



# **Defence Trade Controls (Excluded DSGL goods and DSGL technology) Determination 2024**

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I, Richard Marles, Minister for Defence, make the following determination.

Dated 29 August 2024

Richard Marles  
Minister for Defence

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## 1 Name

This instrument is the *Defence Trade Controls (Excluded DSSL goods and DSSL technology) Determination 2024*.

## 2 Commencement

This instrument commences on 1 September 2024.

## 3 Authority

This instrument is made under subsection 5C(3) of the *Defence Trade Controls Act 2012*.

## 4 Definitions

Note: A number of expressions used in this instrument are defined in the Act, including the following:

- (a) Defence and Strategic Goods List;
- (b) DSSL goods;
- (c) DSSL technology.

In this instrument:

**Act** means the *Defence Trade Controls Act 2012*.

**Activities** means handling, controlling, activating, powering with one-time operational output, launching, laying, sweeping, discharging, decoying, jamming, detonating, disrupting, detecting or disposing.

**Classified** means information that is security classified.

**DSSL Reference Number** means the item number in Part 1—Munitions list or Part 2—Dual use list of the Defence and Strategic Goods List that covers the DSSL goods or DSSL technology.

**Hot section** means combustion chambers and liners; high pressure turbine blades, vanes, disks and related cooled structure; cooled intermediate pressure turbine blades, vanes, disks and related cooled structures; cooled low pressure turbine blades, vanes, disks and related cooled structures; cooled shaft-driving power turbine blades, vanes, disks and related cooled structures; cooled augmenters; and cooled nozzles.

## 5 Excluded DSSL goods or DSSL technology

DSSL goods or DSSL technology specified in an item of column 3 of the table in Schedule 1 that are covered by the DSSL Reference Number in column 2 are excluded for the purposes of subsections 5C(1A), 5C(1B), 5C(1C), 5C(2A) and 5C(2B) of the Act.

## Schedule 1—Excluded DSSL goods or DSSL technology

Column 1	Column 2	Column 3
Item	DSSL Reference Number	DSSL goods or DSSL technology
1	ML1, ML2, ML3, ML901, ML902, ML904	<ol style="list-style-type: none"> <li>1. All firearms listed in ML1, ML2 or ML901, and parts and components therefor.</li> <li>2. Detachable magazines for firearms listed in ML1, ML2 or ML901.</li> </ol>
2	ML4.a	<ol style="list-style-type: none"> <li>1. Anti-personnel landmines.</li> <li>2. Anti-vehicle mines, anti-armour mines, anti-helicopter mines, naval mines.</li> <li>3. Complete Man Portable Air Defence Systems (MANPADS) (with or without missiles, including related launching equipment and rockets).</li> <li>4. Missiles for MANPADS (including missiles which can be used without modification in other applications).</li> <li>5. Cluster munitions, explosive bomblets, explosive sub-munitions.</li> <li>6. Rockets, missiles capable of delivering a payload of at least 500 kg and having a range of at least 300 km, and the following specially designed components: <ol style="list-style-type: none"> <li>7. Thrust vector control systems.</li> <li>8. Weapon or warhead safing, arming, fuzing and firing components.</li> <li>9. Heat shields and components of these items.</li> </ol> </li> <li>10. Rockets, missiles having a range of at least 300 km, and the following specially designed components: <ol style="list-style-type: none"> <li>11. Individual rocket stages.</li> <li>12. Rocket engines.</li> <li>13. Re-entry vehicles, heat sinks therefor, and specially designed components of heat sinks.</li> </ol> </li> </ol>
3	ML4.b.1	<ol style="list-style-type: none"> <li>1. Equipment for “activities” relating to items not permitted under ML4.a in this table.</li> <li>2. “Classified” Chaff and Flare rounds for decoying / countermeasure equipment, specially designed for “classified” Electronic warfare equipment specially designed to introduce extraneous or erroneous signals, and specially designed components therefor.</li> </ol>
4	ML5.b	<ol style="list-style-type: none"> <li>1. Target acquisition, designation, range-finding, surveillance or tracking systems specially designed for items in ML4.a in this table or ML10.c in this table, whose export is not permitted.</li> <li>2. Underwater hardware, equipment, or systems, as follows and specially designed components therefor: <ol style="list-style-type: none"> <li>a. Active or passive acoustic array sensing systems or acoustic array equipment capable of real-time processing that survey or detect, and also track, localise (i.e., determine range and bearing), classify, or identify, surface vessels, submarines, other undersea vehicles,</li> </ol> </li> </ol>

		torpedoes, or mines, having any of the following: <ul style="list-style-type: none"> <li>i. Multi-static capability;</li> <li>ii. Operating frequency less than 20 kHz; or</li> <li>iii. Operating bandwidth greater than 10 kHz;</li> </ul> <ul style="list-style-type: none"> <li>b. Underwater single acoustic sensor system that distinguishes non-biologic tonals and locates the origin of the sound.</li> </ul>
5	ML6	Ground vehicles, specially designed to be used for launching rockets, missiles or UAVs capable of a range of at least 300 km and capable of delivering at least a 500 kg payload.
6	ML7.a	"Biological agents" or radioactive materials selected or modified to increase their effectiveness in producing casualties in humans or animals, degrading equipment or damaging crops or the environment.
7	ML7.b.1	Chemical warfare nerve agents as follows <ol style="list-style-type: none"> <li>1. 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) (CWC Schedule 1A); and Soman (GD): O-Pinacolyl methylphosphonofluoridate (CAS 96-64-0).</li> <li>2. 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).</li> <li>3. 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).</li> </ol>
8	ML7.b.2	Chemical warfare vesicant agents as follows: <p>Sulphur mustards, such as:</p> <ol style="list-style-type: none"> <li>1. 2-Chloroethylchloromethylsulphide (CAS 2625-76-5).</li> <li>2. Bis(2-chloroethyl)sulphide (HD) (CAS 505-60-2).</li> <li>3. Bis(2-chloroethylthio)methane (CAS 63839-13-6).</li> <li>4. 1,2-bis (2-chloroethylthio)ethane (CAS 3563-36-8).</li> <li>5. 1,3-bis (2-chloroethylthio)-n-propane (CAS 63905-10-2).</li> <li>6. 1,4-bis (2-chloroethylthio)-n-butane (CAS 142868-93-7).</li> <li>7. 1,5-bis (2-chloroethylthio)-n-pentane (CAS 142868-94-8).</li> <li>8. Bis (2-chloroethylthiomethyl)ether (CAS 63918-90-1).</li> <li>9. Bis (2-chloroethylthioethyl)ether (CAS 63918-89-8).</li> </ol> <p>Lewisites, such as:</p> <ol style="list-style-type: none"> <li>1. 2-chlorovinylchloroarsine (CAS 541-25-3).</li> <li>2. Tris (2-chlorovinyl) arsine (CAS 40334-70-1).</li> <li>3. Bis (2-chlorovinyl) chloroarsine (CAS 40334-69-8).</li> </ol> <p>Nitrogen mustards, or their protonated salts, as follows:</p>

		<ol style="list-style-type: none"> <li>1. HN1: Bis (2-chloroethyl) ethylamine (CAS 538-07-8).</li> <li>2. HN2: Bis (2-chloroethyl) methylamine (CAS 51-75-2).</li> <li>3. HN3: Tris (2-chloroethyl) amine (CAS 555-77-1).</li> <li>4. Other nitrogen mustards, or their salts, having a propyl, isopropyl, butyl, isobutyl, or tertiary butyl group on the bis(2-chloroethyl) amine base.</li> </ol>
9	ML7.b.3	<p>Chemical warfare incapacitating agents, such as:</p> <ol style="list-style-type: none"> <li>1. 3-Quinuclidinyl benzilate (BZ) (CAS 6581-06-2).</li> <li>2. Diphenylchloroarsine (DA) (CAS 712-48-1).</li> <li>3. Diphenylcyanoarsine (DC) (CAS 23525-22-6).</li> </ol>
10	ML7.e	Equipment, specially designed or modified for military use, designed or modified for the dissemination of any of the ML7 entries above, and specially designed components therefor.
11	ML8	"Energetic materials" and related substances that are "classified" and described in Category II; Item 4.C of the MTCR Annex as per below.

#### 4.C. MATERIALS

##### 4.C.1. Composite and composite modified double base propellants.

##### 4.C.2. Fuel substances as follows:

- a. Hydrazine (CAS 302-01-2) with a concentration of more than 70%;
- b. Hydrazine derivatives as follows:
  1. Monomethylhydrazine (MMH) (CAS 60-34-4);
  2. Unsymmetrical dimethylhydrazine (UDMH) (CAS 57-14-7);
  3. Hydrazine mononitrate (CAS 13464-97-6);
  4. Trimethylhydrazine (CAS 1741-01-1);
  5. Tetramethylhydrazine (CAS 6415-12-9);
  6. N,N diallylhydrazine (CAS 5164-11-4);
  7. Allylhydrazine (CAS 7422-78-8);
  8. Ethylene dihydrazine (CAS 6068-98-0);
  9. Monomethylhydrazine dinitrate;
  10. Unsymmetrical dimethylhydrazine nitrate;
  11. Hydrazinium azide (CAS 14546-44-2);
  12. 1,1-Dimethylhydrazinium azide (CAS 227955-52-4) / 1,2-Dimethylhydrazinium azide (CAS 299177-50-7);
  13. Hydrazinium dinitrate (CAS 13464-98-7);
  14. Diimido oxalic acid dihydrazine (CAS 3457-37-2);
  15. 2-hydroxyethylhydrazine nitrate (HEHN);
  16. Hydrazinium perchlorate (CAS 27978-54-7);
  17. Hydrazinium diperchlorate (CAS 13812-39-0);
  18. Methylhydrazine nitrate (MHN) (CAS 29674-96-2);
  19. 1,1-Diethylhydrazine nitrate (DEHN) / 1,2-Diethylhydrazine nitrate (DEHN) (CAS 363453-17-2);
  20. 3,6-dihydrazino tetrazine nitrate (DHTN);
- c. Spherical or spheroidal aluminium powder (CAS 7429-90-5) in particle size of less than  $200 \times 10^{-6}$  m (200 µm) and an aluminium content of 97% by weight or more, if at least 10% of the total

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weight is made up of particles of less than 63 µm, according to ISO 2591-1:1988 or national equivalents;

- d. Metal powders of any of the following: zirconium (CAS 7440-67-7), beryllium (CAS 7440-41-7), magnesium (CAS 7439-95-4) or alloys of these, if at least 90% of the total particles by particle volume or weight are made up of particles of less than 60 µm (determined by measurement techniques such as using a sieve, laser diffraction or optical scanning), whether spherical, atomised, spheroidal, flaked or ground, consisting of 97% by weight or more of any of the above mentioned metals;
- e. Metal powders of either boron (CAS 7440-42-8) or boron alloys with a boron content of 85% or more by weight, if at least 90% of the total particles by particle volume or weight are made up of particles of less than 60 µm (determined by measurement techniques such as using a sieve, laser diffraction or optical scanning), whether spherical, atomised, spheroidal, flaked or ground;
- f. High energy density materials, usable in the systems specified in 1.A. or 19.A., as follows:
  - 1. Mixed fuels that incorporate both solid and liquid fuels, such as boron slurry, having a mass- based energy density of 40 x 10<sup>6</sup> J/kg or greater;
  - 2. Other high energy density fuels and fuel additives (e.g., cubane, ionic solutions, JP-10) having a volume-based energy density of 37.5 x 10<sup>9</sup> J/m<sup>3</sup> or greater, measured at 20°C and one atmosphere (101.325 kPa) pressure.
- g. Hydrazine replacement fuels as follows:
  - 1. 2-Dimethylaminoethylazide (DMAZ) (CAS 86147-04-8).

#### 4.C.3. Oxidisers/Fuels as follows:

- a. Perchlorates, chlorates or chromates mixed with powdered metals or other high energy fuel components;
- b. Hydroxylammonium nitrate (HAN) (CAS 13465-08-2).

#### 4.C.4. Oxidiser substances as follows:

- a. Oxidiser substances usable in liquid propellant rocket engines as follows:
  - 1. Dinitrogen trioxide (CAS 10544-73-7);
  - 2. Nitrogen dioxide (CAS 10102-44-0) / dinitrogen tetroxide (CAS 10544-72-6);
  - 3. Dinitrogen pentoxide (CAS 10102-03-1);
  - 4. Mixed Oxides of Nitrogen (MON);
  - 5. Inhibited Red Fuming Nitric Acid (IRFNA) (CAS 8007-58-7);
  - 6. Compounds composed of fluorine and one or more of other halogens, oxygen or nitrogen;

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- b. Oxidiser substances usable in solid propellant rocket motors as follows:
    - 1. Ammonium perchlorate (AP) (CAS 7790-98-9);
    - 2. Ammonium dinitramide (ADN) (CAS 140456-78-6);
    - 3. Nitro-amines (cyclotetramethylene - tetranitramine (HMX) (CAS 2691-41-0); cyclotrimethylene - trinitramine (RDX) (CAS 121-82-4);
    - 4. Hydrazinium nitroformate (HNF) (CAS 20773-28-8);
    - 5. 2,4,6,8,10,12-Hexanitrohexaazaisowurtzitane (CL-20) (CAS 135285-90-4).

4.C.5. Polymeric substances, as follows:

- a. Carboxy - terminated polybutadiene (including carboxyl - terminated polybutadiene) (CTPB);
- b. Hydroxy - terminated polybutadiene (including hydroxyl - terminated polybutadiene) (HTPB) (CAS 69102-90-5);
- c. Glycidyl azide polymer (GAP), including hydroxyl - terminated GAP;
- d. Polybutadiene - Acrylic Acid (PBAA);
- e. Polybutadiene - Acrylic Acid - Acrylonitrile (PBAN) (CAS 25265-19-4 / CAS 68891-50-9);
- f. Polytetrahydrofuran polyethylene glycol (TPEG).
- g. Polyglycidyl nitrate (PGN or poly-GLYN) (CAS 27814-48-8).

4.C.6. Other propellant additives and agents as follows:

- a. Bonding agents as follows:
  - 1. Tris (1-(2-methyl)aziridiny) phosphine oxide (MAPO) (CAS 57-39-6);
  - 2. 1,1',1''-trimesoyl-tris(2-ethylaziridine) (HX-868, BITA) (CAS 7722-73-8);
  - 3. Tepanol (HX-878), reaction product of tetraethylenepentamine, acrylonitrile and glycidol (CAS 68412-46-4);
  - 4. Tepan (HX-879), reaction product of tetraethylenepentamine and acrylonitrile (CAS 68412-45-3);
  - 5. Polyfunctional aziridine amides with isophthalic, trimesic, isocyanuric, or trimethyladipic backbone also having a 2-methyl or 2-ethyl aziridine group;

- b. Curing reaction catalysts as follows:  
Triphenyl bismuth (TPB) (CAS 603-33-8);

- c. Burning rate modifiers, as follows:
    - 1. Carboranes, decaboranes, pentaboranes, and derivatives thereof;
    - 2. Ferrocene derivatives, as follows:
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		<ul style="list-style-type: none"> <li>a. Catocene (CAS 37206-42-1);</li> <li>b. Ethyl ferrocene (CAS 1273-89-8);</li> <li>c. n-Propyl ferrocene (CAS 1273-92-3) / iso-propyl ferrocene (CAS 12126-81-7);</li> <li>d. n-Butyl ferrocene (CAS 31904-29-7);</li> <li>e. Pentyl ferrocene (CAS 1274-00-6);</li> <li>f. Dicyclopentyl ferrocene (CAS 125861-17-8);</li> <li>g. Dicyclohexyl ferrocene;</li> <li>h. Diethyl ferrocene (CAS 1273-97-8);</li> <li>i. Dipropyl ferrocene;</li> <li>j. Dibutyl ferrocene (CAS 1274-08-4);</li> <li>k. Dihexyl ferrocene (CAS 93894-59-8);</li> <li>l. Acetyl ferrocene (CAS 1271-55-2) / 1,1'-diacetyl ferrocene (CAS 1273-94-5);</li> <li>m. Ferrocene carboxylic acid (CAS 1271-42-7) / 1,1'-Ferrocenedicarboxylic acid (CAS 1293-87-4);</li> <li>n. Butacene (CAS 125856-62-4);</li> <li>o. Other ferrocene derivatives usable as rocket propellant burning rate modifiers;</li> </ul>
		<ul style="list-style-type: none"> <li>d. Esters and plasticisers as follows: <ul style="list-style-type: none"> <li>1. Triethylene glycol dinitrate (TEGDN) (CAS 111-22-8);</li> <li>2. Trimethylolethane trinitrate (TMETN) (CAS 3032-55-1);</li> <li>3. 1,2,4-butanetriol trinitrate (BTTN) (CAS 6659-60-5);</li> <li>4. Diethylene glycol dinitrate (DEGDN) (CAS 693-21-0);</li> <li>5. 4,5 diazidomethyl-2-methyl-1,2,3-triazole (iso- DAMTR);</li> <li>6. Nitrateoethylnitramine (NENA) based plasticisers, as follows: <ul style="list-style-type: none"> <li>a. Methyl-NENA (CAS 17096-47-8);</li> <li>b. Ethyl-NENA (CAS 85068-73-1);</li> <li>c. Butyl-NENA (CAS 82486-82-6);</li> </ul> </li> <li>7. Dinitropropyl based plasticisers, as follows: <ul style="list-style-type: none"> <li>a. Bis (2,2-dinitropropyl) acetal (BDNPA) (CAS 5108-69-0);</li> <li>b. Bis (2,2-dinitropropyl) formal (BDNPF) (CAS 5917-61-3);</li> </ul> </li> </ul> </li> </ul>
		<ul style="list-style-type: none"> <li>e. Stabilisers as follows: <ul style="list-style-type: none"> <li>1. 2-Nitrodiphenylamine (CAS 119-75-5);</li> <li>2. N-methyl-p-nitroaniline (CAS 100-15-2).</li> </ul> </li> </ul>
		4.C.7. 'Gel propellants' specifically formulated for use in the systems specified in 1.A., 19.A.1. or 19.A.2.
12	ML8.a.4	CL-20 (HNIW or Hexanitrohexaazaisowurtzitane) (CAS 135285-90-4).
13	ML8.a.13.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).
14	ML8.a.21.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).
15	ML8.b.5	Composite and composite modified double-base propellants.
16	ML8.c.3	Boranes.

17	ML8.c.5.a.1	Beryllium (CAS 7440-41-7) in particle sizes of less than 60 µm, excluding metal powders and alloys that have a beryllium content of less than 90%.
18	ML8.c.7	Perchlorates, chlorates and chromates, composited with powdered metal or other high energy fuel components.
19	ML8.c.10	Liquid high energy density fuels.
20	ML8.c.11.b	Mixtures of magnesium, polytetrafluoroethylene (PTFE) and a vinylidene difluoride-hexafluoropropylene copolymer (e.g., MTV).
21	ML8.d	Oxidisers as follows, and 'mixtures' thereof: <ol style="list-style-type: none"> <li>1. ADN (ammonium dinitramide or SR 12) (CAS 140456-78-6).</li> <li>2. AP (ammonium perchlorate) (CAS 7790-98-9).</li> <li>3. HNF (hydrazinium nitroformate) (CAS 20773-28-8).</li> <li>4. Hydrazine nitrate (CAS 37836-27-4).</li> <li>5. Hydrazine perchlorate (CAS 27978-54-7).</li> <li>6. Liquid oxidisers comprised of inhibited red fuming nitric acid (IRFNA) (CAS 8007-58-7).</li> </ol>
22	ML8.e	Binders, plasticisers, monomers and polymers, as follows: <ol style="list-style-type: none"> <li>1. BDNPA (bis (2,2-dinitropropyl)acetal) (CAS 5108-69-0).</li> <li>2. BDNPF (bis (2,2-dinitropropyl)formal) (CAS 5917-61-3).</li> <li>3. BTTN (butanetrioltrinitrate) (CAS 6659-60-5).</li> <li>4. GAP (glycidylazide polymer) (CAS 143178-24-9).</li> <li>5. 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).</li> <li>6. 4,5 diazidomethyl-2-methyl-1,2,3-triazole (iso- DAMTR).</li> <li>7. NENAs (nitrateoethylnitramine compounds) (CAS 17096-47-8)</li> <li>8. NENAs (nitrateoethylnitramine compounds) (CAS 85068-73-1)</li> </ol>
23	ML8.f.4	Ferrocene derivatives as follows: <ol style="list-style-type: none"> <li>1. Butacene (CAS 125856-62-4).</li> <li>2. Catocene (2,2-bis-ethylferrocenyl propane) (CAS 37206-42-1).</li> <li>3. Ferrocene carboxylic acids and ferrocene carboxylic acid esters</li> <li>4. n-butyl-ferrocene (CAS 31904-29-7).</li> <li>5. Ethyl ferrocene (CAS 1273-89-8).</li> <li>6. Propyl ferrocene.</li> <li>7. Pentyl ferrocene (CAS 1274-00-6).</li> <li>8. Dicyclopentyl ferrocene.</li> <li>9. Dicyclohexyl ferrocene.</li> <li>10. Diethyl ferrocene (CAS 1273-97-8).</li> <li>11. Dipropyl ferrocene.</li> <li>12. Dibutyl ferrocene (CAS 1274-08-4).</li> <li>13. Dihexyl ferrocene (CAS 93894-59-8).</li> <li>14. Acetyl ferrocene (CAS 1271-55-2)/1,1'-diacetyl ferrocene (CAS 1273-94-5).</li> </ol>
24	ML8.f.11	MAPO (tris-1-(2-methyl)aziridinyl phosphine oxide) (CAS 57-39-6).
25	ML8.f.13	N-methyl-p-nitroaniline (CAS 100-15-2).

26	ML8.f.17	<p>Bonding agents as follows:</p> <ol style="list-style-type: none"> <li>1,1R,1S-trimesoyl-tris(2-ethylaziridine) (HX-868, BITA) (CAS 7722-73-8).</li> <li>Polyfunctional aziridine amides with isophthalic, trimesic, isocyanuric or trimethyladipic backbone also having a 2-methyl or 2-ethyl aziridine group.</li> </ol>
27	ML8.f.20	TEPAN (tetraethylenepentaamineacrylonitrile) (CAS 68412-45-3).
28	ML8.f.21	TEPANOL (tetraethylenepentaamineacrylonitrileglycidol) (CAS 68412-46-4).
29	ML8.f.22	TPB (triphenyl bismuth) (CAS 603-33-8).
30	ML9, ML22	<p>Naval nuclear propulsion plants and prototypes, and special facilities for construction, support, and maintenance therefor.</p> <p>Any machinery, device, component, or equipment, including production, testing and inspection equipment, and tooling, specially designed for the plants or facilities listed above.</p> <p>Naval nuclear propulsion plants and prototypes for submersible and semi-submersible vessels, and special facilities for construction, support, and maintenance therefor.</p> <p>Parts, components, accessories, attachments, and associated equipment, including production, testing, and inspection equipment and tooling, specially designed for the above items.</p> <p>Technology for the “development” or “production” for all items listed in this exclusion.</p>
31	ML9	<ol style="list-style-type: none"> <li>Equipment and specially designed components therefor not already covered in ML4.b for ‘activities’ relating to items not permitted under ML4.a in this table.</li> <li>“Classified” Digital engine control systems specially designed for the MT7 gas turbine engine, not integrated into a complete engine.</li> <li>Electric motors and specially designed component therefor, specially designed for submarines, having the following: <ol style="list-style-type: none"> <li>Power output of more than 0.75 MW (1,000 hp);</li> <li>Quick reversing;</li> <li>Liquid cooled; and</li> <li>Totally enclosed.</li> </ol> </li> </ol>
32	ML10.a	<ol style="list-style-type: none"> <li>F-22 aircraft and specially designed components of the F-22 aircraft.</li> <li>Missile or rocket launchers, missile rails, weapon pylons, pylon-to-launcher adapters for missiles that have a range equal to or greater than 300 km and specially designed components therefor.</li> <li>Bomb racks, missile or rocket launchers, missile rails, weapon pylons, pylon-to-launcher adapters, specially designed for cluster munitions.</li> </ol>
33	ML10.c	<ol style="list-style-type: none"> <li>Uncrewed aerial vehicles (UAVs) having a range equal to or greater than 300 km.</li> </ol>

		<ol style="list-style-type: none"> <li>2. Radar altimeters with output power management LPI (low probability of intercept) or signal modulation LPI capabilities, for use in UAVs having a range equal to or greater than 300 km.</li> <li>3. Launchers, recovery equipment and ground support equipment for UAVs having a range equal to or greater than 300 km including those that allow take-off or landing on a vessel specified in ML9, and specially designed components therefor.</li> </ol>
34	ML10.d	<p>“Classified” items as follows not integrated into a complete engine:</p> <ol style="list-style-type: none"> <li>1. Digital engine control systems (e.g., Full Authority Digital Engine Controls (FADEC) and Digital Electronic Engine Controls (DEEC)) specially designed for the following gas turbine engines. <ol style="list-style-type: none"> <li>a. Turbofan and Turbojet engines capable of 15,000 lbf (66.7 kN) of thrust or greater, having any of the following: <ol style="list-style-type: none"> <li>i. With or specially designed for thrust augmentation (afterburner);</li> <li>ii. Thrust or exhaust nozzle vectoring;</li> <li>iii. Specially designed for sustained 30 second inverted flight or negative g maneuver; or</li> <li>iv. Specially designed for high power extraction (greater than 50 percent of engine thrust at altitude) at altitudes greater than 50,000 feet.</li> </ol> </li> <li>b. Turboshift and Turboprop engines having any of the following: <ol style="list-style-type: none"> <li>i. Capable of 2000 mechanical shp (1491 kW) or greater and specially designed with oil sump sealing when the engine is in the vertical position; or</li> <li>ii. Capable of a specific power of 225 shp/(lbm/sec) or greater and specially designed for armament gas ingestion and non-civil transient maneuvers, where specific power is defined as maximum takeoff shaft horsepower (shp) divided by compressor inlet flow (lbm/sec).</li> </ol> </li> <li>c. Gas turbine engines specially designed for uncrewed aerial vehicle, cruise missiles, or target drones.</li> <li>d. GE38, AGT1500, CTS800, T55, HPW3000, GE3000, T408, and T700 engines.</li> </ol> </li> <li>2. Specially designed components for the following U.S.-origin engines: F101, F107, F112, F118, F119, F120, F135, F136, F414, F415, and J402;</li> <li>3. “Hot section” components specially designed for gas turbine engines specified in this section.</li> </ol>
35	ML11.a	<ol style="list-style-type: none"> <li>1. Radar and laser radar systems, direction finding equipment for determining bearings to specific electromagnetic sources or terrain characteristics, specially designed for military use and specially designed for Rockets, missiles or UAVs, capable of delivering a payload of at least 500 kg and having a range of at least 300 km.</li> <li>2. Guidance and navigation equipment, as follows:</li> </ol>

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- a. Specially designed for MANPADS or cluster munitions.
    - b. meeting or exceeding specified performance at linear acceleration levels exceeding 25 g if for rockets, missiles, or UAVs, capable of a range of at least 300 km.
    - c. in development and funded by US Department of Defense and for rockets, missiles, or UAVs, capable of a range of at least 300 km.
  3. Electronic equipment for re-entry vehicles.
  4. GNSS receiving equipment, specially designed for military use, and designed or modified for airborne applications and capable of providing navigation information at speeds in excess of 600 m/s.
  5. Global Positioning System (GPS) receiving equipment specially designed or modified for airborne applications and specially designed for encryption or decryption (e.g., Y-Code, M-Code) of GPS precise positioning service (PPS) signals.
  6. GNSS receiving equipment designed or modified for airborne applications and specially designed for use with an antenna that:
    - a. Employ four or more elements, electronically steer angular beams, independently steer angular nulls, create angular nulls with a null depth greater than 20 dB, and achieve a beam switching speed faster than 50 milliseconds;
    - b. Form adaptive null attenuation greater than 35 dB with convergence time less than one second;
    - c. Detect signals across multiple RF bands with matched left hand and right hand spiral antenna elements for determination of signal polarisation; or
    - d. Determine signal angle of arrival less than two degrees (e.g., interferometer antenna).
  7. GNSS receiving equipment specially designed for use with rockets, missiles or uncrewed air vehicle systems capable of a range of at least 300 km and capable of delivering a payload of at least 500 kg.
  8. Mobile relative gravimeters specially designed or modified for military airborne or marine use, having a time to steady-state registration of two minutes or less and having automatic motion compensation with an in-service accuracy of less (better) than 0.4 mGal.
  9. Mobile gravity gradiometers designed or modified for military airborne or marine use having an accuracy of less (better) than 10 Eotvos squared per radian per second for any component of the gravity gradient tensor, and having a spatial gravity wavelength resolution of 50 m or less.
  10. Inertial measurement units incorporating the following:
    - a. Accelerometers having a bias repeatability of less (better) than 10  $\mu$ g and a scale factor repeatability of less (better) than 10 parts per million, or capable of measuring greater than 100,000 g.
    - b. Mechanical gyroscopes or rate sensors having a bias repeatability less (better) than 0.0015 degrees per hour, having a rated drift stability of less than 0.5 degrees (1 sigma or rms) per hour in a 1 g
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		environment or specified to function at acceleration levels greater than 100 g).
		11. Underwater hardware, equipment, or systems, as follows and specially designed components therefor: <ol style="list-style-type: none"> <li>Active or passive acoustic array sensing systems or acoustic array equipment capable of real-time processing that survey or detect, and also track, localise (i.e., determine range and bearing), classify, or identify, surface vessels, submarines, other undersea vehicles, torpedoes, or mines, having any of the following:               <ol style="list-style-type: none"> <li>Multi-static capability;</li> <li>Operating frequency less than 20 kHz; or</li> <li>Operating bandwidth greater than 10 kHz;</li> </ol> </li> <li>Underwater single acoustic sensor system that distinguishes non-biologic tonals and locates the origin of the sound.</li> </ol>
36	ML11	1. The following items, if “classified”: <ol style="list-style-type: none"> <li>Underwater acoustic countermeasures or counter-countermeasures systems and specially designed components therefor, other than underwater acoustic decoy countermeasures.</li> <li>Radar having electronic protection or electronic counter-countermeasures other than manual gain control, automatic gain control, radio frequency selection, constant false alarm rate, and pulse repetition interval jitter, and specially designed components therefor.</li> <li>Electronic Support (ES) systems and equipment that search for, intercept and identify, or locate sources of intentional or unintentional electromagnetic energy specially designed to provide immediate threat detection, recognition, targeting, planning, or conduct of future operations, and specially designed components therefor.</li> <li>Countermeasure and counter-countermeasure systems and equipment specially designed to introduce extraneous or erroneous signals into radar, infrared based seekers, electro-optic based seekers, radio communication receivers, navigation receivers, or that otherwise hinder the reception, operation, or effectiveness of adversary electronics, and specially designed components therefor.</li> <li>Command, control, and communications (C3); command, control, communications, and computers (C4); command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR); and identification systems or equipment, that implement active or passive ECCM (electronic counter-countermeasure) used to counter acts of communication disruption, and specially designed components therefor.</li> <li>Electronic systems, equipment or software, specially designed or modified for military use and specially designed for intelligence purposes that collect, survey, monitor, or exploit, or analyse and produce information from, the electromagnetic spectrum</li> </ol>

		(regardless of transmission medium), or for counteracting such activities.
		g. Information security or information assurance systems and equipment, cryptographic devices, specially designed or modified for military use and specially designed components therefor.
37	ML11.c	<p>Military Spacecraft parts, components, accessories, attachments, equipment, or systems, as follows:</p> <ol style="list-style-type: none"> <li>1. Thrusters, for military spacecraft, using bi-propellants or mono-propellant that provide greater than 667.23 N vacuum thrust with rocket motors, or engines having a total impulse capacity equal to or greater than <math>8.41 \times 10^5</math> newton seconds.</li> <li>2. Space-qualified star tracker or star sensor, specially designed for military use, with angular accuracy less than or equal to 1 arcsec (1-Sigma) per star coordinate, and a tracking rate equal to or greater than 3.0 deg/sec, and specially designed parts and components therefor.</li> <li>3. Heat shields or heat sinks specially designed for atmospheric entry or re-entry, and specially designed parts and components therefor usable in rockets, missiles, or UAVs capable of delivering a payload of at least 500 kg and having a range of at least 300 km.</li> </ol>
38	ML11.c	<p>The following items, if "classified":</p> <ol style="list-style-type: none"> <li>a. "Spacecraft" specially designed or modified for military use;</li> <li>b. "Spacecraft" components specially designed for military use.</li> </ol>
39	ML14	Training equipment for MANPADS.
40	ML16	<p>Unfinished products as follows for any items relating to items whose export is not allowed in this table:</p> <ol style="list-style-type: none"> <li>1. Carbon/carbon billets and preforms that are reinforced with continuous unidirectional fibres, tows, tapes, or woven cloths in three or more dimensional planes.</li> </ol>
41	ML17.c	Signature suppression fittings/coatings/treatments for rockets, missiles or UAVs capable of delivering a payload of at least 500 kg and achieving a range greater than or equal to 300 km, and their subsystems.
42	ML17	<ol style="list-style-type: none"> <li>1. ML17.g, and specially designed components of these items;</li> <li>2. ML17.n and specially designed components of these items, where they are for use in connection with cluster munitions, explosive sub-munitions and explosive bomblets.</li> </ol>
43	ML18	<p>Production equipment specially designed for:</p> <ol style="list-style-type: none"> <li>1. MANPAD systems;</li> <li>2. Anti-personnel landmines; or</li> <li>3. Cluster munitions, explosive sub-munitions and explosive bomblets.</li> </ol>
44	ML18	<p>Production, testing, and inspection equipment specially designed for the following:</p> <ol style="list-style-type: none"> <li>1. Naval nuclear propulsion plants specified in ML17.g;</li> <li>2. Electric motors and specially designed component therefor, specially designed for submarines, having the following: <ol style="list-style-type: none"> <li>a. Power output of more than 0.75 MW (1,000 hp);</li> <li>b. Quick reversing;</li> </ol> </li> </ol>

		<ul style="list-style-type: none"> <li>c. Liquid cooled; and</li> <li>d. Totally enclosed.</li> </ul>
45	ML18	<p>The following items, if “classified”:</p> <ol style="list-style-type: none"> <li>1. Investment casting cores, core dies, or wax pattern dies for the following gas turbine engine components. <ul style="list-style-type: none"> <li>a. Components of the following U.S.-origin engines: F101, F107, F112, F118, F119, F120, F135, F136, F414, F415, and J402.</li> <li>b. “Hot section” components.</li> </ul> </li> <li>2. Jigs, locating fixtures, templates, gauges, molds, dies, caul plates, or bellmouths for components of the following US-origin engines: F101, F107, F112, F118, F119, F120, F135, F136, F414, F415, and J402.</li> </ol>
46	ML19	<p>“Classified” directed energy weapons systems specially designed for counter-space operations and specially designed components therefor.</p> <p>“Classified” directed energy weapon detection / identification / defence equipment specially designed for counter-space operations and specially designed components therefor.</p>
47	ML21.a	Software specially designed for reduced observables or specially designed for analysis of signature reduction, usable for rockets, missiles, or UAVs, capable of achieving a range greater than or equal to 300 km, and their subsystems.
48	ML21.a	“Classified” software for, or performing or simulating the function of, information security or information assurance systems and equipment, cryptographic devices, specially designed or modified for military use.
49	ML21.a	Software directly related to unclassified items whose export is not permitted in this table.
		Classified software directly related to classified items whose export is not permitted in this table.
50	ML21.b	Software for modeling or simulating the environments generated by nuclear detonations or the effects of these environments on systems, subsystems, components, structures, or humans.
51	ML22	<p>Technology relating to items whose export is not allowed in this table, except where technology controls are limited as follows to “classified”:</p> <p>“Classified” technology for the following:</p> <ol style="list-style-type: none"> <li>1. Underwater acoustic countermeasures or counter-countermeasures systems and specially designed components therefor, other than underwater acoustic decoy countermeasures.</li> <li>2. Radar having electronic protection or electronic counter-countermeasures other than manual gain control, automatic gain control, radio frequency selection, constant false alarm rate, and pulse repetition interval jitter, and specially designed components therefor.</li> <li>3. ES systems and equipment that search for, intercept and identify, or locate sources of intentional or unintentional electromagnetic energy specially designed to provide immediate threat detection, recognition, targeting, planning, or conduct of future operations, and specially</li> </ol>



		<p>designed components therefor.</p> <ol style="list-style-type: none"> <li>4. Countermeasure and counter-countermeasure systems and equipment specially designed to introduce extraneous or erroneous signals into radar, infrared-based seekers, electro-optic based seekers, radio communication receivers, navigation receivers, or that otherwise hinder the reception, operation, or effectiveness of adversary electronics, and specially designed components therefor.</li> <li>5. Command, control, and communications (C3); command, control, communications, and computers (C4); command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR); and identification systems or equipment, that implement active or passive ECCM used to counter acts of communication disruption, and specially designed components therefor.</li> <li>6. Electronic systems, equipment or software, specially designed or modified for military use and specially designed for intelligence purposes that collect, survey, monitor, or exploit, or analyse and produce information from, the electromagnetic spectrum (regardless of transmission medium), or for counteracting such activities.</li> </ol> <p>Information security or information assurance systems and equipment, cryptographic devices, specially designed or modified for military use and specially designed components therefor.</p>
52	ML22	<p>“Design methodology” and “engineering analysis” technology for the following items, excluding “build-to-print” and “design-to-specification” technology:</p> <ol style="list-style-type: none"> <li>1. Crewed submersible and semi-submersible vessels that are: <ol style="list-style-type: none"> <li>a. Submarines specially designed for military use.</li> <li>b. Mine countermeasure vehicles.</li> <li>c. Anti-submarine warfare vehicles.</li> <li>d. Armed or are specially designed to be used as a platform to deliver munitions or otherwise destroy or incapacitate targets.</li> <li>e. Swimmer delivery vehicles, that are either crewed vessels or “classified” uncrewed vessels, specially designed for the deployment, recovery, or support of swimmers or divers from submarines.</li> <li>f. Integrated with nuclear propulsion systems.</li> </ol> </li> <li>2. Naval nuclear propulsion plants and prototypes for submersible vessels, and specially designed components therefor for: <ol style="list-style-type: none"> <li>a. Crewed Vessels.</li> <li>b. “Classified” payloads.</li> <li>c. “Classified” uncrewed underwater vehicle signature reduction techniques.</li> </ol> </li> <li>3. Electric motors and specially designed component therefor, specially designed for submarines, having the following: <ol style="list-style-type: none"> <li>a. Power output of more than 0.75 MW (1,000 hp);</li> </ol> </li> </ol>

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- b. Quick reversing;
  - c. Liquid cooled; and
  - d. Totally enclosed.

**“Build-to-print”** means that a foreign consignee can produce an item from engineering drawings without any technical assistance. This transaction is based strictly on a hands-off approach since the foreign consignee is understood to have the inherent capability to produce the item and only lacks the necessary drawings. Supporting documentation (e.g., acceptance criteria, object code software for numerically controlled machines) may be released on an as-required basis (i.e., must have) such that the foreign consignee would not be able to produce an acceptable item without this additional supporting documentation. Build-to-print does not include the release of any information which discloses design methodology, engineering analysis, detailed process information or manufacturing know-how. Documentation which is not absolutely necessary to permit manufacture of an acceptable item (i.e. nice to have) is not considered within the boundaries of a build-to-print data package.

**“Design methodology”** includes the underlying engineering methods and design philosophy utilised (i.e., information that explains the rationale for a particular design decision, engineering feature, or performance requirement); engineering experience (e.g., lessons learned); and the rationale and associated databases (e.g., design allowables, factors of safety, component life predictions, failure analysis criteria) that establish the operational requirements (e.g., performance, mechanical, electrical, electronic, reliability and maintainability) of an item. (Final analytical results and the initial conditions and parameters may be provided.)

**“Design-to-specification”** means that a foreign consignee can design and produce an item from requirement specifications without any technical assistance. This transaction is based strictly on a hands-off approach since the foreign consignee is understood to have the inherent capability to both design and produce the item and only lacks the necessary requirement information.

**“Engineering analysis”** includes the analytical methods and tools used to design or evaluate an item’s performance against the operational requirements. Analytical methods and tools include the development and/or use of mockups, computer models and simulations, and test facilities. (Final analytical results and the initial conditions and parameters may be provided.)

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53	ML22	<p>Technology for the “manufacturing know-how” of the following:</p> <ol style="list-style-type: none"> <li>1. High velocity kinetic energy weapon systems and specially designed components therefor specified by ML12.a.</li> <li>2. Ammunition as follows: <ol style="list-style-type: none"> <li>a. Projectiles that use pyrotechnic tracer materials that incorporate any material having peak radiance above 710 nm or are incendiary</li> </ol> </li> </ol>
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- or explosive;
  - b. Shotgun projectiles that are flechettes, incendiary, tracer, or explosive.
3. Bombs, torpedoes, grenades, rockets, Man-portable air defense systems, mines, missiles, depth charges and specially designed components therefor.
  4. Equipment specified in ML4.b.1 for 'activities' relating to items not permitted in 3 above.
  5. The following parts and specially designed components therefor specified by ML4.a, for rockets and missiles:
    - a. Individual rocket stages.
    - b. Rocket engines.
    - c. Thrust vector control systems.
    - d. Weapon or warhead safing, arming, fuzing and firing components.
    - e. Re-entry vehicles, and the following components of these items.
    - f. Heat shields and components of these items.
    - g. Heat sinks and components of these items.
  6. Body armour specified by ML13.d providing a protection level equal to or greater than NIJ Type IV.
  7. Items specified by ML17.h, specially designed to protect personnel against or reduce detection of personnel by radar, IR, or other sensors at wavelengths greater than 900 nanometres.
  8. Military gas turbine engines as follows:
    - a. Turbofan and Turbojet engines and specially designed components therefor, capable of 15,000 lbf (66.7 kN) of thrust or greater that have any of the following:
      - i. With or specially designed for thrust augmentation (afterburner);
      - ii. Thrust or exhaust nozzle vectoring;
      - iii. Specially designed for sustained 30 second inverted flight or negative g manoeuvre; or
      - iv. Specially designed for high power extraction (greater than 50 percent of engine thrust at altitude) at altitudes greater than 50,000 feet.
    - b. Turboshift and Turboprop engines and specially designed components therefor that have any of the following:
      - i. Capable of 2000 mechanical shp (1491 kW) or greater and specially designed with oil sump sealing when the engine is in the vertical position; or
      - ii. Capable of a specific power of 225 shp/(lbm/sec) or greater and specially designed for armament gas ingestion and non-civil transient manoeuvres, where specific power is defined as maximum takeoff shaft horsepower (shp) divided by compressor inlet flow (lbm/sec).
    - c. Gas turbine engines and specially designed components therefor,
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- specially designed for uncrewed aerial vehicle systems specially designed for military use, cruise missiles, or target drones.
- d. GE38, AGT1500, CTS800, MT7, T55, HPW3000, GE3000, T408, and T700 engines, and specially designed components therefor.
9. Digital engine control systems (e.g., Full Authority Digital Engine Controls (FADEC) and Digital Electronic Engine Controls (DEEC)) and specially designed components therefor specially designed for military gas turbine engines specified in 8 above.
10. Components and equipment as follows, for military aero engines, specified by ML10.d and specially designed components therefor:
- a. Parts, components, accessories, and attachments specially designed for the following U.S.-origin engines: F101, F107, F112, F118, F119, F120, F135, F136, F414, F415, and J402.
- b. The following components and equipment specially designed for military aero-engines specified in paragraph 8 above:
- i. “Hot section” components;
- ii. Uncooled turbine blades, vanes, disks, and tip shrouds;
- iii. Combustor cowls, diffusers, domes, and shells;
- iv. Engine monitoring systems.
11. Investment casting cores, core dies, or wax pattern dies for the following:
- a. U.S.-origin engines: F101, F107, F112, F118, F119, F120, F135, F136, F414, F415, and J402;
- b. “Hot section” components;
- c. Uncooled turbine blades, vanes, disks, and tip shrouds.
12. The following items for military aeroengines specified in paragraph 8 above:
- a. Pressure gain combustors and three-stream fan systems that allow the movement of airflow between the streams to control fan pressure ratio or bypass ratio.
- b. High pressure compressors with core-driven bypass streams that have a pressure ratio greater than one, occurring across any section of the bypass duct.
- c. Intermediate compressors of a three-spool compression system with an intermediate spool-driven bypass stream that has a pressure ratio greater than one, occurring across any section of the bypass duct.
13. Jigs, locating fixtures, templates, gauges, molds, dies, caul plates, or bellmouths for the following U.S.-origin engines: F101, F107, F112, F118, F119, F120, F135, F136, F414, F415, and J402.

**“Manufacturing know-how”** includes information that provides detailed manufacturing processes and techniques needed to translate a detailed design into a qualified, finished item. (Information may be provided in a

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		build-to-print package that is necessary in order to produce an acceptable item.)
54	1C350.5, 1C350.26	Methyl phosphonyl dichloride (CAS 676-97-1). Methyl phosphinyl dichloride (CAS 676-83-5). Technology for the “development” or “production” of these chemicals.
55	1C351.d.4, 1C351.d.5, 1C353, 1E001	The following toxins, genetic elements thereof, and “development” and “production” technology therefor: 1. Ricin. 2. Saxitoxin.
56	5A001.f.1, 5B001, 5D001.a, 5E001.a	Mobile telecommunications interception or jamming equipment, and monitoring equipment therefor, as follows, and specially designed components therefor: 1. Interception equipment designed for the extraction of voice or data, transmitted over the air interface.  Other devices primarily useful for the surreptitious interception of wire, oral, or electronic communications, and parts, components and accessories therefor. Directly related technology and software for the above.  Specific software specially designed or modified to provide characteristics, functions or features of equipment, listed in 5A001 or 5B001 of the DSGL.  Technology or software for the “development” or “production” of equipment in 5A001.f.1, or having functions or features listed in 5A001.f.1
57	9A004, ML11, 9E001, 9E002	“Classified” spacecraft, assemblies, payloads, and technology.