- 21) Aðildarríkjum ber, til að greiða fyrir tilflutningi varnartengdra vara, að birta almenn tilflutningsleyfi sem heimila öllum fyrirtækjum, sem uppfylla þá skilmála og skilyrði sem eru útlistuð í hverju og einu almennu tilflutningsleyfi, tilflutning varnartengdra vara.
- 22) Birta ber almennt tilflutningsleyfi vegna tilflutnings varnartengdra vara til ríkisherja í því skyni að stórauka afhendingaröryggi fyrir öll aðildarríki sem velja að kaupa inn þess háttar vörur í Bandalaginu.
- 23) Birta ber almennt tilflutningsleyfi vegna flutnings íhluta til vottaðra evrópskra fyrirtækja á sviði varna, í því skyni að hlúa að samvinnu milli, og samlögun, þeirra fyrirtækja, einkum með því að greiða fyrir kjörnýtingu aðfangakeðja og stærðarhagkvæmni.
- 24) Aðildarríki, sem taka þátt í milliríkjasamstarfi, ættu að eiga þess kost að birta almennt tilflutningsleyfi vegna tilflutnings varnartengdra vara til viðtakenda í öðrum þáttökuaðildarríkjum, eftir því sem nauðsynlegt er vegna samstarfsins. Slíkt myndi bæta skilyrði til þátttöku fyrirtækja með staðfestu í þátttökuaðildarríkjum í milliríkjasamstarfi.
- 25) Aðildarríkjunum ætti að vera kleift að birta frekari almenn tilflutningsleyfi sem gilda um tilflutning sem, með tilliti til eðlis viðkomandi vara og viðtakenda, felur í sér mjög litla áhættu með tilliti til þess að varðveita mannréttindi, frið, öryggi og stöðugleika.
- 26) Ef ekki reynist unnt að birta almennt tilflutningsleyfi ber aðildarríkjum, að fram kominni beiðni þar um, að veita einstökum fyrirtækjum heildartilflutningsleyfi, nema í þeim tilvikum er um getur í tilskipun þessari. Aðildarríkjum ætti að vera kleift að veita endurnýjanleg heildartilflutningsleyfi.
- 27) Fyrirtækjum ber að tilkynna lögbærum stjórnvöldum um notkun almennra tilflutningsleyfa í því skyni að vernda mannréttindi, frið, öryggi og stöðugleika og til að gefa kost á gagnsærri upplýsingagjöf um tilflutning varnartengdra vara í því skyni að lýðræðislegt eftirlit sé tryggt.
- 28) Svigrúm aðildarríkja til að ákvarða skilmála og skilyrði almennra, heildar- og einstakra tilflutningsleyfa ætti að vera nægilega mikið til að yfirstandandi alþjóðasamstarf um útflutningseftirlit geti haldið áfram. Þar eð ákvörðun um að heimila eða neita um útflutning er, og ber áfram að vera, ákvörðunarefni hvers og eins aðildarríkis, ætti fyrrnefnt samstarf að vera einungis uppbyggt á viljafrjálstri samþættingu útflutningsstefnumála.
- 29) Til að veita á móti því að skipta einstöku fyrirfram eftirliti út í áföngum fyrir almennt eftirlit eftir á í aðildarríkinu þar sem viðkomandi varnartengdar vörur eru upprunnar, ber að skapa skilyrði fyrir gagnkvæman trúnað og traust með því að gera ráð fyrir tryggingum fyrir því að umræddar varnartengdar vörur verði ekki fluttar út til þriðju landa í trássi við útflutningstakmarkanir. Þá ber einnig að fylgja þessari grunnreglu þegar varnartengdar vörur eru tilfluttar nokkrum sinnum milli aðildarríkja áður en þær eru fluttar út til þriðja lands.
- 30) Aðildarríkin vinna saman innan ramma sameiginlegrar afstöðu ráðsins 2008/944/SSUÖ frá 8. desember 2008 um

- skilgreiningu á sameiginlegum reglum um eftirlit með útflutningi á hernaðarlegri tækni og búnaði ⁽¹⁾ með því að beita sameiginlegum viðmiðunum ásamt fyrirkomulagi synjunartilkynninga og samráðs í því skyni að auka samleitni að því er varðar framkvæmd stefnumála þeirra varðandi útflutning varnartengdra vara til þriðju landa. Tilskipun þessi ætti ekki að koma í veg fyrir að aðildarríki ákveði skilmála og skilyrði tilflutningsleyfa vegna varnartengdra vara, þ.m.t. hugsanlegar útflutningstakmarkanir, einkum þegar það er nauðsynlegt vegna samstarfs innan ramma fyrrnefndrar sameiginlegrar afstöðu.
- 31) Birgjum ber að upplýsa viðtakendur um allar takmarkanir, sem fylgja tilflutningsleyfum, til þess að unnt sé að byggja upp gagnkvæmt traust að því er varðar getu viðtakenda til að virða slíkar takmarkanir að tilflutningi loknum, einkum komi fram beiðni um útflutning til þriðju landa.
- 32) Fyrirtækjanna er að ákveða hvort ávinningur af hugsanlegri viðtöku varnartengdra vara samkvæmt almennu tilflutningsleyfi réttlæti beiðni um vottun. Tilflutningur innan fyrirtækjahóps ætti að vera ábata-samur í krafti almenns tilflutningsleyfis, þegar meðlimir hópsins eru vottaðir í því aðildarríki þar sem hver og einn þeirra hefur staðfestu.
- 33) Sameiginlegar viðmiðanir um vottun eru nauðsynlegar til að byggja upp gagnkvæmt traust, einkum að því er varðar getu viðtakenda til að virða takmarkanir á útflutningi varnartengdra vara sem er veitt viðtaka samkvæmt tilflutningsleyfi frá öðru aðildarríki.
- 34) Viðtakendur tilfluttra varnartengdra vara skulu forðast að flytja slíkar vörur út þegar kveðið er á um útflutningstakmarkanir í viðkomandi tilflutningsleyfi.
- 35) Fyrirtækjum ber, þegar þau sækja um útflutningsleyfi til þriðju landa, að upplýsa viðkomandi lögbær stjórnvöld um hvort þau hafi virt útflutningstakmarkanir sem aðildarríkið, sem gaf út tilflutningsleyfið, lét fylgja tilflutningi á viðkomandi varnartengdri vöru. Minnt er á, í þessu sambandi, að samráðsfyrirkomulag milli aðildarríkja, sbr. ákvæði sameiginlegrar afstöðu ráðsins 2008/944/SSUÖ, hefur sérstaka þýðingu.
- 36) Fyrirtækjum ber að færa sönnur á útflutningsleyfið hjá lögbærum tollyfirvöldum á sameiginlegum ytri landamærum Bandalagsins, þegar útflutningur til þriðja lands á varnartengdri vöru, sem veitt er viðtaka samkvæmt tilflutningsleyfi, á sér stað.
- 37) Uppfæra ber listann yfir varnartengdar vörur, sem er settur fram í viðaukanum við tilskipun þessa, í fullu samræmi við hinn sameiginlega hergagnalista Evrópusambandsins.
- 38) Til þess að unnt sé að byggja upp gagnkvæmt traust og trúnað í áföngum er nauðsynlegt að aðildarríkin ákveði skilvirkar ráðstafanir, þ.m.t. viðurlög, sem duga til að framfylgja ákvæðum tilskipunar þessarar, einkum þeim þar sem mælt er fyrir um að fyrirtækin skuli fylgja sameiginlegum viðmiðunum um vottun og virða takmarkanir á frekari notkun varnartengdra vara að tilflutningi loknum.
- 39) Hafi upprunaaðildarríki rökstuddar efasemdir um að vottaður viðtakandi muni uppfylla skilyrði, sem er tengt almennu tilflutningsleyfi þess, eða telji aðildarríki, sem er leyfisveitandi, að allsherjarreglu, almannaöryggi eða mikilvægum öryggishagsmunum þess kunni að verða ógnað, ber því ekki aðeins að tilkynna hinum aðildarríkjunum og framkvæmdastjórninni þar um, heldur ætti og að eiga þess kost að fella til bráðabirgða og tímabundið úr gildi tilflutningsleyfi, að því er fyrrnefndan viðtakanda varðar, með hliðsjón af þeirri ábyrgð þess að standa vörð um mannréttindi, frið, öryggi og stöðugleika.
- 40) Í því augnamiði að skapa gagnkvæmt traust ber að fresta því að beita lögum og stjórnsýslufyrirmælum sem eru samþykkt til að tryggja að ákvæðum tilskipunar þessarar sé fylgt. Þetta gerir kleift, áður en

(¹) Stjttíð. ESB L 335, 19.12.2008, bls. 99.

- fyrirnefndum ákvæðum er beitt, að meta framvindu mála á grundvelli skýrslu framkvæmdastjórnarinnar sem er byggð á upplýsingum sem aðildarríkin leggja fram um þær ráðstafanir sem gerðar hafa verið.
- 41) Framkvæmdastjórninni ber að birta reglulega skýrslu um framkvæmd tilskipunar þessarar og láta fylgja tillögur um laga-setningu, eftir því sem við á.
- 42) Tilskipun þessi hefur engin áhrif á tilvist eða efndir svæðisbandalaga milli Belgíu og Lúxemborgar eða milli Belgíu, Lúxemborgar og Hollands, sbr. ákvæði 306. gr. sáttmálans.
- 43) Þar eð aðildarríkin geta ekki, í ljósi ólíkra reglna um leyfi sem nú gilda og þess að tilflutningur fer fram yfir landamæri, fyllilega náð markmiðum tilskipunar þessarar, einkum einföldun reglna og málsmeðferðar sem gilda um tilflutning varnartengdra vara innan Bandalagsins í því skyni að innri markaðurinn geti starfað með eðlilegum hætti, og þar eð þeim verður betur náð á vettvangi Bandalagsins, getur Bandalagið samþykkt ráðstafanir í samræmi við dreifræðisregluna skv. 5. gr. sáttmálans. Í samræmi við meðalhöfsregluna, eins og hún er sett fram í þeirri grein, er ekki gengið lengra en nauðsyn krefur í tilskipun þessari til að ná fyrirnefndu markmiði.
- 44) Nauðsynlegar ráðstafanir til framkvæmdar tilskipun þessari skulu samþykktar í samræmi við ákvörðun ráðsins 1999/468/EB frá 28. júní 1999 um reglur um meðferð framkvæmdarvalds sem framkvæmdastjórninni er falið ⁽¹⁾.
- 45) Framkvæmdastjórninni skal einkum veitt umboð til að gera breytingar á viðaukanum. Þar eð þessar ráðstafanir eru almenns eðlis og ætlað að breyta veigaminni þáttum tilskipunar þessarar verður að samþykkja þær í samræmi við þá reglunefndarmeðferð með grannskoðun sem kveðið er á um í 5. gr. ákvörðunar 1999/468/EB.

- 46) Í samræmi við 34. lið Samstarfssamnings milli stofnana um betri lagasetningu ⁽²⁾ eru aðildarríkin hvött til þess, bæði í eigin þágu og í þágu Bandalagsins, að semja og birta sín eigin yfirlit sem sýna, eftir því sem kostur er, samsvörun milli tilskipunar þessarar og lögleiðingarráðstafana,

SAMÞYKKT TILSKIPUN ÞESSA:

I. KAFLI

EFNI, GILDISSVIÐ OG SKILGREININGAR

1. gr.

Efni.

- Með tilskipun þessari er stefnt að því að einfalda reglur og málsmeðferð, sem gilda um tilflutning varnartengdra vara innan Bandalagsins, í því skyni að innri markaðurinn geti starfað með eðlilegum hætti.
- Tilskipun þessi hefur engin áhrif á eigin ákvarðanir aðildarríkja um stefnu varðandi útflutning varnartengdra vara.
- Beiting tilskipunar þessarar er með fyrirvara um ákvæði 30. og 296. gr. sáttmálans.
- Tilskipun þessi hefur engin áhrif á tækifæri aðildarríkjana til að leggja sig eftir milliríkjasamstarfi og þróa það enn frekar, jafnframt því að fara að ákvæðum tilskipunar þessarar.

2. gr.

Gildissvið.

Tilskipun þessi gildir um varnartengdar vöru sem um getur í viðaukanum.

3. gr.

Skilgreiningar.

Í tilskipun þessari er merking eftirfarandi hugtaka sem hér segir:

- „varnartengd vara“ merkir hverja þá vöru sem er tilgreind í viðaukanum,

⁽¹⁾ Stjtið. EB L 184, 14.7.1999, bls. 23.

⁽²⁾ Stjtið. ESB C 321, 31.12.2003, bls. 1.

2. „tilflutningur“ merkir hvers kyns sendingu eða flutning varnartengdrar vöru frá birgi til viðtakanda í öðru aðildarríki,
3. „birgir“ merkir lögaðila eða einstakling sem er með staðfestu í Bandalaginu og ber lagalega ábyrgð á tilflutningi,
4. „viðtakandi“ merkir lögaðila eða einstakling sem er með staðfestu í Bandalaginu og ber lagalega ábyrgð á viðtöku tilflutnings,
5. „tilflutningsleyfi“ merkir heimild, sem innlent yfirvald aðildarríkis veitir birgjum, til að flytja varnartengdar vörur til viðtakanda í öðru aðildarríki,
6. „útflutningsleyfi“ merkir heimild til að afhenda lögaðila eða einstaklingi í þriðja landi varnartengdar vörur,
7. „gegnumferð“ merkir flutning varnartengdra vara um eitt aðildarríki eða fleiri, önnur en upprunaríkið eða viðtökuríkið.

II. KAFLI TILFLUTNINGSLEYFI

4. gr.

Almenn ákvæði.

1. Tilflutningur varnartengdra vara milli aðildarríkja er háður leyfi fyrirfram. Eigi er krafist frekari leyfa af hálfu annarra aðildarríkja fyrir ferð gegnum aðildarríki eða fyrir komu inn á yfirráðasvæði þess aðildarríkis þar sem viðtakandi varnartengdu varanna er staðsettur, sbr. þó beitingu ákvæða sem eru nauðsynleg vegna almannaoðryggis eða allsherjarreglu eins og flutningsöryggis.
2. Aðildarríkin geta, þrátt fyrir ákvæði 1. mgr., veitt undanþágu frá þeirri skyldu að afla leyfis fyrirfram vegna tilflutnings varnartengdra vara, sem sett er fram í þeirri málsgrein, þegar:
 - a) birgirinn eða viðtakandinn er opinber stofnun eða hluti hersins,
 - b) aðdrættir eru af hálfu Evrópusambandsins, Atlantshafsbandalagsins, Alþjóðakjarnorkumálastofnunarinnar eða annarra

milliríkjastofnana í því skyni að leysa verkefni þeirra,

- c) tilflutningurinn er nauðsynlegur til þess að hrinda í framkvæmd samstarfsáætlun aðildarríkjanna um hergögn,
 - d) tilflutningurinn tengist hjálparstarfi í hamförum eða framlagi vegna neyðar-ástands eða
 - e) tilflutningurinn er nauðsynlegur vegna eða að aflokinni viðgerð, viðhaldi, sýningu eða kynningu.
3. Framkvæmdastjórnin getur, að fram kominni beiðni aðildarríkis eða að eigin frumkvæði, breytt 2. mgr. til þess að ákvæði hennar taki til tilfella þar sem:
- a) tilflutningurinn á sér stað við skilyrði sem engin áhrif hafa á allsherjarreglu eða almannaoðryggi,
 - b) sú skylda að afla leyfis fyrirfram stríðir gegn alþjóðlegum skuldbindingum aðildarríkjanna eftir að tilskipun þessi er samþykkt eða
 - c) nauðsyn krefur vegna milliríkjasamvinnu, eins og um getur í 4. mgr. 1. gr.

Þær ráðstafanir sem eru sniðnar til að breyta veigaminni þáttum tilskipunar þessarar með viðbótum við hana skal samþykkja í samræmi við þá reglunefndarmeðferð með skoðun skv. 2. mgr. 14. gr.

4. Aðildarríkin skulu tryggja að birgjar, sem vilja flytja varnartengdar vörur frá yfirráðasvæði þeirra, geti notað almenn tilflutningsleyfi eða sótt um heildar- eða einstakt tilflutningsleyfi skv. 5., 6. og 7. gr.

5. Aðildarríkin skulu ákveða gerð tilflutningsleyfa fyrir viðkomandi varnartengdar vörur eða flokka varnartengdra vara í samræmi við ákvæði þessarar greinar og 5., 6. og 7. gr.

6. Aðildarríkin skulu ákveða alla skilmála og skilyrði tilflutningsleyfa, þ.m.t. allar takmarkanir á útflutningi varnartengdra vara til lögaðila eða einstaklinga í þriðju löndum, m.a. með hliðsjón af þeirri hættu sem kann að steðja að verndun

mannréttinda, friðar, öryggis og stöðugleika vegna viðkomandi tilflutnings. Aðildarríkin geta, jafnframt því að fara að lögum Bandalagsins, notfært sér þann kost að fara fram á tryggingu vegna endanlegrar notkunar, þ.m.t. vottorð um endanlega notendur.

7. Aðildarríkin skulu ákveða alla skilmála og skilyrði tilflutningsleyfa vegna íhluta á grundvelli mats á því hversu viðkvæmur tilflutningurinn er, m.a. að teknu tilliti til eftirfarandi viðmiðana:

- a) eiginleikar íhlutanna með tilliti til þeirra vara sem setja á þá í og hvers kyns loka-notkun hinna frágengnu vara sem gæti valdið áhyggjum,
- b) þýðing íhlutanna með tilliti til þeirra vara sem setja á þá í.

8. Aðildarríkin skulu forðast, nema þau telji tilflutning íhluta viðkvæman, að setja takmarkanir á útflutning íhluta, framvísi viðtakandinn yfirlýsingu um notkun, þar sem hann skýrir frá því að þeir íhlutir sem tilflutningsleyfið tekur til séu eða verði settir í hans eigin vörur og að ekki sé hægt, síðar meir, að flytja þá til eða út sem slíka, nema til viðhalds eða viðgerða.

9. Aðildarríkin geta hvenær sem er afturkallað, fellt tímabundið úr gildi eða takmarkað notkun tilflutningsleyfa, sem þau hafa gefið út, til að verja brýna öryggishagsmuni sína, vegna allsherjarreglu eða almannaöryggis eða sakir þess að þeir skilmálar og þau skilyrði sem fylgja tilflutningsleyfinu eru ekki uppfyllt.

5. gr.

Almenn tilflutningsleyfi.

1. Aðildarríkin skulu birta almenn tilflutningsleyfi sem veita birgjum, sem hafa staðfestu á yfiráðasvæðum þeirra og uppfylla skilmála og skilyrði sem fylgja hinu almenna tilflutningsleyfi, beina heimild til að koma í framkvæmd flutningi varnartengdra vara, sem tilgreind eru í hinu almenna tilflutningsleyfi, til flokks eða flokka viðtakenda sem eru staðsettir í öðru aðildarríki.

2. Almenn tilflutningsleyfi skal birta, sbr. þó 2. mgr. 4. gr., að minnsta kosti í þeim tilvikum þegar:

- a) viðtakandinn er hluti af her aðildarríkis eða innkaupastofnun á sviði varna sem gerir innkaup vegna einkanota hers aðildarríkis,
- b) viðtakandinn er vottað fyrirtæki skv. 9. gr.,
- c) tilflutningurinn á sér stað vegna kynningar, mats eða sýningar,
- d) tilflutningurinn á sér stað vegna viðhalds og viðgerðar, að því gefnu að viðtakandinn sé hinn upphaflegi birgir viðkomandi varnartengdra vara.

3. Aðildarríki sem taka þátt í áætlun um milliríkjasamstarf um þróun, framleiðslu og notkun varnartengdrar vöru, einnar eða fleiri, geta birt almennt tilflutningsleyfi vegna flutninga til annarra aðildarríkja, sem taka þátt í áætluninni, eftir því sem nauðsyn krefur til að unnt sé að hrinda áætluninni í framkvæmd.

4. Aðildarríkin geta, með fyrirvara um önnur ákvæði tilskipunar þessarar, mælt fyrir um þau skilyrði sem gilda vegna skráningar áður en til notkunar almenns tilflutningsleyfis kemur í fyrsta sinn.

6. gr.

Heildartilflutningsleyfi.

1. Aðildarríkin skulu ákveða að veita einstökum birgi heildartilflutningsleyfi, að fram kominni beiðni hans, sem heimila flutning varnartengdra vara til viðtakenda í öðru aðildarríki, einu eða fleiri.

2. Með sérhverju heildartilflutningsleyfi ákveða aðildarríkin þær varnartengdar vörur eða þá flokka vara sem heildartilflutningsleyfið tekur til og þá viðtakendur eða flokka viðtakenda sem viðurkenndir eru.

Veita skal heildartilflutningsleyfi til þriggja ára og er viðkomandi aðildarríki heimilt að endurnýja það tímabil.

7. gr.

Einstök tilflutningsleyfi.

Aðildarríkin skulu ákveða að veita einstökum birgi einstök tilflutningsleyfi, að fram kominni

beiðni hans, sem heimila einn flutning varnartengdra vara í tilteknu magni, sem skal senda í einu eða mörgu lagi, til eins viðtakanda, þegar:

- a) beiðnin um tilflutning er takmörkuð við einn tilflutning,
- b) það er nauðsynlegt til að vernda grundvallaröryggishagsmuni viðkomandi aðildarríkis eða vegna allsherjarreglu,
- c) það er nauðsynlegt til að aðildarríki geti uppfyllt alþjóðlegar skyldur sínar og skuldbindingar eða
- d) aðildarríki hefur ærna ástæðu til að halda að viðkomandi birgir muni ekki geta staðið við nauðsynlega skilmála og skilyrði til að hægt sé að veita honum heildartilflutningsleyfi.

III. KAFLI UPPLÝSINGASKYLDA, VOTTUN OG ÚTFLUTNINGUR AÐ TILFLUTNINGI LOKNUM

8. gr.

Upplýsingar sem birgjum ber að veita.

1. Aðildarríkin skulu sjá til þess að birgjar varnartengdra vara upplýsi viðtakendur um skilmála og skilyrði sem fylgja viðkomandi tilflutningsleyfi, þ.m.t. takmarkanir, og varða endanlega notkun eða útflutning þeirrar varnartengdu vöru sem um ræðir.

2. Aðildarríkin skulu sjá til þess að birgjar upplýsi lögbær stjórnvöld, í því aðildarríki þaðan sem þeir hyggjast flytja varnartengdar vörur, innan hæfilegs frests um þá fyrirætlun sína að nota almennt tilflutningsleyfi í fyrsta sinn. Aðildarríkin geta ákveðið hvaða viðbótarupplýsinga má krefjast vegna varnartengdra vara sem vísað er til í almennu tilflutningsleyfi.

3. Aðildarríkin skulu tryggja að, og kanna reglulega hvort, birgjar haldi ítarlegar og fullgerðar skrár um tilflutning sinn samkvæmt gildandi löggjöf í viðkomandi aðildarríki og ákveða kvaðir um skýrslugjöf sem tengjast notkun almenns, heildar- eða einstaks tilflutningsleyfis. Skrárnar skulu innihalda viðskipta-skjöl þar sem eftirfarandi kemur fram:

- a) lýsing viðkomandi varnartengdrar vöru ásamt tilvísunar samkvæmt viðaukanum,
- b) magn og virði viðkomandi varnartengdrar vöru,
- c) dagsetningar tilflutnings,
- d) nafn og heimilisfang birgis og viðtakanda,
- e) endanleg notkun og endanlegur notandi viðkomandi varnartengdrar vöru, ef vítað er,
- f) staðfesting þess að upplýsingar um útflutningstakmarkanir, sem fylgja tilflutningsleyfi, hafi verið sendar viðtakanda viðkomandi varnartengdra vara.

4. Aðildarríkin skulu sjá til þess að birgjar haldi þær skrár er um getur í 3. mgr., a.m.k. eins lengi og kveðið er á um í viðeigandi innlendra löggjöf um kröfur sem eru gerðar til rekstraraðila vegna skýrsluhalds og er í gildi í viðkomandi aðildarríki, en aldrei skemur en þrjú ár frá lokum þess almanaksárs þegar tilflutningurinn átti sér stað. Skrárnar skulu lagðar fram að beiðni lögbærra stjórnvalda þess aðildarríkis sem á yfirráðasvæði þaðan sem viðkomandi birgir flutti umræddar varnartengdar vörur.

9. gr.

Vottun.

1. Aðildarríkin skulu tilnefna lögbær stjórnvöld sem annast vottun viðtakanda varnartengdra vara, þ.e. vara sem tilflutningsleyfi, sem önnur aðildarríki birta skv. b-lið 2. mgr. 5. gr., taka til, sem hafa staðfestu á yfirráðasvæði þeirra.

2. Vottun skal staðfesta áreiðanleika þess fyrirtækis sem er viðtakandi, einkum að því er varðar hæfni þess til að virða útflutningstakmarkanir á þeim varnartengdu vörum sem veitt er viðtaka samkvæmt tilflutningsleyfi frá öðru aðildarríki. Meta ber áreiðanleika samkvæmt eftirfarandi viðmiðunum:

- a) reynsla af störfum á sviði varna sem unnt er að sýna fram á, einkum með tilliti til hvernig fyrirtækinu hefur tekist að virða útflutningstakmarkanir, til dómsniðurstaðna hvað það varðar, til heimilda til að

- framleiða eða markaðsetja varnartengdar vörur og til ráðninga reyndra stjórnenda,
- b) atvinnustarfsemi sem máli skiptir varðandi varnartengdar vörur í Bandalaginu, einkum geta til samþættingar kerfa og undirkerfa,
 - c) tilnefning háttsetts framkvæmdastjóra sem er sá starfsmaður sem gefur sig að og ber ábyrgð sem slíkur á tilflutningi og útflutningi,
 - d) skrifleg skuldbinding fyrirtækisins, undirrituð af þeim háttsetta framkvæmdastjóra er um getur í c-lið, þess efnis að það muni gera nauðsynlegar ráðstafanir til að uppfylla og efna öll tiltekin skilyrði er varða endanlega notkun og útflutning sérhvers tiltekins íhlutar eða vöru sem veitt er viðtaka,
 - e) skrifleg skuldbinding fyrirtækisins, undirrituð af þeim háttsetta framkvæmdastjóra er um getur í c-lið, þess efnis að veita lögbærum stjórnvöldum, af tilhlýðilegri skyldurækni, ítarlegar upplýsingar í svari við beiðnum og fyrirspurnum um endanlega notendur eða endanlega notkun allra vara sem eru fluttar út eða til eða veitt er viðtaka samkvæmt tilflutningsleyfi frá öðru aðildarríki og
 - f) lýsing, meðárituð af þeim háttsetta framkvæmdastjóra er um getur í c-lið, þeirrar áætlunar um innra eftirlit eða þess innra stjórnunarkerfis tilflutnings og útflutnings sem er framkvæmt í fyrirtækinu. Lýsingin skal geyma ítarlegar upplýsingar um tiltækan viðbúnað á sviði skipulags, mannaúts og tækni, sem veitt er til þess að stýra tilflutningi og útflutningi, um hvernig ábyrgð er háttáð innan fyrirtækisins, um innri úttekt, um vitundarvakningu og þjálfun starfsfólks, um efnislegar og tæknilegar öryggisráðstafanir, um skýrsluhald og um rekjanleika tilflutnings og útflutnings.

3. Eftirfarandi upplýsingar komi fram í vottorðum:

- a) það lögbæra stjórnvald sem gefur út vottorðið,
- b) nafn og heimilisfang viðtakanda,

c) yfirlýsing um með hvaða hætti viðtakandinn hefur fullnægt þeim viðmiðunum er um getur í 2. mgr. og

d) útgáfudagur og gildistími vottorðsins.

Gildistími vottorðsins, er um getur í d-lið, skal í öllu falli ekki vera lengri en fimm ár.

4. Vottorð kunna að innihalda frekari skilyrði um eftirfarandi:

a) að láta í té nauðsynlegar upplýsingar til að unnt sé að sannreyna hvort þeim viðmiðunum er um getur í 2. mgr. sé fullnægt,

b) tímabundna ógildingu eða afturköllun vottorðsins.

5. Lögbær stjórnvöld skulu gera úttekt á því hvort viðtakendur fullnægi þeim viðmiðunum er um getur í 2. mgr. a.m.k. þriðja hvert ár, ennfremur þeim skilyrðum sem fylgja þeim vottorðum er um getur í 4. mgr.

6. Aðildarríkin skulu viðurkenna öll vottorð sem eru gefin út í samræmi við tilskipun þessa í öðru aðildarríki.

7. Lögbært stjórnvald skal grípa til viðeigandi ráðstafana komist það að því að handhafi vottorðs, sem hefur staðfestu á yfirráðasvæði aðildarríkis þess, fullnægi ekki lengur þeim viðmiðunum er um getur í 2. mgr. eða öðrum skilyrðum er um getur í 4. mgr. Afturköllun vottorðsins getur verið meðal fyrrnefndra ráðstafana. Viðkomandi lögbært stjórnvald skal tilkynna framkvæmdastjórninni og hinum aðildarríkjunum um ákvörðun sína.

8. Aðildarríkin skulu birta og uppfæra reglulega lista yfir vottaða viðtakendur og tilkynna framkvæmdastjórninni, Evrópuþinginu og hinum aðildarríkjunum um það.

Framkvæmdastjórnin skal gera miðlæga skrá um viðtakendur, sem aðildarríkin hafa vottað, aðgengilega almenningi á vefsíðu sinni.

10. gr.

Útflutningstakmarkanir.

Aðildarríkin skulu sjá til þess að viðtakendur varnartengdra vara lýsi því yfir við lögbær

stjórnvöld sín, þegar þeir sækja um útflutningsleyfi og í tilvikum þegar þeim vörum sem er veitt viðtaka samkvæmt tilflutningsleyfi frá öðru aðildarríki fylgja útflutningstakmarkanir, að þeir hafi uppfyllt skilmála fyrrnefndra takmarkana, m.a. og eftir atvikum, með því að hafa aflað sér nauðsynlegs samþykkis upprunaaðildarríkisins.

IV. KAFLI REGLUR UM TOLLMEÐFERÐ OG SAMVINNA STJÓRNVALDA

11. gr.

Reglur um tollmeðferð.

1. Þegar útflytjandi gengur frá formsatriðum vegna útflutnings varnartengdra vara á þeirri tollskrifstofu sem annast meðferð útflutningsskýrslunnar, skulu aðildarríkin sjá til þess að hann færi sönnur á að nauðsynlegra útflutningsleyfa hafi verið aflað.

2. Aðildarríki getur einnig, með fyrirvara um reglugerð ráðsins (EBE) nr. 2913/93 frá 12. október um setningu tollareglna Bandalagsins ⁽¹⁾, og lengst í 30 virka daga, fellt niður tímabundið útflutning frá yfirráðasvæði sínu á varnartengdum vörum, sem er veitt viðtaka frá öðru aðildarríki samkvæmt tilflutningsleyfi og er innfellt í aðra varnartengda vöru, eða komið, ef nauðsyn krefur, með öðrum hætti í veg fyrir að slíkar vörur fari út úr Bandalaginu frá yfirráðasvæði sínu, ef það telur:

- a) að ekki hafi verið tekið tillit til viðeigandi upplýsinga þegar útflutningsleyfið var veitt eða
- b) að aðstæður hafi breyst verulega síðan útflutningsleyfið var veitt.

3. Aðildarríkjum er heimilt að kveða á um að einungis sé heimilt að ganga frá formsatriðum vegna útflutnings á varnartengdum vörum á tilteknum tollstöðvum.

4. Aðildarríki þau sem nýta sér þann kost sem settur er fram í 3. mgr. skulu upplýsa framkvæmdastjórnina um þær tollstöðvar sem um ræðir. Framkvæmdastjórnin skal birta fyrrnefndar upplýsingar í C-deild Stjórnartíðinda Evrópusambandsins.

⁽¹⁾ Stjtið. ESB L 302, 5.9.2006, bls. 1.

12. gr.

Upplýsingaskipti.

Aðildarríkin skulu gera allar viðeigandi ráðstafanir, í samráði við framkvæmdastjórnina, til þess að koma á beinni samvinnu og upplýsingaskiptum milli lögbærra stjórnvalda hvers um sig.

V. KAFLI

UPPFÆRSLA LISTANS YFIR VARNARTENGÐAR VÖRUR

13. gr.

Aðlögun viðaukans.

1. Framkvæmdastjórnin skal uppfæra listann yfir varnartengdar vörur sem settur er fram í viðaukanum þannig að hann sé í fullu samræmi við sameiginlegan hergagnalista Evrópusambandsins.

2. Þessar ráðstafanir, sem er ætlað að breyta veigaminni þáttum tilskipunar þessarar, skal samþykkja í samræmi við þá reglunefndar-meðferð með skoðun skv. 2. mgr. 14. gr.

14. gr.

Nefndin.

1. Framkvæmdastjórnin skal njóta aðstoðar nefndar.

2. Þegar vísað er til þessarar málsgreinar gilda ákvæði 1.-4. mgr., 5a. gr. og 7. gr. ákvörðunar 1999/468/EB, með hliðsjón af ákvæðum 8. gr. hennar.

VI. KAFLI

LOKAÁKVÆÐI

15. gr.

Verndarráðstafanir.

1. Telji leyfisveitandi aðildarríki að alvarleg hættu sé á að viðtakandi, sem er vottaður skv. 9. gr. í öðru aðildarríki, muni ekki fullnægja skilyrði sem fylgir almennu tilflutningsleyfi eða telji aðildarríki, sem veitir leyfi, að allsherjarreglu eða grundvallaröryggishagsmunum þess kunni að verða raskað, ber því að upplýsa hitt aðildarríkið og óska eftir að aðstæður verði kannaðar.

2. Ef þær efasemdir er um getur í 1. mgr. haldast getur hið leyfisveitandi aðildarríki frestað áhrifum almenns tilflutningsleyfis síns til bráða-birgða þegar um fyrrnefnda viðtakendur er að ræða. Það skal tilkynna hinum aðildarríkjunum og framkvæmdastjórninni um og ástæður fyrrnefndrar verndarráðstöfunar. Aðildarríkið, sem samþykkti fyrrnefnda ráðstöfun, getur ákveðið að nema hana úr gildi, telji það forsendur hennar brostnar.

16. gr.

Viðurlög.

Aðildarríkin skulu mæla fyrir um reglur um viðurlög við brotum á ákvæðum, sem eru samþykkt tilskipun þessari til framkvæmdar, einkum þegar þær upplýsingar sem eru lagðar fram skv. 1. mgr. 8. gr. eða 10. gr., um hvort útflutningstakmarkanir sem fylgja tilflutningsleyfi séu virtar, eru rangar eða ófullnægjandi. Aðildarríkin skulu gera allar nauðsynlegar ráðstafanir til að tryggja að fyrrnefndum reglum sé framfylgt. Þau viðurlög sem mælt er fyrir um skulu vera skilvirk, meðalhófskennd og hafa varnaðaráhrif.

17. gr.

Endurskoðun og skýrslugjöf.

1. Framkvæmdastjórnin skal, eigi síðar en 30. júní 2012, leggja fram skýrslu um ráðstafanir sem aðildarríki gera með það í huga að lögleiða þessa tilskipun, einkum 9. til 12. gr. og 15. gr. hennar.

2. Framkvæmdastjórnin skal, eigi síðar en 30. júní 2016, taka framkvæmd tilskipunar þessarar til endurskoðunar og skila skýrslu um hana til Evrópuþingsins og ráðsins. Hún skal einkum meta hvort og að hve miklu leyti markmiðunum með tilskipun þessari hefur verið náð, m.a. með tilliti til starfsemi innri markaðarins. Í skýrslu

Gjört í Strassborg 6. maí 2009.

Fyrir hönd Evrópuþingsins,
H.-G. PÖTTERING
forseti.

sinni skal framkvæmdastjórnin endurskoða beitingu 9. til 12. gr. og 15. gr. tilskipunar þessarar og meta áhrif hennar á þróun evrópsks markaðar fyrir tækjabúnað til varna og grundvöll evrópskrar tækni- og iðnaðar á sviði varna, m.a. með tilliti til hags lítilla og meðalstórra fyrirtækja. Ef nauðsyn krefur skal skýrslunni fylgja tillaga að löggjöf.

18. gr.

Innleiðing.

1. Aðildarríkin skulu samþykkja og birta nauðsynleg lög og stjórnsýslufyrirmæli til að fara að tilskipun þessari eigi síðar en 30. júní 2011. Þau skulu þegar í stað senda framkvæmdastjórninni texta þeirra ákvæða.

Þau skulu beita þessum ákvæðum frá 30. júní 2012.

Þegar aðildarríkin samþykkja þessi ákvæði skal vera í þeim vísun til tilskipunar þessarar eða þeim fylgi slík tilvísun þegar þau verða birt opinberlega. Aðildarríkin skulu mæla fyrir um hvernig gera skal slíka tilvísun úr garði.

2. Aðildarríkin skulu senda framkvæmdastjórninni texta helstu ákvæða landslaga sem þau samþykkja um þau málefni sem tilskipun þessi tekur til.

19. gr.

Gildistaka.

Tilskipun þessi öðlast gildi á tuttugasta degi eftir að hún birtist í *Stjórnartíðindum Evrópu-sambandsins*.

20. gr.

Viðtakendur.

Tilskipun þessari er beint til aðildarríkjanna.

Fyrir hönd ráðsins,
J. KOHOUT
forseti.

ANNEX

COMMON MILITARY LIST OF THE EUROPEAN UNION

(adopted by the Council on 21 February 2011)

(equipment covered by Council Common Position 2008/944/CFSP defining common rules governing the control of exports of military technology and equipment)

(updating and replacing the Common Military List of the European Union adopted by the Council on 15 February 2010)

(CFSP)

(2011/C 86/01)

Note 1: Terms in "quotations" are defined terms. Refer to 'Definitions of Terms used in these lists' annexed to this List.

Note 2: In some instances chemicals are listed by name and CAS number. The list applies to chemicals of the same structural formula (including hydrates) regardless of name or CAS number. CAS numbers are shown to assist in identifying a particular chemical or mixture, irrespective of nomenclature. CAS numbers cannot be used as unique identifiers because some forms of the listed chemical have different CAS numbers, and mixtures containing a listed chemical may also have different CAS numbers.

ML1 Smooth-bore weapons with a calibre of less than 20 mm, other arms and automatic weapons with a calibre of 12,7 mm (calibre 0,50 inches) or less and accessories, as follows, and specially designed components therefor:

a. Rifles, carbines, revolvers, pistols, machine pistols and machine guns;

Note ML1.a. does not apply to the following:

a. Muskets, rifles and carbines manufactured earlier than 1938;

b. Reproductions of muskets, rifles and carbines the originals of which were manufactured earlier than 1890;

c. Revolvers, pistols and machine guns manufactured earlier than 1890, and their reproductions;

- b. Smooth-bore weapons, as follows:
1. Smooth-bore weapons specially designed for military use;
 2. Other smooth-bore weapons as follows:
 - a. Fully automatic type weapons;
 - b. Semi-automatic or pump-action type weapons;
- c. Weapons using caseless ammunition;
- d. Silencers, special gun-mountings, clips, weapons sights and flash suppressors for arms specified by ML1.a., ML1.b. or ML1.c.

Note 1 *ML1 does not apply to smooth-bore weapons used for hunting or sporting purposes. These weapons must not be specially designed for military use or of the fully automatic firing type.*

Note 2 *ML1 does not apply to firearms specially designed for dummy ammunition and which are incapable of firing any ammunition specified by ML3.*

Note 3 *ML1 does not apply to weapons using non-centre fire cased ammunition and which are not of the fully automatic firing type.*

Note 4 *ML1.d. does not apply to optical weapon sights without electronic image processing, with a magnification of 4 times or less, provided they are not specially designed or modified for military use.*

ML2 Smooth-bore weapons with a calibre of 20 mm or more, other weapons or armament with a calibre greater than 12,7 mm (calibre 0,50 inches), projectors and accessories, as follows, and specially designed components therefor:

- a. Guns, howitzers, cannon, mortars, anti-tank weapons, projectile launchers, military flame throwers, rifles, recoilless rifles, smooth-bore weapons and signature reduction devices therefor;

Note 1 *ML2.a. includes injectors, metering devices, storage tanks and other specially designed components for use with liquid propelling charges for any of the equipment specified by ML2.a.*

Note 2 *ML2.a. does not apply to weapons as follows:*

1. Muskets, rifles and carbines manufactured earlier than 1938;
2. Reproductions of muskets, rifles and carbines the originals of which were manufactured earlier than 1890.

Note 3 *ML2.a. does not apply to hand-held projectile launchers specially designed to launch tethered projectiles having no high explosive charge or communications link, to a range of less than or equal to 500 m.*

- b. Smoke, gas and pyrotechnic projectors or generators, specially designed or modified for military use;

Note *ML2.b. does not apply to signal pistols.*

c. Weapons sights and weapon sight mounts, having all of the following:

1. Specially designed for military use; and
2. Specially designed for weapons specified in ML2.a.;

d. Mountings specially designed for the weapons specified in ML2.a

ML3 Ammunition and fuse setting devices, as follows, and specially designed components therefor:

- a. Ammunition for weapons specified by ML1, ML2 or ML12;
- b. Fuse setting devices specially designed for ammunition specified by ML3.a.

Note 1 Specially designed components specified by ML3 include:

- a. Metal or plastic fabrications such as primer anvils, bullet cups, cartridge links, rotating bands and munitions metal parts;
- b. Safing and arming devices, fuses, sensors and initiation devices;
- c. Power supplies with high one-time operational output;
- d. Combustible cases for charges;
- e. Submunitions including bomblets, minelets and terminally guided projectiles.

Note 2 ML3.a. does not apply to ammunition crimped without a projectile (blank star) and dummy ammunition with a pierced powder chamber.

Note 3 ML3.a. does not apply to cartridges specially designed for any of the following purposes:

- a. Signalling;
- b. Bird scaring; or
- c. Lighting of gas flares at oil wells.

ML4 Bombs, torpedoes, rockets, missiles, other explosive devices and charges and related equipment and accessories, as follows, and specially designed components therefor:

N.B.1: For guidance and navigation equipment, see ML11.

N.B.2: For Aircraft Missile Protection Systems (AMPS), see ML4.c.

- a. Bombs, torpedoes, grenades, smoke canisters, rockets, mines, missiles, depth charges, demolition-charges, demolition-devices, demolition-kits, "pyrotechnic" devices, cartridges and simulators (i.e. equipment simulating the characteristics of any of these items), specially designed for military use;

Note ML4.a. includes:

- a. Smoke grenades, fire bombs, incendiary bombs and explosive devices;
- b. Missile rocket nozzles and re-entry vehicle nosetips.

b. Equipment having all of the following:

1. Specially designed for military use; and
2. Specially designed for 'activities' relating to any of the following:
 - a. Items specified by ML4.a.; or
 - b. Improvised Explosive Devices (IEDs).

Technical Note:

For the purpose of ML4.b.2. 'activities' applies to handling, launching, laying, controlling, discharging, detonating, activating, powering with one-time operational output, decoying, jamming, sweeping, detecting, disrupting or disposing.

Note 1 ML4.b. includes:

- a. Mobile gas liquefying equipment capable of producing 1 000 kg or more per day of gas in liquid form;
- b. Buoyant electric conducting cable suitable for sweeping magnetic mines.

Note 2 ML4.b. does not apply to hand-held devices, limited by design solely to the detection of metal objects and incapable of distinguishing between mines and other metal objects.

c. Aircraft Missile Protection Systems (AMPS).

Note ML4.c. does not apply to AMPS having all of the following:

- a. Any of the following missile warning sensors:
 1. Passive sensors having peak response between 100-400 nm; or
 2. Active pulsed Doppler missile warning sensors;
- b. Countermeasures dispensing systems;
- c. Flares, which exhibit both a visible signature and an infrared signature, for decoying surface-to-air missiles; and
- d. Installed on "civil aircraft" and having all of the following:
 1. The AMPS is only operable in a specific "civil aircraft" in which the specific AMPS is installed and for which any of the following has been issued:

- a. A civil Type Certificate; or
 - b. An equivalent document recognised by the International Civil Aviation Organisation (ICAO);
2. The AMPS employs protection to prevent unauthorised access to "software"; and
3. The AMPS incorporates an active mechanism that forces the system not to function when it is removed from the "civil aircraft" in which it was installed.

ML5 Fire control, and related alerting and warning equipment, and related systems, test and alignment and countermeasure equipment, as follows, specially designed for military use, and specially designed components and accessories therefor:

- a. Weapon sights, bombing computers, gun laying equipment and weapon control systems;
- b. Target acquisition, designation, range-finding, surveillance or tracking systems; detection, data fusion, recognition or identification equipment; and sensor integration equipment;
- c. Countermeasure equipment for items specified by ML5.a. or ML5.b.;

Note For the purposes of ML5.c., countermeasure equipment includes detection equipment.

- d. Field test or alignment equipment, specially designed for items specified by ML5.a., ML5.b. or ML5.c.

ML6 Ground vehicles and components, as follows:

N.B. For guidance and navigation equipment, see ML11.

- a. Ground vehicles and components therefor, specially designed or modified for military use;

Technical Note

For the purposes of ML6.a. the term ground vehicles includes trailers.

- b. Other ground vehicles and components, as follows:
 - 1. All-wheel drive vehicles capable of off-road use which have been manufactured or fitted with materials or components to provide ballistic protection to level III (NIJ 0108.01, September 1985, or comparable national standard) or better;
 - 2. Components having all of the following:
 - a. Specially designed for vehicles specified in ML6.b.1.; and
 - b. Providing ballistic protection to level III (NIJ 0108.01, September 1985, or comparable national standard) or better.

N.B. See also ML13.a

Note 1 ML6.a. includes:

- a. Tanks and other military armed vehicles and military vehicles fitted with mountings for arms or equipment for mine laying or the launching of munitions specified by ML4;
- b. Armoured vehicles;
- c. Amphibious and deep water fording vehicles;
- d. Recovery vehicles and vehicles for towing or transporting ammunition or weapon systems and associated load handling equipment.

Note 2 Modification of a ground vehicle for military use specified by ML6.a. entails a structural, electrical or mechanical change involving one or more components that are specially designed for military use. Such components include:

- a. Pneumatic tyre casings of a kind specially designed to be bullet-proof;
- b. Armoured protection of vital parts, (e.g. fuel tanks or vehicle cabs);
- c. Special reinforcements or mountings for weapons;
- d. Black-out lighting.

Note 3 ML6 does not apply to civil automobiles, or trucks designed or modified for transporting money or valuables, having armoured or ballistic protection.

ML7 **Chemical or biological toxic agents, "riot control agents", radioactive materials, related equipment, components and materials, as follows:**

- a. Biological agents or radioactive materials, "adapted for use in war" to produce casualties in humans or animals, degrade equipment or damage crops or the environment;
- b. Chemical warfare (CW) agents, including:
 1. CW nerve agents:
 - a. O-Alkyl (equal to or less than C₁₀, including cycloalkyl) alkyl (Methyl, Ethyl, n-Propyl or Isopropyl) -phosphonofluoridates, such as:

Sarin (GB):O-Isopropyl methylphosphonofluoridate (CAS 107-44-8); and

Soman (GD):O-Pinacolyl methylphosphonofluoridate (CAS 96-64-0);
 - b. O-Alkyl (equal to or less than C₁₀, including cycloalkyl) N,N-dialkyl (Methyl, Ethyl, n-Propyl or Isopropyl) phosphoramidocyanidates, such as:

Tabun (GA):O-Ethyl N,N-dimethylphosphoramidocyanidate (CAS 77-81-6);
 - c. O-Alkyl (H or equal to or less than C₁₀, including cycloalkyl) S-2-dialkyl (Methyl, Ethyl, n-Propyl or Isopropyl)-aminoethyl alkyl (Methyl, Ethyl, n-Propyl or Isopropyl) phosphonothiolates and corresponding alkylated and protonated salts, such as:

VX: O-Ethyl S-2-diisopropylaminoethyl methyl phosphonothiolate (CAS 50782-69-9);

2. CW vesicant agents:

a. Sulphur mustards, such as:

1. 2-Chloroethylchloromethylsulphide (CAS 2625-76-5);
2. Bis(2-chloroethyl) sulphide (CAS 505-60-2);
3. Bis(2-chloroethylthio) methane (CAS 63869-13-6);
4. 1,2-bis (2-chloroethylthio) ethane (CAS 3563-36-8);
5. 1,3-bis (2-chloroethylthio)-n-propane (CAS 63905-10-2);
6. 1,4-bis (2-chloroethylthio)-n-butane (CAS 142868-93-7);
7. 1,5-bis (2-chloroethylthio)-n-pentane (CAS 142868-94-8);
8. Bis (2-chloroethylthiomethyl) ether (CAS 63918-90-1);
9. Bis (2-chloroethylthioethyl) ether (CAS 63918-89-8);

b. Lewisites, such as:

1. 2-chlorovinylchloroarsine (CAS 541-25-3);
2. Tris (2-chlorovinyl) arsine (CAS 40334-70-1);
3. Bis (2-chlorovinyl) chloroarsine (CAS 40334-69-8);

c. Nitrogen mustards, such as:

1. HN1: bis (2-chloroethyl) ethylamine (CAS 538-07-8);
2. HN2: bis (2-chloroethyl) methylamine (CAS 51-75-2);
3. HN3: tris (2-chloroethyl) amine (CAS 555-77-1);

3. CW incapacitating agents, such as:

3-Quinuclidinyl benzilate (BZ) (CAS 6581-06-2);

4. CW defoliants, such as:

- a. Butyl 2-chloro-4-fluorophenoxyacetate (LNF);
- b. 2,4,5-trichlorophenoxyacetic acid (CAS 93-76-5) mixed with 2,4-dichlorophenoxyacetic acid (CAS 94-75-7) (Agent Orange (CAS 39277-47-9));

c. CW binary precursors and key precursors, as follows:

1. Alkyl (Methyl, Ethyl, n-Propyl or Isopropyl) Phosphonyl Difluorides, such as:

DF: Methyl Phosphonyldifluoride (CAS 676-99-3);

2. O-Alkyl (H or equal to or less than C₁₀, including cycloalkyl) O-2-dialkyl (Methyl, Ethyl, n-Propyl or Isopropyl) aminoethyl alkyl (Methyl, Ethyl, n-Propyl or Isopropyl) phosphonites and corresponding alkylated and protonated salts, such as:

QL: O-Ethyl-2-di-isopropylaminoethyl methylphosphonite (CAS 57856-11-8);

3. Chlorosarin: O-Isopropyl methylphosphonochloridate (CAS 1445-76-7);

4. Chlorosoman: O-Pinacolyl methylphosphonochloridate (CAS 7040-57-5);

- d. "Riot control agents", active constituent chemicals and combinations thereof, including:

1. α -Bromobenzeneacetonitrile, (Bromobenzyl cyanide) (CA) (CAS 5798-79-8);
2. [(2-chlorophenyl) methylene] propanedinitrile, (o-Chlorobenzylidenemalononitrile (CS) (CAS 2698-41-1);
3. 2-Chloro-1-phenylethanone, Phenylacetyl chloride (ω -chloroacetophenone) (CN) (CAS 532-27-4);
4. Dibenz-(b,f)-1,4-oxazepine, (CR) (CAS 257-07-8);
5. 10-Chloro-5,10-dihydrophenarsazine, (Phenarsazine chloride), (Adamsite), (DM) (CAS 578-94-9);
6. N-Nonanoylmorpholine, (MPA) (CAS 5299-64-9);

Note 1 ML7.d. does not apply to "riot control agents" individually packaged for personal self-defence purposes.

Note 2 ML7.d. does not apply to active constituent chemicals, and combinations thereof, identified and packaged for food production or medical purposes.

- e. Equipment specially designed or modified for military use, designed or modified for the dissemination of any of the following, and specially designed components therefor:

1. Materials or agents specified by ML7.a., ML7.b. or ML7.d.; or
2. CW agents made up of precursors specified by ML7.c.

- f. Protective and decontamination equipment, specially designed or modified for military use, components and chemical mixtures, as follows:

1. Equipment designed or modified for defence against materials specified by ML7.a., ML7.b. or ML7.d., and specially designed components therefor;
2. Equipment designed or modified for decontamination of objects contaminated with materials specified by ML7.a. or ML7.b. and specially designed components therefor;
3. Chemical mixtures specially developed or formulated for the decontamination of objects contaminated with materials specified by ML7.a. or ML7.b.;

Note ML7.f.1. includes:

- a. Air conditioning units specially designed or modified for nuclear, biological or chemical filtration;
- b. Protective clothing.

N.B. For civil gas masks, protective and decontamination equipment, see also entry 1A004 on the EU Dual-Use List.

- g. Equipment specially designed or modified for military use designed or modified for the detection or identification of materials specified by ML7.a., ML7.b. or ML7.d., and specially designed components therefor;

Note ML7.g. does not apply to personal radiation monitoring dosimeters.

N.B. See also entry 1A004 on the EU Dual-Use List.

- h. "Biopolymers" specially designed or processed for the detection or identification of CW agents specified by ML7.b., and the cultures of specific cells used to produce them;
- i. "Biocatalysts" for the decontamination or degradation of CW agents, and biological systems therefor, as follows:
 1. "Biocatalysts" specially designed for the decontamination or degradation of CW agents specified by ML7.b. resulting from directed laboratory selection or genetic manipulation of biological systems;
 2. Biological systems containing the genetic information specific to the production of "biocatalysts" specified by ML7.i.1., as follows:
 - a. "Expression vectors";
 - b. Viruses;
 - c. Cultures of cells.

Note 1 ML7.b. and ML7.d. do not apply to the following:

- a. Cyanogen chloride (CAS 506-77-4). See 1C450.a.5. on the EU Dual-Use List;
- b. Hydrocyanic acid (CAS 74-90-8);
- c. Chlorine (CAS 7782-50-5);
- d. Carbonyl chloride (phosgene) (CAS 75-44-5). See 1C450.a.4. on the EU Dual-Use List;
- e. Diphosgene (trichloromethyl-chloroformate) (CAS 503-38-8);
- f. Not used since 2004;
- g. Xylyl bromide, ortho: (CAS 89-92-9), meta: (CAS 620-13-3), para: (CAS 104-81-4);
- h. Benzyl bromide (CAS 100-39-0);
- i. Benzyl iodide (CAS 620-05-3);

- j. Bromo acetone (CAS 598-31-2);
- k. Cyanogen bromide (CAS 506-68-3);
- l. Bromo methylethylketone (CAS 816-40-0);
- m. Chloro acetone (CAS 78-95-5);
- n. Ethyl iodoacetate (CAS 623-48-3);
- o. Iodo acetone (CAS 3019-04-3);
- p. Chloropicrin (CAS 76-06-2). See 1C450.a.7. on the EU Dual-Use List.

Note 2 The cultures of cells and biological systems specified by ML7.h. and ML7.i.2. are exclusive and these sub-items do not apply to cells or biological systems for civil purposes, such as agricultural, pharmaceutical, medical, veterinary, environmental, waste management, or in the food industry.

ML8 **"Energetic materials", and related substances, as follows:**

N.B.1. See also 1C011 on the EU Dual-Use List.

N.B.2. For charges and devices, see ML4 and 1A008 on the EU Dual-Use List

Technical Notes

1. For the purposes of ML8, mixture refers to a composition of two or more substances with at least one substance being listed in the ML8 sub-items.
2. Any substance listed in the ML8 sub-items is subject to this list, even when utilised in an application other than that indicated. (e.g. TAGN is predominantly used as an explosive but can also be used either as a fuel or an oxidizer.)

a. "Explosives", as follows, and mixtures thereof:

1. ADNBF (aminodinitrobenzofuroxan or 7-amino-4,6-dinitrobenzofurazane-1-oxide) (CAS 97096-78-1);
2. BNCP (cis-bis (5-nitrotetrazolato) tetra amine-cobalt (III) perchlorate) (CAS 117412-28-9);
3. CL-14 (diamino dinitrobenzofuroxan or 5,7-diamino-4,6-dinitrobenzofurazane-1-oxide) (CAS 117907-74-1);
4. CL-20 (HNIW or Hexanitrohexaazaisowurtzitane) (CAS 135285-90-4); clathrates of CL-20 (see also ML8.g.3. and g.4. for its "precursors");
5. CP (2-(5-cyanotetrazolato) penta amine-cobalt (III) perchlorate) (CAS 70247-32-4);
6. DADE (1,1-diamino-2,2-dinitroethylene, FOX7) (CAS 145250-81-3);
7. DATB (diaminotrinitrobenzene) (CAS 1630-08-6);
8. DDFP (1,4-dinitrodifurazanopiperazine);
9. DDPO (2,6-diamino-3,5-dinitropyrazine-1-oxide, PZO) (CAS 194486-77-6);

10. DIPAM (3,3'-diamino-2,2',4,4',6,6'-hexanitrobiphenyl or dipicramide) (CAS 17215-44-0);
11. DNGU (DINGU or dinitroglycoluril) (CAS 55510-04-8);
12. Furazans, as follows:
 - a. DAAOF (diaminoazoxyfurazan);
 - b. DAAzF (diaminoazofurazan) (CAS 78644-90-3);
13. HMX and derivatives (see also ML8.g.5. for its "precursors"), as follows:
 - a. HMX (Cyclotetramethylenetetranitramine, octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazine, 1,3,5,7-tetranitro-1,3,5,7-tetraza-cyclooctane, octogen or octogene) (CAS 2691-41-0);
 - b. difluoroaminated analogs of HMX;
 - c. K-55 (2,4,6,8-tetranitro-2,4,6,8-tetraazabicyclo [3,3,0]-octanone-3, tetranitrosemiglycouril or keto-bicyclic HMX) (CAS 130256-72-3);
14. HNAD (hexanitroadamantane) (CAS 143850-71-9);
15. HNS (hexanitrostilbene) (CAS 20062-22-0);
16. Imidazoles as follows:
 - a. BNNII (Octahydro-2,5-bis(nitroimino)imidazo [4,5-d]imidazole);
 - b. DNI (2,4-dinitroimidazole) (CAS 5213-49-0);
 - c. FDIA (1-fluoro-2,4-dinitroimidazole);
 - d. NTDNIA (N-(2-nitrotriazolo)-2,4-dinitroimidazole);
 - e. PTIA (1-picryl-2,4,5-trinitroimidazole);
17. NTNMH (1-(2-nitrotriazolo)-2-dinitromethylene hydrazine);
18. NTO (ONTA or 3-nitro-1,2,4-triazol-5-one) (CAS 932-64-9);
19. Polynitrocubanes with more than four nitro groups;
20. PYX (2,6-Bis(picrylamino)-3,5-dinitropyridine) (CAS 38082-89-2);
21. RDX and derivatives, as follows:
 - a. RDX (cyclotrimethylenetrinitramine, cyclonite, T4, hexahydro-1,3,5-trinitro-1,3,5-triazine, 1,3,5-trinitro-1,3,5-triaza-cyclohexane, hexogen or hexogene) (CAS 121-82-4);
 - b. Keto-RDX (K-6 or 2,4,6-trinitro-2,4,6-triazacyclohexanone) (CAS 115029-35-1);
22. TAGN (triaminoguanidinenitrate) (CAS 4000-16-2);

23. TATB (triaminotrinitrobenzene) (CAS 3058-38-6) (see also ML8.g.7 for its "precursors");
24. TEDDZ (3,3,7,7-tetrabis(difluoroamine) octahydro-1,5-dinitro-1,5-diazocine);
25. Tetrazoles, as follows:
 - a. NTAT (nitrotriazol aminotetrazole);
 - b. NTNT (1-N-(2-nitrotriazolo)-4-nitrotetrazole);
26. Tetryl (trinitrophenylmethylnitramine) (CAS 479-45-8);
27. TNAD (1,4,5,8-tetranitro-1,4,5,8-tetraazadecalin) (CAS 135877-16-6) (see also ML8.g.6. for its "precursors");
28. TNAZ (1,3,3-trinitroazetidine) (CAS 97645-24-4) (see also ML8.g.2. for its "precursors");
29. TNGU (SORGUYL or tetranitroglycoluril) (CAS 55510-03-7);
30. TNP (1,4,5,8-tetranitro-pyridazino[4,5-d]pyridazine) (CAS 229176-04-9);
31. Triazines, as follows:
 - a. DNAM (2-oxy-4,6-dinitroamino-s-triazine) (CAS 19899-80-0);
 - b. NNHT (2-nitroimino-5-nitro-hexahydro-1,3,5-triazine) (CAS 130400-13-4);
32. Triazoles, as follows:
 - a. 5-azido-2-nitrotriazole;
 - b. ADHTDN (4-amino-3,5-dihydrazino-1,2,4-triazole dinitramide) (CAS 1614-08-0);
 - c. ADNT (1-amino-3,5-dinitro-1,2,4-triazole);
 - d. BDNTA ([bis-dinitrotriazole]amine);
 - e. DBT (3,3'-dinitro-5,5-bi-1,2,4-triazole) (CAS 30003-46-4);
 - f. DNBT (dinitrobistriazole) (CAS 70890-46-9);
 - g. Not used since 2010;
 - h. NTDNT (1-N-(2-nitrotriazolo) 3,5-dinitrotriazole);
 - i. PDNT (1-picryl-3,5-dinitrotriazole);
 - j. TACOT (tetranitrobenzotriazolobenzotriazole) (CAS 25243-36-1);
33. Explosives not listed elsewhere in ML8.a. and having any of the following:
 - a. Detonation velocity exceeding 8 700 m/s, at maximum density, or

- b. Detonation pressure exceeding 34 GPa (340 kbar);
34. Organic explosives not listed elsewhere in ML8.a. and having all the following:
- a. Yielding detonation pressures of 25 GPa (250 kbar) or more and
 - b. Remaining stable at temperatures of 523 K (250 °C) or higher for periods of five minutes or longer;
- b. "Propellants" as follows:
- 1. Any United Nations (UN) Class 1.1 solid "propellant" with a theoretical specific impulse (under standard conditions) of more than 250 seconds for non-metallised, or more than 270 seconds for aluminised compositions;
 - 2. Any UN Class 1.3 solid "propellant" with a theoretical specific impulse (under standard conditions) of more than 230 seconds for non-halogenised, 250 seconds for non-metallised compositions and 266 seconds for metallised compositions;
 - 3. "Propellants" having a force constant of more than 1 200 kJ/kg;
 - 4. "Propellants" that can sustain a steady-state linear burning rate of more than 38 mm/s under standard conditions (as measured in the form of an inhibited single strand) of 6,89 MPa (68,9 bar) pressure and 294 K (21 °C);
 - 5. Elastomer Modified Cast Double Base (EMCDB) "propellants" with extensibility at maximum stress of more than 5 % at 233 K (-40 °C);
 - 6. Any "propellant" containing substances specified by ML8.a.
 - 7. "Propellants", not specified elsewhere in the EU Common Military List, specially designed for military use;
- c. "Pyrotechnics", fuels and related substances, as follows, and mixtures thereof:
- 1. Aircraft fuels specially formulated for military purposes;
 - 2. Alane (aluminum hydride) (CAS 7784-21-6);
 - 3. Carboranes; decaborane (CAS 17702-41-9); pentaboranes (CAS 19624-22-7 and 18433-84-6) and their derivatives;
 - 4. Hydrazine and derivatives, as follows (see also ML8.d.8. and d.9. for oxidising hydrazine derivatives):
 - a. Hydrazine (CAS 302-01-2) in concentrations of 70 % or more;
 - b. Monomethyl hydrazine (CAS 60-34-4);
 - c. Symmetrical dimethyl hydrazine (CAS 540-73-8);
 - d. Unsymmetrical dimethyl hydrazine (CAS 57-14-7);

5. Metal fuels in particle form whether spherical, atomised, spheroidal, flaked or ground, manufactured from material consisting of 99 % or more of any of the following:
- a. Metals as follows and mixtures thereof:
 1. Beryllium (CAS 7440-41-7) in particle sizes of less than 60 µm;
 2. Iron powder (CAS 7439-89-6) with particle size of 3 µm or less produced by reduction of iron oxide with hydrogen;
 - b. Mixtures containing any of the following:
 1. Zirconium (CAS 7440-67-7), magnesium (CAS 7439-95-4) or alloys of these in particle sizes of less than 60 µm; or
 2. Boron (CAS 7440-42-8) or boron carbide (CAS 12069-32-8) fuels of 85 % purity or higher and particle sizes of less than 60 µm;
6. Military materials, containing thickeners for hydrocarbon fuels, specially formulated for use in flame throwers or incendiary munitions, such as metal stearates or palmates (e.g. octal (CAS 637-12-7)) and M1, M2, and M3 thickeners;
7. Perchlorates, chlorates and chromates, composited with powdered metal or other high energy fuel components;
8. Spherical aluminium powder (CAS 7429-90-5) with a particle size of 60 µm or less, manufactured from material with an aluminium content of 99 % or more;
9. Titanium subhydride (TiH_n) of stoichiometry equivalent to n = 0,65 to 1,68.

Note 1 Aircraft fuels specified by ML8.c.1. are finished products, not their constituents.

Note 2 ML8.c.4.a. does not apply to hydrazine mixtures specially formulated for corrosion control.

Note 3 ML8.c.5. applies to explosives and fuels, whether or not the metals or alloys are encapsulated in aluminium, magnesium, zirconium, or beryllium.

Note 4 ML8.c.5.b.2. does not apply to boron and boron carbide enriched with boron-10 (20 % or more of total boron-10 content).

Note 5 ML8.c.5.b. only applies to metal fuels in particle form when they are mixed with other substances to form a mixture formulated for military purposes such as liquid propellant slurries, solid propellants, or pyrotechnic mixtures.

- d. Oxidizers as follows, and mixtures thereof:
1. ADN (ammonium dinitramide or SR 12) (CAS 140456-78-6);
 2. AP (ammonium perchlorate) (CAS 7790-98-9);
 3. Compounds composed of fluorine and any of the following:
 - a. Other halogens;

b. Oxygen; or

c. Nitrogen;

Note 1 ML8.d.3 does not apply to chlorine trifluoride (CAS 7790-91-2).

Note 2 ML8.d.3 does not apply to nitrogen trifluoride (CAS 7783-54-2) in its gaseous state.

4. DNAD (1,3-dinitro-1,3-diazetidene) (CAS 78246-06-7);
5. HAN (hydroxylammonium nitrate) (CAS 13465-08-2);
6. HAP (hydroxylammonium perchlorate) (CAS 15588-62-2);
7. HNF (hydrazinium nitroformate) (CAS 20773-28-8);
8. Hydrazine nitrate (CAS 37836-27-4);
9. Hydrazine perchlorate (CAS 27978-54-7);
10. Liquid oxidisers comprised of or containing inhibited red fuming nitric acid (IRFNA) (CAS 8007-58-7);

Note ML8.d.10 does not apply to non-inhibited fuming nitric acid.

e. Binders, plasticisers, monomers and polymers, as follows:

1. AMMO (azidomethylmethyloxetane and its polymers) (CAS 90683-29-7) (see also ML8.g.1. for its "precursors");
2. BAMO (bisazidomethyloxetane and its polymers) (CAS 17607-20-4) (see also ML8.g.1. for its "precursors");
3. BDNPA (bis (2,2-dinitropropyl)acetal) (CAS 5108-69-0);
4. BDNPF (bis (2,2-dinitropropyl)formal) (CAS 5917-61-3);
5. BTTN (butanetrioltrinitrate) (CAS 6659-60-5) (see also ML8.g.8. for its "precursors");
6. Energetic monomers, plasticizers or polymers, specially formulated for military use and containing any of the following:
 - a. Nitro groups;
 - b. Azido groups;
 - c. Nitrate groups;
 - d. Nitratata groups; or
 - e. Difluoroamino groups;
7. FAMAO (3-difluoroaminomethyl-3-azidomethyl oxetane) and its polymers;

8. FEFO (bis-(2-fluoro-2,2-dinitroethyl) formal) (CAS 17003-79-1);
 9. FPF-1 (poly-2,2,3,3,4,4-hexafluoropentane-1,5-diol formal) (CAS 376-90-9);
 10. FPF-3 (poly-2,4,4,5,5,6,6-heptafluoro-2-tri-fluoromethyl-3-oxaheptane-1,7-diol formal);
 11. GAP (glycidylazide polymer) (CAS 143178-24-9) and its derivatives;
 12. HTPB (hydroxyl terminated polybutadiene) with a hydroxyl functionality equal to or greater than 2,2 and less than or equal to 2,4, a hydroxyl value of less than 0,77 meq/g, and a viscosity at 30 °C of less than 47 poise (CAS 69102-90-5);
 13. Alcohol functionalised poly(epichlorohydrin) with a molecular weight less than 10 000, as follows:
 - a. Poly(epichlorohydrindiol);
 - b. Poly(epichlorohydrintriol)
 14. NENAs (nitroethylnitramine compounds) (CAS 17096-47-8, 85068-73-1, 82486-83-7, 82486-82-6 and 85954-06-9);
 15. PGN (poly-GLYN, polyglycidynitrate or poly(nitratomethyl oxirane) (CAS 27814-48-8);
 16. Poly-NIMMO (poly nitratomethylmethyloxetane) or poly-NMMO (poly[3-Nitratomethyl-3-methyloxetane]) (CAS 84051-81-0);
 17. Polynitroorthocarbonates;
 18. TVOPA (1,2,3-tris[1,2-bis(difluoroamino)ethoxy] propane or tris vinoxy propane adduct) (CAS 53159-39-0).
- f. "Additives" as follows:
1. Basic copper salicylate (CAS 62320-94-9);
 2. BHEGA (bis-(2-hydroxyethyl) glycolamide) (CAS 17409-41-5);
 3. BNO (butadienenitrileoxide) (CAS 9003-18-3);
 4. Ferrocene derivatives as follows:
 - a. Butacene (CAS 125856-62-4);
 - b. Catocene (2,2-bis-ethylferrocenyl propane) (CAS 37206-42-1);
 - c. Ferrocene carboxylic acids including:

Ferrocene carboxylic acid (CAS 1271-42-7), 1,1'-Ferrocenedicarboxylic acid (CAS 1293-87-4);
 - d. n-butyl-ferrocene (CAS 31904-29-7);
 - e. Other adducted polymer ferrocene derivatives;

5. Lead beta-resorcylate (CAS 20936-32-7);
6. Lead citrate (CAS 14450-60-3);
7. Lead-copper chelates of beta-resorcylate or salicylates (CAS 68411-07-4);
8. Lead maleate (CAS 19136-34-6);
9. Lead salicylate (CAS 15748-73-9);
10. Lead stannate (CAS 12036-31-6);
11. MAPO (tris-1-(2-methyl)aziridinyl phosphine oxide) (CAS 57-39-6); BOBBA 8 (bis(2-methyl aziridinyl) 2-(2-hydroxypropanoxy) propylamino phosphine oxide); and other MAPO derivatives;
12. Methyl BAPO (bis(2-methyl aziridinyl) methylamino phosphine oxide) (CAS 85068-72-0);
13. N-methyl-p-nitroaniline (CAS 100-15-2);
14. 3-Nitrazo-1,5-pentane diisocyanate (CAS 7406-61-9);
15. Organo-metallic coupling agents as follows:
 - a. Neopentyl[diallyl]oxy, tri[diocetyl]phosphato-titanate (CAS 103850-22-2); also known as titanium IV, 2,2[bis 2-propenolato-methyl, butanolato, tris (diocetyl) phosphato] (CAS 110438-25-0); or LICA 12 (CAS 103850-22-2);
 - b. Titanium IV, [(2-propenolato-1) methyl, n-propanolatomethyl] butanolato-1, tris[diocetyl] pyrophosphate or KR3538;
 - c. Titanium IV, [(2-propenolato-1)methyl, n-propanolatomethyl] butanolato-1, tris(diocetyl)phosphate;
16. Polycyanodifluoroaminoethyleneoxide;
17. Polyfunctional aziridine amides with isophthalic, trimesic (BITA or butylene imine trimesamide), isocyanuric or trimethyladipic backbone structures and 2-methyl or 2-ethyl substitutions on the aziridine ring;
18. Propyleneimine (2-methylaziridine) (CAS 75-55-8);
19. Superfine iron oxide (Fe_2O_3) (CAS 1317-60-8) with a specific surface area more than $250 \text{ m}^2/\text{g}$ and an average particle size of 3,0 nm or less;
20. TEPAN (tetraethylenepentaamineacrylonitrile) (CAS 68412-45-3); cyanoethylated polyamines and their salts;
21. TEPANOL (tetraethylenepentaamineacrylonitrileglycidol) (CAS 68412-46-4); cyanoethylated polyamines adducted with glycidol and their salts;
22. TPB (triphenyl bismuth) (CAS 603-33-8).

g. "Precursors", as follows:

N.B. In ML8.g. the references are to specified "Energetic Materials" manufactured from these substances.

1. BCMO (bischloromethyloxetane) (CAS 142173-26-0) (see also ML8.e.1. and e.2.);
2. Dinitroazetidine-t-butyl salt (CAS 125735-38-8) (see also ML8.a.28.);
3. HBIW (hexabenzylhexaazaisowurtzitane) (CAS 124782-15-6) (see also ML8.a.4.);
4. TAIW (tetraacetyldibenzylhexaazaisowurtzitane) (see also ML8.a.4.) (CAS 182763-60-6);
5. TAT (1,3,5,7 tetraacetyl-1,3,5,7,-tetraaza cyclo-octane) (CAS 41378-98-7) (see also ML8.a.13.);
6. 1,4,5,8-tetraazadecalin (CAS 5409-42-7) (see also ML8.a.27.);
7. 1,3,5-trichlorobenzene (CAS 108-70-3) (see also ML8.a.23.);
8. 1,2,4-trihydroxybutane (1,2,4-butanetriol) (CAS 3068-00-6) (see also ML8.e.5).

Note 5 Not used since 2009

Note 6 ML8 does not apply to the following substances unless they are compounded or mixed with the "energetic material" specified by ML8.a. or powdered metals specified by ML8.c.:

- a. Ammonium picrate (CAS 131-74-8);
- b. Black powder;
- c. Hexanitrodiphenylamine (CAS 131-73-7);
- d. Difluoroamine(CAS 10405-27-3);
- e. Nitrostarch (CAS9056-38-6);
- f. Potassium nitrate (CAS 7757-79-1);
- g. Tetranitronaphthalene;
- h. Trinitroanisol;
- i. Trinitronaphthalene;
- j. Trinitroxylene;
- k. N-pyrrolidinone; 1-methyl-2-pyrrolidinone (CAS 872-50-4);
- l. Dioctylmaleate (CAS 142-16-5);
- m. Ethylhexylacrylate (CAS 103-11-7);
- n. Triethylaluminium (TEA) (CAS 97-93-8), trimethylaluminium (TMA) (CAS 75-24-1), and other pyrophoric metal alkyls and aryls of lithium, sodium, magnesium, zinc or boron;

- o. Nitrocellulose (CAS 9004-70-0);
- p. Nitroglycerin (or glyceroltrinitrate, trinitroglycerine) (NG) (CAS 55-63-0);
- q. 2,4,6-trinitrotoluene (TNT) (CAS 118-96-7);
- r. Ethylenediaminedinitrate (EDDN) (CAS 20829-66-7);
- s. Pentaerythritoltetranitrate (PETN) (CAS 78-11-5);
- t. Lead azide (CAS 13424-46-9), normal lead styphnate (CAS 15245-44-0) and basic lead styphnate (CAS 12403-82-6), and primary explosives or priming compositions containing azides or azide complexes;
- u. Triethyleneglycoldinitrate (TEGDN) (CAS 111-22-8);
- v. 2,4,6-trinitroresorcinol (styphnic acid) (CAS 82-71-3);
- w. Diethyldiphenylurea (CAS 85-98-3); dimethyldiphenylurea (CAS 611-92-7); methyl-ethyldiphenyl urea [Centralites];
- x. N,N-diphenylurea (unsymmetrical diphenylurea) (CAS 603-54-3);
- y. Methyl-N,N-diphenylurea (methyl unsymmetrical diphenylurea) (CAS 13114-72-2);
- z. Ethyl-N,N-diphenylurea (ethyl unsymmetrical diphenylurea) (CAS 64544-71-4);
- aa. 2-Nitrodiphenylamine (2-NDPA) (CAS 119-75-5);
- bb. 4-Nitrodiphenylamine (4-NDPA) (CAS 836-30-6);
- cc. 2,2-dinitropropanol (CAS 918-52-5);
- dd. Nitroguanidine (CAS 556-88-7) (see IC011.d. on the EU Dual-Use List).

ML9 Vessels of war (surface or underwater), special naval equipment, accessories, components and other surface vessels, as follows:

N.B. For guidance and navigation equipment, see ML11.

a. Vessels and components, as follows:

1. Vessels (surface or underwater) specially designed or modified for military use, regardless of current state of repair or operating condition, and whether or not they contain weapon delivery systems or armour, and hulls or parts of hulls for such vessels, and components therefor specially designed for military use;
2. Surface vessels, other than those specified in ML9.a.1., having any of the following, fixed or integrated into the vessel:
 - a. Automatic weapons having a calibre of 12,7 mm or greater specified in ML1., or weapons specified in ML2., ML4., ML12. or ML19., or 'mountings' or hard points for such weapons;

Technical Note

'Mountings' refers to weapon mounts or structural strengthening for the purpose of installing weapons.

- b. Fire control systems specified in ML5.;
- c. Having all of the following:
 - 1. 'Chemical, Biological, Radiological and Nuclear (CBRN) protection'; and
 - 2. 'Pre-wet or wash down system' designed for decontamination purposes; or

Technical Notes

- 1. 'CBRN protection' is a self contained interior space containing features such as over-pressurization, isolation of ventilation systems, limited ventilation openings with CBRN filters and limited personnel access points incorporating air-locks.
- 2. 'Pre-wet or wash down system' is a seawater spray system capable of simultaneously wetting the exterior superstructure and decks of a vessel.

- d. Active weapon countermeasure systems specified in ML4.b., ML5.c. or ML11.a. and having any of the following:
 - 1. 'CBRN protection';
 - 2. Hull and superstructure, specially designed to reduce the radar cross section;
 - 3. Thermal signature reduction devices, (e.g., an exhaust gas cooling system), excluding those specially designed to increase overall power plant efficiency or to reduce the environmental impact; or
 - 4. A degaussing system designed to reduce the magnetic signature of the whole vessel;
- b. Engines and propulsion systems, as follows, specially designed for military use and components therefor specially designed for military use:
 - 1. Diesel engines specially designed for submarines and having all of the following:
 - a. Power output of 1,12 MW (1 500 hp) or more; and
 - b. Rotary speed of 700 rpm or more;
 - 2. Electric motors specially designed for submarines and having all of the following:
 - a. Power output of more than 0,75 MW (1 000 hp);
 - b. Quick reversing;
 - c. Liquid cooled; and
 - d. Totally enclosed;

3. Non-magnetic diesel engines having all of the following:
 - a. Power output of 37,3 kW (50 hp) or more; and
 - b. Non-magnetic content in excess of 75 % of total mass;
4. 'Air Independent Propulsion' (AIP) systems specially designed for submarines;

Technical Note

'Air Independent Propulsion' (AIP) allows a submerged submarine to operate its propulsion system, without access to atmospheric oxygen, for a longer time than the batteries would have otherwise allowed. For the purposes of ML9.b.4., AIP does not include nuclear power.

- c. Underwater detection devices, specially designed for military use, controls therefor and components therefor specially designed for military use;
- d. Anti-submarine nets and anti-torpedo nets, specially designed for military use;
- e. Not used since 2003;
- f. Hull penetrators and connectors, specially designed for military use, that enable interaction with equipment external to a vessel, and components therefor specially designed for military use;

Note ML9.f. includes connectors for vessels which are of the single-conductor, multi-conductor, coaxial or waveguide type, and hull penetrators for vessels, both of which are capable of remaining impervious to leakage from without and of retaining required characteristics at marine depths exceeding 100 m; and fibre-optic connectors and optical hull penetrators, specially designed for "laser" beam transmission, regardless of depth. ML9.f. does not apply to ordinary propulsive shaft and hydrodynamic control-rod hull penetrators.

- g. Silent bearings having any of the following, components therefor and equipment containing those bearings, specially designed for military use:
 1. Gas or magnetic suspension;
 2. Active signature controls; or
 3. Vibration suppression controls.

ML10 "Aircraft", "lighter-than-air vehicles", unmanned airborne vehicles, aero-engines and "aircraft" equipment, related equipment and components, specially designed or modified for military use, as follows:

N.B. For guidance and navigation equipment, see ML11.

- a. Combat "aircraft" and specially designed components therefor;
- b. Other "aircraft" and "lighter-than-air vehicles", specially designed or modified for military use, including military reconnaissance, assault, military training, transporting and airdropping troops or military equipment, logistics support, and specially designed components therefor;

- c. Unmanned airborne vehicles and related equipment, specially designed or modified for military use, as follows, and specially designed components therefor:
 - 1. Unmanned airborne vehicles including remotely piloted air vehicles (RPVs), autonomous programmable vehicles and "lighter-than-air vehicles";
 - 2. Associated launchers and ground support equipment;
 - 3. Related equipment for command and control;
- d. Aero-engines specially designed or modified for military use, and specially designed components therefor;
- e. Airborne equipment, including airborne refuelling equipment, specially designed for use with the "aircraft" specified by ML10.a. or ML10.b. or the aero-engines specified by ML10.d., and specially designed components therefor;
- f. Pressure refuellers, pressure refuelling equipment, equipment specially designed to facilitate operations in confined areas and ground equipment, developed specially for "aircraft" specified by ML10.a. or ML10.b., or for aero-engines specified by ML10.d.;
- g. Military crash helmets and protective masks, and specially designed components therefor, pressurised breathing equipment and partial pressure suits for use in "aircraft", anti-g suits, liquid oxygen converters used for "aircraft" or missiles, and catapults and cartridge actuated devices, for emergency escape of personnel from "aircraft";
- h. Parachutes, paragliders and related equipment, as follows, and specially designed components therefor:
 - 1. Parachutes not specified elsewhere in the EU Common Military List;
 - 2. Paragliders
 - 3. Equipment specially designed for high altitude parachutists (e.g. suits, special helmets, breathing systems, navigation equipment);
- i. Automatic piloting systems for parachuted loads; equipment specially designed or modified for military use for controlled opening jumps at any height, including oxygen equipment.

Note 1 ML10.b. does not apply to "aircraft" or variants of those "aircraft" specially designed for military use, and which are all of the following:

- a. Not configured for military use and not fitted with equipment or attachments specially designed or modified for military use; and
- b. Certified for civil use by the civil aviation authority in a Member State or in a Wassenaar Arrangement Participating State.

Note 2 ML10.d. does not apply to:

- a. Aero-engines designed or modified for military use which have been certified by civil aviation authorities in a Member State or in a Wassenaar Arrangement Participating State for use in "civil aircraft", or specially designed components therefor;

- b. *Reciprocating engines or specially designed components therefor, except those specially designed for unmanned airborne vehicles.*

Note 3 *ML10.b. and ML10.d. on specially designed components and related equipment for non-military "aircraft" or aero-engines modified for military use applies only to those military components and to military related equipment required for the modification to military use.*

ML11 Electronic equipment, not specified elsewhere on the EU Common Military List, as follows, and specially designed components therefor:

- a. Electronic equipment specially designed for military use;

Note *ML11.a. includes:*

- a. *Electronic countermeasure and electronic counter-countermeasure equipment (i.e. equipment designed to introduce extraneous or erroneous signals into radar or radio communication receivers or otherwise hinder the reception, operation or effectiveness of adversary electronic receivers including their countermeasure equipment), including jamming and counter-jamming equipment;*
- b. *Frequency agile tubes;*
- c. *Electronic systems or equipment, designed either for surveillance and monitoring of the electromagnetic spectrum for military intelligence or security purposes or for counteracting such surveillance and monitoring;*
- d. *Underwater countermeasures, including acoustic and magnetic jamming and decoy, equipment designed to introduce extraneous or erroneous signals into sonar receivers;*
- e. *Data processing security equipment, data security equipment and transmission and signalling line security equipment, using ciphering processes;*
- f. *Identification, authentication and keyloader equipment and key management, manufacturing and distribution equipment;*
- g. *Guidance and navigation equipment;*
- h. *Digital troposcatter-radio communications transmission equipment;*
- i. *Digital demodulators specially designed for signals intelligence;*
- j. *"Automated command and control systems".*

N.B. *For "software" associated with military "Software" Defined Radio (SDR), see ML21.*

- b. Global Navigation Satellite Systems (GNSS) jamming equipment.

ML12 High velocity kinetic energy weapon systems and related equipment, as follows, and specially designed components therefor:

- a. Kinetic energy weapon systems specially designed for destruction or effecting mission-abort of a target;

- b. Specially designed test and evaluation facilities and test models, including diagnostic instrumentation and targets, for dynamic testing of kinetic energy projectiles and systems.

N.B. For weapon systems using sub-calibre ammunition or employing solely chemical propulsion, and ammunition therefor, see ML1 to ML4.

Note 1 ML12 includes the following when specially designed for kinetic energy weapon systems:

- a. Launch propulsion systems capable of accelerating masses larger than 0,1 g to velocities in excess of 1,6 km/s, in single or rapid fire modes;
- b. Prime power generation, electric armour, energy storage, thermal management, conditioning, switching or fuel-handling equipment; and electrical interfaces between power supply, gun and other turret electric drive functions;
- c. Target acquisition, tracking, fire control or damage assessment systems;
- d. Homing seeker, guidance or divert propulsion (lateral acceleration) systems for projectiles.

Note 2 ML12 applies to weapon systems using any of the following methods of propulsion:

- a. Electromagnetic;
- b. Electrothermal;
- c. Plasma;
- d. Light gas; or
- e. Chemical (when used in combination with any of the above).

ML13 Armoured or protective equipment, constructions and components, as follows:

- a. Armoured plate, having any of the following:
 1. Manufactured to comply with a military standard or specification; or
 2. Suitable for military use;
- b. Constructions of metallic or non-metallic materials, or combinations thereof, specially designed to provide ballistic protection for military systems, and specially designed components therefor;
- c. Helmets manufactured according to military standards or specifications, or comparable national standards, and specially designed components therefor, (i.e. helmet shell, liner and comfort pads);
- d. Body armour and protective garments, manufactured according to military standards or specifications, or equivalent, and specially designed components therefor.

Note 1 ML13.b. includes materials specially designed to form explosive reactive armour or to construct military shelters.

Note 2 ML13.c. does not apply to conventional steel helmets, neither modified or designed to accept, nor equipped with any type of accessory device.

Note 3 ML13.c. and d. do not apply to helmets, body armour or protective garments, when accompanying their user for the user's own personal protection.

Note 4 The only helmets specially designed for bomb disposal personnel that are specified by ML13. are those specially designed for military use.

N.B. 1 See also entry 1A005 on the EU Dual-Use List.

N.B. 2 For "fibrous or filamentary materials" used in the manufacture of body armour and helmets, see entry 1C010 on the EU Dual Use List

ML14 **'Specialised equipment for military training' or for simulating military scenarios, simulators specially designed for training in the use of any firearm or weapon specified by ML1 or ML2, and specially designed components and accessories therefor.**

Technical Note

The term 'specialised equipment for military training' includes military types of attack trainers, operational flight trainers, radar target trainers, radar target generators, gunnery training devices, anti-submarine warfare trainers, flight simulators (including human-rated centrifuges for pilot/astronaut training), radar trainers, instrument flight trainers, navigation trainers, missile launch trainers, target equipment, drone "aircraft", armament trainers, pilotless "aircraft" trainers, mobile training units and training equipment for ground military operations.

Note 1 ML14 includes image generating and interactive environment systems for simulators, when specially designed or modified for military use.

Note 2 ML14 does not apply to equipment specially designed for training in the use of hunting or sporting weapons.

ML15 **Imaging or countermeasure equipment, as follows, specially designed for military use, and specially designed components and accessories therefor:**

- a. Recorders and image processing equipment;
- b. Cameras, photographic equipment and film processing equipment;
- c. Image intensifier equipment;
- d. Infrared or thermal imaging equipment;
- e. Imaging radar sensor equipment;
- f. Countermeasure or counter-countermeasure equipment, for the equipment specified by ML15.a. to ML15.e.

Note ML15.f. includes equipment designed to degrade the operation or effectiveness of military imaging systems or to minimize such degrading effects.

Note 1 In ML15, the term specially designed components includes the following when specially designed for military use:

- a. Infrared image converter tubes;

- b. Image intensifier tubes (other than first generation);
- c. Microchannel plates;
- d. Low-light-level television camera tubes;
- e. Detector arrays (including electronic interconnection or read out systems);
- f. Pyroelectric television camera tubes;
- g. Cooling systems for imaging systems;
- h. Electrically triggered shutters of the photochromic or electro-optical type having a shutter speed of less than 100 μ s, except in the case of shutters which are an essential part of a high-speed camera;
- i. Fibre optic image inverters;
- j. Compound semiconductor photocathodes

Note 2 ML15 does not apply to "first generation image intensifier tubes" or equipment specially designed to incorporate "first generation image intensifier tube".

N.B. For the classification of weapons sights incorporating "first generation image intensifier tubes" see ML1., ML2. and ML5.a.

N.B. See also 6A002.a.2. and 6A002.b. on the EU Dual-Use List.

ML16 **Forgings, castings and other unfinished products, specially designed for items specified by ML1 to ML4, ML6, ML9, ML10, ML12 or ML19.**

Note ML16. applies to unfinished products when they are identifiable by material composition, geometry or function.

ML17 **Miscellaneous equipment, materials and 'libraries', as follows, and specially designed components therefor:**

- a. Self-contained diving and underwater swimming apparatus, as follows:
 1. Closed or semi-closed circuit (rebreathing) apparatus specially designed for military use (i.e. specially designed to be non magnetic);
 2. Specially designed components for use in the conversion of open-circuit apparatus to military use;
 3. Articles designed exclusively for military use with self-contained diving and underwater swimming apparatus;
- b. Construction equipment specially designed for military use;
- c. Fittings, coatings and treatments, for signature suppression, specially designed for military use;
- d. Field engineer equipment specially designed for use in a combat zone;

- e. "Robots", "robot" controllers and "robot" "end-effectors", having any of the following characteristics:
1. Specially designed for military use;
 2. Incorporating means of protecting hydraulic lines against externally induced punctures caused by ballistic fragments (e.g. incorporating self-sealing lines) and designed to use hydraulic fluids with flash points higher than 839 K (566 °C); or
 3. Specially designed or rated for operating in an electro magnetic pulse (EMP) environment;

Technical Note

Electro-magnetic pulse does not refer to unintentional interference caused by electromagnetic radiation from nearby equipment (e.g. machinery, appliances or electronics) or lightning.

- f. 'Libraries' (parametric technical databases) specially designed for military use with equipment specified by the EU Common Military List;
- g. Nuclear power generating equipment or propulsion equipment, including "nuclear reactors", specially designed for military use and components therefor specially designed or 'modified' for military use;
- h. Equipment and material, coated or treated for signature suppression, specially designed for military use, other than those specified elsewhere in the EU Common Military List;
- i. Simulators specially designed for military "nuclear reactors";
- j. Mobile repair shops specially designed or 'modified' to service military equipment;
- k. Field generators specially designed or 'modified' for military use;
- l. Containers specially designed or 'modified' for military use;
- m. Ferries, other than those specified elsewhere in the EU Common Military List, bridges and pontoons, specially designed for military use;
- n. Test models specially designed for the "development" of items specified by ML4, ML6, ML9 or ML10;
- o. Laser protection equipment (e.g. eye and sensor protection) specially designed for military use.
- p. "Fuel cells" other than those specified elsewhere in the EU Common Military List, specially designed or 'modified' for military use.

Technical Notes

1. For the purpose of ML17, the term 'library' (parametric technical database) means a collection of technical information of a military nature, reference to which may enhance the performance of military equipment or systems.
2. For the purpose of ML17, 'modified' means any structural, electrical, mechanical, or other change that provides a non-military item with military capabilities equivalent to an item which is specially designed for military use.

ML18 Production equipment and components, as follows:

- a. Specially designed or modified 'production' equipment for the 'production' of products specified by the EU Common Military List, and specially designed components therefor;
- b. Specially designed environmental test facilities and specially designed equipment therefor, for the certification, qualification or testing of products specified by the EU Common Military List.

Technical Note

For the purposes of ML18, the term 'production' includes design, examination, manufacture, testing and checking.

Note ML18.a. and ML18.b. include the following equipment:

- a. Continuous nitrators;
- b. Centrifugal testing apparatus or equipment having any of the following:
 1. Driven by a motor or motors having a total rated horsepower of more than 298 kW (400 hp);
 2. Capable of carrying a payload of 113 kg or more; or
 3. Capable of exerting a centrifugal acceleration of 8 g or more on a payload of 91 kg or more;
- c. Dehydration presses;
- d. Screw extruders specially designed or modified for military explosive extrusion;
- e. Cutting machines for the sizing of extruded propellants;
- f. Sweetie barrels (tumblers) 1,85 m or more in diameter and having over 227 kg product capacity;
- g. Continuous mixers for solid propellants;
- h. Fluid energy mills for grinding or milling the ingredients of military explosives;
- i. Equipment to achieve both sphericity and uniform particle size in metal powder listed in ML8.c.8.;
- j. Convection current converters for the conversion of materials listed in ML8.c.3.

ML19 Directed Energy Weapon (DEW) systems, related or countermeasure equipment and test models, as follows, and specially designed components therefor:

- a. "Laser" systems specially designed for destruction or effecting mission-abort of a target;

- b. Particle beam systems capable of destruction or effecting mission-abort of a target;
- c. High power Radio-Frequency (RF) systems capable of destruction or effecting mission-abort of a target;
- d. Equipment specially designed for the detection or identification of, or defence against, systems specified by ML19.a. to ML19.c.;
- e. Physical test models for the systems, equipment and components, specified by ML19.
- f. "Laser" systems specially designed to cause permanent blindness to unenhanced vision, i.e. to the naked eye or to the eye with corrective eyesight devices.

Note 1 DEW systems specified by ML19 include systems whose capability is derived from the controlled application of:

- a. "Lasers" of sufficient power to effect destruction similar to the manner of conventional ammunition;
- b. Particle accelerators which project a charged or neutral particle beam with destructive power;
- c. High pulsed power or high average power radio frequency beam transmitters, which produce fields sufficiently intense to disable electronic circuitry at a distant target.

Note 2 ML19 includes the following when specially designed for DEW systems:

- a. Prime power generation, energy storage, switching, power conditioning or fuel-handling equipment;
- b. Target acquisition or tracking systems;
- c. Systems capable of assessing target damage, destruction or mission-abort;
- d. Beam-handling, propagation or pointing equipment;
- e. Equipment with rapid beam slew capability for rapid multiple target operations;
- f. Adaptive optics and phase conjugators;
- g. Current injectors for negative hydrogen ion beams;
- h. "Space-qualified" accelerator components;
- i. Negative ion beam funnelling equipment;
- j. Equipment for controlling and slewing a high energy ion beam;
- k. "Space qualified" foils for neutralising negative hydrogen isotope beams.

ML20 **Cryogenic and "superconductive" equipment, as follows, and specially designed components and accessories therefor:**

- a. Equipment specially designed or configured to be installed in a vehicle for military ground, marine, airborne or space applications, capable of operating while in motion and of producing or maintaining temperatures below 103 K (-170 °C);

Note ML20.a. includes mobile systems incorporating or employing accessories or components manufactured from non-metallic or non-electrical conductive materials, such as plastics or epoxy-impregnated materials.

- b. "Superconductive" electrical equipment (rotating machinery and transformers) specially designed or configured to be installed in a vehicle for military ground, marine, airborne or space applications, and capable of operating while in motion.

Note ML20.b. does not apply to direct current hybrid homopolar generators that have single-pole normal metal armatures which rotate in a magnetic field produced by superconducting windings, provided those windings are the only superconducting components in the generator.

ML21 **"Software", as follows:**

- a. "Software" specially designed or modified for the "development", "production" or "use" of equipment, materials or "software", specified by the EU Common Military List;

- b. Specific "software", other than that specified by ML21.a., as follows:

1. "Software" specially designed for military use and specially designed for modelling, simulating or evaluating military weapon systems;
2. "Software" specially designed for military use and specially designed for modelling or simulating military operational scenarios;
3. "Software" for determining the effects of conventional, nuclear, chemical or biological weapons;
4. "Software" specially designed for military use and specially designed for Command, Communications, Control and Intelligence (C³I) or Command, Communications, Control, Computer and Intelligence (C⁴I) applications;

- c. "Software", not specified by ML21.a., or b., specially designed or modified to enable equipment not specified by the EU Common Military List to perform the military functions of equipment specified by the EU Common Military List.

ML22 **"Technology" as follows:**

- a. "Technology", other than specified in ML22.b., which is "required" for the "development", "production" or "use" of items specified in the EU Common Military List;

- b. "Technology" as follows:

1. "Technology" "required" for the design of, the assembly of components into, and the operation, maintenance and repair of, complete production installations for items specified in the Common Military List of The European Union, even if the components of such production installations are not specified;

2. "Technology" "required" for the "development" and "production" of small arms even if used to produce reproductions of antique small arms;
3. "Technology" "required" for the "development", "production" or "use" of toxicological agents, related equipment or components specified by ML7.a. to ML7.g.;
4. "Technology" "required" for the "development", "production" or "use" of "biopolymers" or cultures of specific cells, specified by ML7.h.;
5. "Technology" "required" exclusively for the incorporation of "biocatalysts", specified by ML7.i.1., into military carrier substances or military material.

Note 1 "Technology" "required" for the "development", "production" or "use" of items specified by the EU Common Military List remains under control even when applicable to any item not specified by the EU Common Military List.

Note 2 ML22 does not apply to:

- a. "Technology" that is the minimum necessary for the installation, operation, maintenance (checking) and repair, of those items which are not controlled or whose export has been authorised;
- b. "Technology" that is "in the public domain", "basic scientific research" or the minimum necessary information for patent applications;
- c. "Technology" for magnetic induction for continuous propulsion of civil transport devices.

DEFINITIONS OF TERMS USED IN THIS LIST

The following are definitions of the terms used in this List, in alphabetical order.

Note 1 Definitions apply throughout the List. The references are purely advisory and have no effect on the universal application of defined terms throughout the List.

Note 2 Words and terms contained in this List of Definitions only take the defined meaning where this is indicated by their being enclosed in "double quotations marks". Definitions of terms between 'single quotation marks' are given in a Technical note to the relevant item. Elsewhere, words and terms take their commonly accepted (dictionary) meanings.

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| ML7 | <p>"Adapted for use in war"</p> <p>Any modification or selection (such as altering purity, shelf life, virulence, dissemination characteristics, or resistance to UV radiation) designed to increase the effectiveness in producing casualties in humans or animals, degrading equipment or damaging crops or the environment.</p> |
| ML8 | <p>"Additives"</p> <p>Substances used in explosive formulations to improve their properties.</p> |
| ML8, ML9 and ML10 | <p>"Aircraft"</p> <p>A fixed wing, swivel wing, rotary wing (helicopter), tilt rotor or tilt-wing airborne vehicle.</p> |

ML11

"Automated Command and Control Systems"

Electronic systems, through which information essential to the effective operation of the grouping, major formation, tactical formation, unit, ship, subunit or weapons under command is entered, processed and transmitted. This is achieved by the use of computer and other specialised hardware designed to support the functions of a military command and control organisation. The main functions of an automated command and control system are: the efficient automated collection, accumulation, storage and processing of information; the display of the situation and the circumstances affecting the preparation and conduct of combat operations; operational and tactical calculations for the allocation of resources among force groupings or elements of the operational order of battle or battle deployment according to the mission or stage of the operation; the preparation of data for appreciation of the situation and decision-making at any point during operation or battle; computer simulation of operations.

ML22

"Basic scientific research"

Experimental or theoretical work undertaken principally to acquire new knowledge of the fundamental principles of phenomena or observable facts, not primarily directed towards a specific practical aim or objective.

ML7 and 22

"Biocatalysts"

Enzymes for specific chemical or biochemical reactions or other biological compounds which bind to and accelerate the degradation of CW agents.

Technical Note

"Enzymes" means "biocatalysts" for specific chemical or biochemical reactions.

ML7 and 22

"Biopolymers"

Biological macromolecules as follows:

- a. Enzymes for specific chemical or biochemical reactions;
- b. Antibodies, monoclonal, polyclonal or anti-idiotypic;
- c. Specially designed or specially processed receptors;

Technical Notes

1. "Anti-idiotypic antibodies" means antibodies which bind to the specific antigen binding sites of other antibodies;
2. "Monoclonal antibodies" means proteins which bind to one antigenic site and are produced by a single clone of cells;
3. "Polyclonal antibodies" means a mixture of proteins which bind to the specific antigen and are produced by more than one clone of cells;
4. "Receptors" means biological macromolecular structures capable of binding ligands, the binding of which affects physiological functions.

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| ML10 | "Civil aircraft" |
| | Those "aircraft" listed by designation in published airworthiness certification lists by the civil aviation authorities to fly commercial civil internal and external routes or for legitimate civil, private or business use. |
| ML21 and 22 | "Development" |
| | Is related to all stages prior to serial production, such as: design, design research, design analyses, design concepts, assembly and testing of prototypes, pilot production schemes, design data, process of transforming design data into a product, configuration design, integration design, layouts. |
| ML17 | "End-effectors" |
| | Grippers, active tooling units and any other tooling that is attached to the baseplate on the end of a "robot" manipulator arm. |
| | <u>Technical Note</u> |
| | <i>"Active tooling units" are devices for applying motive power, process energy or sensing to a work piece.</i> |
| ML4 and 8 | "Energetic materials" |
| | Substances or mixtures that react chemically to release energy required for their intended application. "Explosives", "pyrotechnics" and "propellants" are subclasses of energetic materials. |
| ML8 and 18 | "Explosives" |
| | Solid, liquid or gaseous substances or mixtures of substances which, in their application as primary, booster, or main charges in warheads, demolition and other applications, are required to detonate. |
| ML7 | "Expression Vectors" |
| | Carriers (e.g. plasmid or virus) used to introduce genetic material into host cells. |
| ML 17 | "Fuel cell" |
| | An electrochemical device that converts chemical energy directly into Direct Current (DC) electricity by consuming fuel from an external source. |
| ML13 | "Fibrous or filamentary materials" |
| | Include: |
| | a. Continuous monofilaments; |
| | b. Continuous yarns and rovings; |
| | c. Tapes, fabrics, random mats and braids; |
| | d. Chopped fibres, staple fibres and coherent fibre blankets; |

- e. Whiskers, either monocrystalline or polycrystalline, of any length;
- f. Aromatic polyamide pulp.

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| ML15 | "First generation image intensifier tubes" |
| | Electrostatically focused tubes, employing input and output fibre optic or glass face plates, multi-alkali photocathodes (S-20 or S-25), but not microchannel plate amplifiers. |
| ML22 | "In the public domain" |
| | This means "technology" or "software" which has been made available without restrictions upon its further dissemination. |
| | <i>Note: Copyright restrictions do not remove "technology" or "software" from being "in the public domain".</i> |
| ML5 and 19 | "Laser" |
| | An assembly of components which produce both spatially and temporally coherent light that is amplified by stimulated emission of radiation. |
| ML10 | "Lighter-than-air vehicles" |
| | Balloons and airships that rely on hot air or on lighter-than-air gases such as helium or hydrogen for their lift. |
| ML17 | "Nuclear reactor" |
| | Includes the items within or attached directly to the reactor vessel, the equipment which controls the level of power in the core, and the components which normally contain or come into direct contact with or control the primary coolant of the reactor core. |
| ML8 | "Precursors" |
| | Speciality chemicals used in the manufacture of explosives. |
| ML21 and 22 | "Production" |
| | Means all production stages, such as: product engineering, manufacture, integration, assembly (mounting), inspection, testing, quality assurance. |
| ML8 | "Propellants" |
| | Substances or mixtures that react chemically to produce large volumes of hot gases at controlled rates to perform mechanical work. |
| ML4 and 8 | "Pyrotechnic(s)" |
| | Mixtures of solid or liquid fuels and oxidizers which, when ignited, undergo an energetic chemical reaction at a controlled rate intended to produce specific time delays, or quantities of heat, noise, smoke, visible light or infrared radiation. Pyrophorics are a subclass of pyrotechnics, which contain no oxidizers but ignite spontaneously on contact with air. |

ML22

"Required"

As applied to "technology", refers to only that portion of "technology" which is peculiarly responsible for achieving or exceeding the controlled performance levels, characteristics or functions. Such "required" "technology" may be shared by different products.

ML7

"Riot control agents"

Substances which, under the expected conditions of use for riot control purposes, produce rapidly in humans sensory irritation or disabling physical effects which disappear within a short time following termination of exposure. (Tear gases are a subset of "riot control agents".)

ML17

"Robot"

A manipulation mechanism, which may be of the continuous path or of the point-to-point variety, may use sensors, and has all the following characteristics:

- a. Is multifunctional;
- b. Is capable of positioning or orienting material, parts, tools or special devices through variable movements in three-dimensional space;
- c. Incorporates three or more closed or open loop servo-devices which may include stepping motors; and
- d. Has "user-accessible programmability" by means of the teach/playback method or by means of an electronic computer which may be a programmable logic controller, i.e. without mechanical intervention.

Note The above definition does not include the following devices:

1. Manipulation mechanisms which are only manually/teleoperator controllable;
2. Fixed sequence manipulation mechanisms which are automated moving devices, operating according to mechanically fixed programmed motions. The programme is mechanically limited by fixed stops, such as pins or cams. The sequence of motions and the selection of paths or angles are not variable or changeable by mechanical, electronic or electrical means;
3. Mechanically controlled variable sequence manipulation mechanisms which are automated moving devices, operating according to mechanically fixed programmed motions. The programme is mechanically limited by fixed, but adjustable, stops, such as pins or cams. The sequence of motions and the selection of paths or angles are variable within the fixed programme pattern. Variations or modifications of the programme pattern (e.g. changes of pins or exchanges of cams) in one or more motion axes are accomplished only through mechanical operations;
4. Non-servo-controlled variable sequence manipulation mechanisms which are automated moving devices, operating according to mechanically fixed programmed motions. The programme is variable but the sequence proceeds only by the binary signal from mechanically fixed electrical binary devices or adjustable stops;
5. Stacker cranes defined as Cartesian coordinate manipulator systems manufactured as an integral part of a vertical array of storage bins and designed to access the contents of those bins for storage or retrieval.

- ML21 **"Software"**
- A collection of one or more "programmes" or "microprogrammes" fixed in any tangible medium of expression.
- ML19 **"Space-qualified"**
- Products designed, manufactured and tested to meet the special electrical, mechanical or environmental requirements for use in the launch and deployment of satellites or high altitude flight systems operating at altitudes of 100 km or higher.
- ML18 and 20 **"Superconductive"**
- Refers to materials, (i.e. metals, alloys or compounds) which can lose all electrical resistance (i.e. which can attain infinite electrical conductivity and carry very large electrical currents without Joule heating).
- Technical Note*
- The "superconductive" state of a material is individually characterised by a "critical temperature", a critical magnetic field, which is a function of temperature, and a critical current density which is, however, a function of both magnetic field and temperature.*
- ML22 **"Technology"**
- Specific information necessary for the "development", "production" or "use" of a product. The information takes the form of technical data or technical assistance.
- Technical Notes*
- 1. 'Technical data' may take forms such as blueprints, plans, diagrams, models, formulae, tables, engineering designs and specifications, manuals and instructions written or recorded on other media or devices such as disk, tape, read-only memories.*
 - 2. 'Technical assistance' may take forms such as instruction, skills, training, working knowledge, consulting services. 'Technical assistance' may involve transfer of 'technical data'.*
- ML21 and 22 **"Use"**
- Operation, installation (including on-site installation), maintenance (checking), repair, overhaul and refurbishing.