



Defense Trade Cooperation Munitions List 2017

I, Christina Mathewson, delegate of the Minister for Defence, make the following list.

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Christina Mathewson
Assistant Secretary
Defence Export Controls
Department of Defence

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Part 1A—Preliminary

1 Name

This instrument is the *Defense Trade Cooperation Munitions List 2017*.

2 Commencement

- (1) Each provision of this instrument specified in column 1 of the table commences, or is taken to have commenced, in accordance with column 2 of the table. Any other statement in column 2 has effect according to its terms.

Commencement information		
Column 1	Column 2	Column 3
Provisions	Commencement	Date/Details
1. The whole of this instrument	The day after this instrument is registered.	1 February 2017

Note: This table relates only to the provisions of this instrument as originally made. It will not be amended to deal with any later amendments of this instrument.

- (2) Any information in column 3 of the table is not part of this instrument. Information may be inserted in this column, or information in it may be edited, in any published version of this instrument.

3 Authority

This instrument is made under section 36 of the *Defence Trade Controls Act 2012*.

4 Schedules

Each instrument that is specified in a Schedule to this instrument is amended or repealed as set out in the applicable items in the Schedule concerned, and any other item in a Schedule to this instrument has effect according to its terms.

5 Definitions

In this instrument:

accessories and attachments means associated equipment for any component, end-item or system, and which are not necessary for their operation, but which enhance their usefulness or effectiveness. (Examples: military riflescopes, special paints, etc.)

component means an item which is useful only when used in conjunction with an end-item. A major component includes any assembled element which forms a portion of an end-item without which the end-item is inoperable. (Example: Airframes, tail sections, transmissions, tank treads, hulls, etc.) A minor component includes any assembled element of a major component.

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defence article means any item or technical data designated in this instrument. It does not include basic marketing information on function or purpose or general system descriptions.

defence service means:

- (a) the furnishing of assistance (including training) to foreign persons in the design, development, engineering, manufacture, production, assembly, testing, repair, maintenance, modification, operation, demilitarisation, destruction, processing or use of defence articles; or
- (b) the furnishing to foreign persons of any technical data controlled under the DTCML; or
- (c) military training of foreign units and forces, regular and irregular, including formal or informal instruction of foreign persons by correspondence courses, technical, educational, or information publications and media of all kinds, training aid, orientation, training exercise, and military advice.

end-item means an assembled article ready for its intended use. Only ammunition, fuel or another energy source is required to place it in an operating state.

firmware and any related unique support tools (such as computers, linkers, editors, test case generators, diagnostic checkers, library of functions and system test diagnostics) specifically designed for equipment or systems covered under any category in this list are considered as part of the end-item or component. Firmware includes but is not limited to circuits into which software has been programmed.

Missile Technology Control Regime (MTCR) means the policy statement between the United States, the United Kingdom, the Federal Republic of Germany, France, Italy, Canada, and Japan, announced on April 16, 1987, to restrict sensitive missile-relevant transfers based on the MTCR Annex, and any amendments thereto.

MTCR Annex means the Guidelines and Equipment and Technology Annex of the MTCR, and any amendments thereto.

Note 1: The MTCR Annex is contained in Division 2 of Part 1.

Note 2: If an item in Division 1 of Part 1 uses “(MT)”, the MTCR Annex is applicable to that item.

part means any single unassembled element of a major or a minor component, accessory, or attachment which is not normally subject to disassembly without the destruction or the impairment of design use. (Examples: rivets, wire, bolts, etc.)

software includes but is not limited to the system functional design, logic flow, algorithms, application programs, operating systems and support software for design, implementation, test, operation, diagnosis and repair.

system is a combination of end-items, components, parts, accessories, attachments, firmware or software, specifically designed, modified or adapted to operate together to perform a specialized military function.

technical data means:

- (a) information, other than software, which is required for the design, development, production, manufacture, assembly, operation, repair, testing, maintenance or modification of defence articles. This includes information in the form of blueprints, drawings, photographs, plans, instructions or documentation;
- (b) classified information relating to defence articles and defence services;
- (c) information covered by an invention secrecy order;
- (d) software directly related to defence articles;

This definition does not include information concerning general scientific, mathematical or engineering principles commonly taught in schools, colleges and universities or information in the public domain. It also does not include basic marketing information on function or purpose or general system descriptions of defence articles.

United States means the United States of America.

United States Government means the Government of the United States of America.

vessels of war means vessels, waterborne or submersible, designed, modified or equipped for military purposes, including vessels described as developmental, “demilitarised” or decommissioned.

Part 1—Articles Eligible for Trade under the Defense Trade Cooperation Treaty

Division 1—Munitions

6 Category I—Firearms, Close Assault Weapons and Combat Shotguns

- (a) Non-automatic and semi-automatic firearms to calibre .50 inclusive (12.7 mm).
- (b) Fully automatic firearms to .50 calibre inclusive (12.7 mm).
- (c) Firearms or other weapons (for example, insurgency-counterinsurgency, close assault weapons systems) having a special military application regardless of calibre.
- (d) Combat shotguns. This includes any shotgun with a barrel length less than 18 inches.
- (e) Silencers, mufflers, sound and flash suppressors for the articles in paragraphs (a) to (d) and their specifically designed, modified or adapted components and parts.
- (f) Riflescopes manufactured to military specifications.
- (g) Barrels, cylinders, receivers (frames) or complete breech mechanisms for the articles in paragraphs (a) to (d).
- (h) Components, parts, accessories and attachments for the articles in paragraphs (a) to (g).
- (i) Technical data and defence services directly related to the defence articles enumerated in paragraphs (a) to (h).
- (j) The following interpretations explain and amplify the terms used in this category and throughout this Part:
 - (1) a firearm is a weapon not over .50 calibre (12.7 mm) which is designed to expel a projectile by the action of an explosive or which may be readily converted to do so;
 - (2) a rifle is a shoulder firearm which can discharge a bullet through a rifled barrel 16 inches or longer;
 - (3) a carbine is a lightweight shoulder firearm with a barrel under 16 inches in length;
 - (4) a pistol is a hand-operated firearm having a chamber integral with or permanently aligned with the bore;
 - (5) a revolver is a hand-operated firearm with a revolving cylinder containing chambers for individual cartridges;
 - (6) a submachine gun, “machine pistol” or “machine gun” is a firearm originally designed to fire, or capable of being fired, fully automatically by a single pull of the trigger.

Note 1: Paragraphs (a) to (i) exclude any non-combat shotgun with a barrel length of 18 inches or longer, BB, pellet, and muzzle loading (black powder) firearms. This category does not cover riflescopes and sighting devices that are not manufactured to military

specifications. It also excludes accessories and attachments (for example, belts, slings, after market rubber grips, cleaning kits) for firearms that do not enhance the usefulness, effectiveness, or capabilities of the firearm, components and parts.

Note 2: Paragraph (f)—see Category XII(c) for controls on night sighting devices.

7 Category II—Guns and Armament

- (a) Guns over calibre .50, that is 12.7mm, whether towed, airborne, self-propelled or fixed, including but not limited to the following:
 - (1) cannons;
 - (2) grenade launchers;
 - (3) howitzers;
 - (4) mortars;
 - (5) recoilless rifles.
- (b) Flame throwers specifically designed or modified for military application.
- (c) Apparatus and devices for launching or delivering ordnance other than those articles controlled in category IV.
- (d) Kinetic energy weapon systems specifically designed or modified for destruction or rendering mission-abort of a target.
- (e) Signature control materials (for example, parasitic, structural, coatings, screening) techniques, and equipment specifically designed, developed, configured, adapted or modified to alter or reduce the signature (for example, muzzle flash suppression, radar, infrared, visual, laser/electro-optical, acoustic) of defence articles controlled by this category.
- (f) Engines specifically designed or modified for the self-propelled guns and howitzers in paragraph (a).
- (g) Tooling and equipment specifically designed or modified for the production of defence articles controlled by this category.
- (h) Test and evaluation equipment and test models specifically designed or modified for the articles controlled by this category. This includes but is not limited to diagnostic instrumentation and physical test models.
- (i) Auto-loading systems for electronic programming of projectile function for the defence articles controlled in this category.
- (j) All other components, parts, accessories, attachments and associated equipment specifically designed or modified for the articles in paragraphs (a) to (i). This includes but is not limited to mounts and carriages for the articles controlled in this category.
- (k) Technical data and defence services directly related to the defence articles enumerated in paragraphs (a) to (j).
- (l) The following interpretations explain and amplify the terms used in this category and elsewhere in this list:
 - (1) the kinetic energy weapons systems in paragraph (d) include but are not limited to:

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- (i) launch systems and subsystems capable of accelerating masses larger than 0.1g to velocities in excess of 1.6km/s, in single or rapid fire modes, using methods such as: electromagnetic, electrothermal, plasma, light gas, or chemical;
 - (ii) prime power generation, electric armour, energy storage, thermal management; conditioning, switching or fuel-handling equipment; and the electrical interfaces between power supply gun and other turret electric drive function;
 - (iii) target acquisition, tracking fire control or damage assessment systems; and
 - (iv) homing seeker, guidance or divert propulsion (lateral acceleration) systems for projectiles;
- (2) the articles in this category include any end item, component, accessory, attachment part, firmware, software or system that has been designed or manufactured using technical data and defence services controlled by this category;
- (3) the articles specifically designed or modified for military application controlled in this category include any article specifically developed, configured, or adapted for military application.

8 Category III—Ammunition/Ordnance

- (a) Ammunition/ordnance for the articles in Categories I and II of the DTCML.
- (b) Ammunition/ordnance handling equipment specifically designed or modified for the articles controlled in this category, such as, belting, linking, and de-linking equipment.
- (c) Equipment and tooling specifically designed or modified for the production of defence articles controlled by this category.
- (d) Components, parts, accessories, attachments and associated equipment specifically designed or modified for the articles in this category:
 - (1) guidance and control components for the articles in paragraph (a);
 - (2) safing, arming and fusing components (including target detection and localisation devices) for the articles in paragraph (a); and
 - (3) all other components, parts, accessories, attachments and associated equipment for the articles in paragraphs (a) to (c).
- (e) Technical data and defence services directly related to the defence articles enumerated in paragraphs (a) to (d).
- (f) The following explains and amplifies the terms used in this category and elsewhere in this list:
 - (1) the components, parts, accessories and attachments controlled in this category include, but are not limited to cartridge cases, powder bags (or other propellant charges), bullets, jackets, cores, shells (excluding shotgun shells), projectiles (including canister rounds and sub-munitions therefore), boosters, firing components therefore, primers, and other detonating devices for the defence articles controlled in this category;

- (2) this category does not control cartridge and shell casings that, prior to export, have been rendered useless beyond the possibility of restoration for use as a cartridge or shell casing by means of heating, flame treatment, mangling, crushing, cutting or popping;
- (3) equipment and tooling in paragraph (c) does not include equipment for hand-loading ammunition;
- (4) the articles in this category include any end item, component, accessory, attachment, part, firmware, software, or system that has been designed or manufactured using technical data and defence services controlled by this category;
- (5) the articles specifically designed or modified for military application controlled in this category include any article specifically developed, configured, or adapted for military application.

9 Category IV—Launch Vehicles, Guided Missiles, Ballistic Missiles, Rockets, Torpedoes, Bombs and Mines

- (a) Rockets, space launch vehicles (SLVs), missiles, bombs, torpedoes, depth charges, mines, and grenades as follows:
 - (1) rockets, SLVs and missiles capable of delivering at least a 500 kg payload to a range of at least 300 km (MT);
 - (2) rockets, SLVs and missiles capable of delivering less than a 500 kg payload to a range of at least 300 km (MT);
 - (3) man-portable air defence systems (MANPADS);
 - (4) anti-tank missiles and rockets;
 - (5) rockets, SLVs, and missiles not meeting the criteria of subparagraphs (1) to (4);
 - (6) bombs;
 - (7) torpedoes;
 - (8) depth charges;
 - (9) anti-personnel, anti-vehicle, or anti-armour land mines (for example, area denial devices);
 - (10) anti-helicopter mines;
 - (11) naval mines;
 - (12) fragmentation and high explosive hand grenades.

Note 1: “Range” is the maximum distance that the specified rocket system is capable of travelling in the mode of stable flight as measured by the projection of its trajectory over the surface of the Earth. The maximum capability based on the design characteristics of the system, when fully loaded with fuel or propellant, will be taken into consideration in determining range. The range for rocket systems will be determined independently of any external factors such as operational restrictions, limitations imposed by telemetry, data links, or other external constraints. For rocket systems, the range will be determined using the trajectory that maximises range, assuming International Civil Aviation Organization (ICAO) standard atmosphere with zero wind.

Note 2: “Payload” is the total mass that can be carried or delivered by the specified rocket, SLV, or missile that is not used to maintain flight.

Note 3: This paragraph does not control model and high power rockets and kits thereof made of paper, wood, fibreglass, or plastic containing no substantial metal parts and designed to

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be flown with hobby rocket motors that are certified for consumer use. Such rockets must not contain active controls (for example, RF, GPS).

Note 4: “Mine” means a munition placed under, on, or near the ground or other surface area and designed to be exploded by the presence, proximity, or contact of a person or vehicle.

(b) Launchers for rockets, SLVs and missiles, as follows:

- (1) fixed launch sites and mobile launcher mechanisms for any system enumerated in paragraphs (a)(1) and (2) (MT);
- (2) fixed launch sites and mobile launcher mechanisms for any system enumerated in paragraphs (a)(3) to (5) (for example, launch tables, TOW missile, MANPADS).

Note 1: For controls on non-SLV launcher mechanisms for use on aircraft, see Category VIII(h).

Note 2: For controls on launcher mechanisms that are integrated onto a vessel or ground vehicle, see Categories VI and VII, respectively.

Note 3: This paragraph does not control parts and accessories (for example, igniters, launch stands) specially designed for consumer use with model and high power rockets and kits thereof made of paper, wood, fibreglass, or plastic containing no substantial metal parts and designed to be flown with hobby rocket motors that are certified for consumer use.

(c) Apparatus and devices specially designed for the handling, control, activation, monitoring, detection, projection, discharge, or detonation of the articles in paragraphs (a) and (b) (MT for those systems enumerated in paragraphs (a)(1) and (2), and (b)(1)).

Note 1: This paragraph includes specialised handling equipment (transporters, cranes, and lifts) specially designed to handle articles enumerated in paragraphs (a) and (b) for preparation and launch from fixed and mobile sites. The equipment in this paragraph also includes specially designed robots, robot controllers, and robot end-effectors, and liquid propellant tanks specially designed for the storage or handling of the propellants controlled in Category V, or other liquid propellants used in the systems enumerated in paragraphs (a)(1), (2) or (5).

Note 2: Aircraft Missile Protection Systems (AMPS) are controlled in Category XI.

(d) Rocket, SLV and missile power plants, as follows:

- (1) except as enumerated in subparagraph (2) or (3) of this paragraph, individual rocket stages for the articles enumerated in paragraph (a)(1), (2) or (5) (MT for those stages usable in systems enumerated in paragraphs (a)(1) and (2));
- (2) solid propellant rocket motors, hybrid or gel rocket motors, or liquid propellant rocket engines having a total impulse capacity equal to or greater than $1.1 \times 10^6 \text{N}\cdot\text{s}$ (MT);
- (3) solid propellant rocket motors, hybrid or gel rocket motors, or liquid propellant rocket engines having a total impulse capacity equal to or greater than $8.41 \times 10^5 \text{N}\cdot\text{s}$, but less than $1.1 \times 10^6 \text{N}\cdot\text{s}$ (MT);
- (4) combined cycle, pulsejet, ramjet, or scramjet engines (MT);
- (5) air-breathing engines that operate above Mach 4 not enumerated in subparagraph (4);
- (6) pressure gain combustion-based propulsion systems not enumerated in subparagraphs (4) and (5);
- (7) rocket, SLV, and missile engines and motors, not otherwise enumerated in:

- (i) subparagraphs (1) to (6) of this category; or
- (ii) Category XIX.

Note: This paragraph does not control model and high power rocket motors, containing no more than 5 pounds of propellant, that are certified for consumer use.

(e) - (f) [Reserved]

- (g) Non-nuclear warheads for rockets, bombs and missiles (for example, explosive, kinetic, EMP, thermobaric, shape charge and fuel air explosive (FAE)).
- (h) Systems, subsystems, parts, components, accessories, attachments or associated equipment, as follows:
 - (1) flight control and guidance systems (including guidance sets) specially designed for articles enumerated in paragraph (a) (MT for those articles enumerated in paragraphs (a)(1) and (2));
 - (2) seeker systems specially designed for articles enumerated in paragraph (a) (for example, radiofrequency, infrared) (MT for articles enumerated in paragraphs (a)(1) and (2));
 - (3) kinetic kill vehicles and specially designed parts and components therefor;
 - (4) missile or rocket thrust vector control systems (MT for those thrust vector control systems usable in articles enumerated in paragraph (a)(1));
 - (5) MANPADS grip stocks and specially designed parts and components therefor;
 - (6) rocket or missile nozzles and nozzle throats, and specially designed parts and components therefor (MT for those nozzles and nozzle throats usable in systems enumerated in paragraphs (a)(1) and (2));
 - (7) rocket or missile nose tips, nose fairings, or aerospikes, and specially designed parts and components therefor (MT for those articles enumerated in subparagraphs (a)(1) and (2));
 - (8) re-entry vehicle or warhead heat shields (MT for those re-entry vehicles and heat shields usable in systems enumerated in subparagraph (a)(1));
 - (9) missile and rocket safing, arming, fusing, and firing (SAFF) components (to include target detection and proximity sensing devices), and specially designed parts therefor (MT for those SAFF components usable in systems enumerated in paragraph (a)(1));
 - (10) self-destruct systems specially designed for articles enumerated in paragraph (a) (MT for those articles enumerated in paragraphs (a)(1) and (2));
 - (11) separation mechanisms, staging mechanisms, and interstages useable for articles enumerated in paragraph (a), and specially designed parts and components therefor (MT for those separation mechanisms, staging mechanisms, and interstages usable in systems enumerated in subparagraph (a)(1));
 - (12) post-boost vehicles (PBV) (MT);
 - (13) engine or motor mounts specially designed for articles enumerated in paragraphs (a) and (b) (MT for those articles enumerated in paragraphs (a)(1) and (2) and (b)(1));
 - (14) combustion chambers specially designed for articles enumerated in paragraphs (a) and (d) and specially designed parts and components

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- therefor (MT for those articles enumerated in subparagraphs (a)(1) and (2), (b)(1) and (d)(1) to (5));
- (15) injectors specially designed for articles controlled in this category (MT for those injectors specially designed which are usable in systems enumerated in subparagraph (a)(1));
 - (16) solid rocket motor or liquid engine igniters;
 - (17) re-entry vehicles and specially designed parts and components therefor not elsewhere specified in this category (MT);
 - (18) specially designed parts and components for articles controlled in paragraph (g) not elsewhere specified in this category;
 - (19) penetration aids and specially designed parts and components therefor (for example, physical or electronic countermeasure suites, re-entry vehicle replicas or decoys, or submunitions);
 - (20) rocket motor cases and specially designed parts and components therefor (for example, flanges, flange seals, end domes) (MT for those rocket motor cases usable in systems enumerated in subparagraphs (a)(1) and (2) and for specially designed parts and components for hybrid rocket motors enumerated in subparagraphs (d)(2) and (3));
 - (21) solid rocket motor liners and rocket motor insulation (MT for those solid rocket motor liners usable in systems enumerated in subparagraph (a)(1) or specially designed for systems enumerated in subparagraph (a)(2); and rocket motor insulation usable in systems enumerated in subparagraphs (a)(1) and (2));
 - (22) radomes, sensor windows, and antenna windows specially designed for articles enumerated in paragraph (a) (MT for those radomes usable in systems enumerated in subparagraph (a)(1) and for any radomes, sensor windows, or antenna windows manufactured as composite structures or laminates specially designed for use in the systems and components enumerated in:
 - (i) subparagraph (a)(1) or (2); or
 - (ii) subparagraph (d)(1); or
 - (iii) subparagraph (8), (9), (17) or (25) of this paragraph;
 - (23) rocket or missile payload fairings;
 - (24) rocket or missile launch canisters (MT for those rocket or missile launch canisters designed or modified for systems enumerated in subparagraphs (a)(1) and (2));
 - (25) fuses specially designed for articles enumerated in paragraph (a) (for example, proximity, contact, electronic, dispenser proximity, airburst, variable time delay, or multi-option) (MT for those fuses usable in systems enumerated in subparagraph (a)(1));
 - (26) rocket or missile liquid propellant tanks (MT for those rocket or missile liquid propellant tanks usable in systems enumerated in subparagraph (a)(1));
 - (27) rocket or missile altimeters specially designed for use in articles enumerated in subparagraph (a)(1) (MT);
 - (28) pneumatic, hydraulic, mechanical, electro-optical, or electromechanical flight control systems (including fly-by-wire systems) and attitude control equipment specially designed for use in the rockets or missiles enumerated

in subparagraph (a)(1) (MT for these systems which have been designed or modified for those enumerated in subparagraph (a)(1));

- (29) umbilical and interstage electrical connectors specially designed for use in the rockets or missiles enumerated in subparagraph (a)(1) or (2) (MT);
- (30) any part, component, accessory, attachment, equipment, or system that (MT for those articles designated as such):
 - (i) is classified; or
 - (ii) contains classified software directly related to defence articles in this list; or
 - (iii) is being developed using classified information.

Note 1: Subparagraph (1)—a guidance set integrates the process of measuring and computing a vehicle's position and velocity, that is navigation, with that of computing and sending commands to the vehicle's flight control systems to correct the trajectory.

Note 2: Subparagraph (17)—this subparagraph does not control spacecraft. For controls on spacecraft, see Category XV.

Note 3: Subparagraph (29)—this subparagraph also includes electrical connectors installed between the systems specified in subparagraph (a)(1) or (2) and their payload.

- (i) Technical data and defence services directly related to the defence articles enumerated in paragraphs (a) to (h), including classified technical data, and defence services using the classified technical data. Defence services include the furnishing of assistance (including training) to a foreign person in the integration of a satellite or spacecraft to a launch vehicle, including both planning and onsite support, regardless of the jurisdiction, ownership, or origin of the satellite or spacecraft, or whether technical data is used. It also includes the furnishing of assistance (including training) to a foreign person in the launch failure analysis of a launch vehicle, regardless of the jurisdiction, ownership, or origin of the launch vehicle, or whether technical data is used. (MT for technical data and defence services related to articles designated as such.)

(j)-(w) [Reserved]

- (x) Commodities, software, and technical data used in or with defence articles controlled in this category.

Note: Use of this paragraph is limited to exports of defence articles controlled in this category where the purchase documentation includes commodities, software, or technical data.

10 Category V—Explosives and Energetic Materials, Propellants, Incendiary Agents and Their Constituents

- (a) Explosives, and mixtures thereof, as follows:
 - (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) chlathrates of CL-20 (MT for CL-20);

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- (5) CP (2-(5-cyanotetrazolato) penta aminecobalt (III) perchlorate) (CAS 70247-32-4);
- (6) DADE (1,1-diamino-2,2-dinitroethylene, FOX-7) (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) DNAN (2,4-Dinitroanisole) (CAS 119-27-7);
- (12) DNGU (DINGU or dinitroglycoluril) (CAS 55510-04-8);
- (13) furazans, as follows:
 - (i) DAAOF (DAAF, DAAFox or diaminoazoxyfurazan);
 - (ii) DAAzF (diaminoazofurazan) (CAS 78644-90-3);
 - (iii) ANF (Furazanamine, 4-nitro- or 3-Amino-4-nitrofurazan; or 4-Nitro-1,2,5-oxadiazol-3-amine; or 4-Nitro-3-furazanamine; CAS 66328-69-6);
 - (iv) ANAzF (Aminonitroazofurazan or 1,2,5-Oxadiazol-3-amine, 4-[2-(4-nitro-1,2,5-oxadiazol-3-yl) diazenyl]; or 1,2,5-Oxadiazol-3-amine, 4-[(4-nitro-1,2,5-oxadiazol-3-yl)azo]- (9CI); or Furazanamine, 4-[(nitrofuranyl)azo]-; or 4-[(4-Nitro-1,2,5-oxadiazol-3-yl)azo]-1,2,5-oxadiazol-3-amine) (CAS 155438-11-2);
- (14) GUDN (Guanylurea dinitramide) FOX-12 (CAS 217464-38-5);
- (15) HMX and derivatives, as follows:
 - (i) 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, octogene) (CAS 2691-41-0) (MT);
 - (ii) difluoroaminated analogs of HMX;
 - (iii) 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);
- (16) HNAD (hexanitroadamantane) (CAS 143850-71-9);
- (17) HNS (hexanitrostilbene) (CAS 20062-22-0);
- (18) imidazoles, as follows:
 - (i) BNNII (Octahydro-2,5-bis(nitroimino) imidazo [4,5-d]Imidazole);
 - (ii) DNI (2,4-dinitroimidazole) (CAS 5213-49-0);
 - (iii) FDIA (1-fluoro-2,4-dinitroimidazole);
 - (iv) NTDNIA (N-(2-nitrotriazolo)-2,4-dinitro-imidazole);
 - (v) PTIA (1-picryl-2,4,5-trinitroimidazole);
- (19) NTNMH (1-(2-nitrotriazolo)-2-dinitromethylene hydrazine);
- (20) NTO (ONTA or 3-nitro-1,2,4-triazol-5-one) (CAS 932-64-9);
- (21) polynitrocubanes with more than four nitro groups;
- (22) PYX (2,6-Bis(picrylamino)-3,5-dinitropyridine) (CAS 38082-89-2);
- (23) RDX and derivatives, as follows:

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- (i) 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) (MT);
 - (ii) keto-RDX (K-6 or 2,4,6-trinitro-2,4,6-triazacyclohexanone (CAS 115029-35-1);
 - (iii) difluoraminated derivative of RDX; 1,3-Dinitro-5,5-bis(difluoramino)1,3-diazahehexane (CAS 193021-34-0);
- (24) TAGN (Triaminoguanidinenitrate) (CAS 4000-16-2);
 - (25) TATB (Triaminotrinitrobenzene) (CAS 3058-38-6);
 - (26) TEDDZ (3,3,7,7-tetrakis(difluoroamine) octahydro-1,5-dinitro-1,5-diazocine);
 - (27) tetrazines, as follows:
 - (i) BTAT (Bis(2,2,2-trinitroethyl)-3,6-diaminotetrazine);
 - (ii) LAX-112 (3,6-diamino-1,2,4,5-tetrazine-1,4-dioxide);
 - (28) tetrazoles, as follows:
 - (i) NTAT (nitrotriazolaminotetrazole);
 - (ii) NTNT (1-N-(2-nitrotriazolo)-4-nitrotetrazole);
 - (29) tetryl (trinitrophenylmethylnitramine) (CAS 479-45-8);
 - (30) TEX (4,10-Dinitro-2,6,8,12-tetraoxa-4,10-diazaaisowurtzitane);
 - (31) TNAD (1,4,5,8-tetranitro-1,4,5,8-tetraazadecalin) (CAS 135877-16-6);
 - (32) TNAZ (1,3,3-trinitroazetidine) (CAS 97645-24-4);
 - (33) TNGU (SORGUYL or tetranitroglycoluril) (CAS 55510-03-7);
 - (34) TNP (1,4,5,8-tetranitro-pyridazino [4,5-d] pyridazine) (CAS 229176-04-9);
 - (35) triazines, as follows:
 - (i) DNAM (2-oxy-4,6-dinitroamino-s-triazine) (CAS 19899-80-0);
 - (ii) NNHT (2-nitroimino-5-nitro-hexahydro-1,3,5 triazine) (CAS 130400-13-4);
 - (36) triazoles, as follows:
 - (i) 5-azido-2-nitrotriazole;
 - (ii) ADHTDN (4-amino-3,5-dihydrazino-1,2,4-triazole dinitramide)(CAS 1614-08-0);
 - (iii) ADNT (1-amino-3,5-dinitro-1,2,4-triazole);
 - (iv) BDNTA (Bis(dinitrotriazole)amine);
 - (v) DBT (3,3'-dinitro-5,5-bi-1,2,4-triazole) (CAS 30003-46-4);
 - (vi) DNBT (dinitrobistriazole) (CAS 70890-46-9);
 - (vii) NTDNT (1-N-(2-nitrotriazolo) 3,5-dinitro-triazole);
 - (viii) PDNT (1-picryl-3,5-dinitrotriazole);
 - (ix) TACOT (tetranitrobenzotriazolobenzotriazole) (CAS 25243-36-1);
 - (37) energetic ionic materials melting between 343 K (70°C) and 373 K (100°C) and with detonation velocity exceeding 6800 m/s or detonation pressure exceeding 18 GPa (180 kbar);
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- (38) explosives not listed elsewhere in paragraph (a) with a detonation velocity exceeding 8,700m/s at maximum density or a detonation pressure exceeding 34 Gpa (340 kbar).
- (b) Propellants, as follows (MT for composite and composite modified double-base propellants):
- (1) any solid propellant with a theoretical specific impulse (see paragraph (k)(4)) greater than:
 - (i) 240 seconds for non-metallised, non-halogenated propellant;
 - (ii) 250 seconds for non-metallised, halogenated propellant;
 - (iii) 260 seconds for metallised propellant;
 - (2) propellants having a force constant of more than 1,200 kJ/kg;
 - (3) propellants that can sustain a steady-state burning rate more than 38mm/s under standard conditions (as measured in the form of an inhibited single strand) of 6.89 Mpa (68.9 bar) pressure and 294K (21°C);
 - (4) elastomer modified cast double based propellants with extensibility at maximum stress greater than 5% at 233 K (-40C);
 - (5) other composite and composite modified double-base propellants;
- (c) Pyrotechnics, fuels and related substances, and mixtures thereof:
- (1) alane (aluminum hydride)(CAS 7784-21-6);
 - (2) carboranes; decaborane (CAS 17702-41-9); pentaborane and derivatives thereof (MT);
 - (3) liquid high energy density fuels, as follows (MT):
 - (i) mixed fuels that incorporate both solid and liquid fuels, such as boron slurry, having a mass-based energy density of 40 MJ/kg or greater;
 - (ii) other high energy density fuels and fuel additives (for example, cubane, ionic solutions, JP-7, JP-10) having a volume-based energy density of 37.5 GJ per cubic metre or greater, measured at 20°C and one atmosphere (101.325 kPa) pressure;
 - (4) metal fuels, and fuel or pyrotechnic mixtures, in particle form whether spherical, atomised, spheroidal, flaked or ground, manufactured from material consisting of 99% or more of any of the following:
 - (i) metals and mixtures thereof, as follows:
 - (A) beryllium (CAS 7440-41-7) in particle sizes of less than 60 micrometres (MT);
 - (B) iron powder (CAS 7439-89-6) with particle size of 3 micrometres or less produced by reduction of iron oxide with hydrogen;
 - (ii) fuel mixtures of pyrotechnic mixtures, which contain any of the following:
 - (A) 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 micrometres;
 - (B) zirconium (CAS 7440-67-7), magnesium (CAS 7439-95-4) or alloys of these in particle sizes of less than 60 micrometres;

- (iii) explosives and fuels containing the metals or alloys listed in subparagraphs (c)(4)(i) and (ii) whether or not the metals or alloys are encapsulated in aluminum, magnesium, zirconium, or beryllium;
- (5) fuel, pyrotechnic, or energetic mixtures having any nanosized aluminium, beryllium, boron, zirconium, magnesium, or titanium, as follows:
 - (i) having particle size less than 200 nm in any direction;
 - (ii) having 60% or higher purity;
- (6) pyrotechnic and pyrophoric materials, as follows:
 - (i) pyrotechnic or pyrophoric materials specifically formulated to enhance or control the production of radiated energy in any part of the IR spectrum;
 - (ii) mixtures of magnesium, polytetrafluoroethylene and the copolymer vinylidene difluoride and hexafluoropropylene (MT);
- (7) titanium subhydride (TiH_n) of stoichiometry equivalent to $n = 0.65-1.68$;
- (8) hydrocarbon fuels specially formulated for use in flame throwers or incendiary munitions containing metal stearates (for example, octal) or palmitates, and M1, M2 and M3 thickeners.

Note: Subsubparagraph (3)(ii)—JP-4, JP-8, fossil refined fuels or biofuels, or fuels for engines certified for use in civil aviation are not included.

(d) Oxidizers, as follows:

- (1) ADN (ammonium dinitramide or SR-12) (CAS 140456-78-6) (MT);
- (2) AP (ammonium perchlorate) (CAS 7790-98-9) (MT);
- (3) BDNPN (bis (2,2-dinitropropyl) nitrate) (CAS 28464-24-6);
- (4) DNAD (1,3-dinitro-1,3-diazetidine) (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) (MT);
- (8) hydrazine nitrate (CAS 37836-27-4) (MT);
- (9) hydrazine perchlorate (CAS 27978-54-7) (MT);
- (10) inhibited red fuming nitric acid (IRFNA) (CAS 8007-58-7) and liquid oxidisers comprised of or containing IRFNA or oxygen difluoride (MT for liquid oxidisers comprised of IRFNA);
- (11) perchlorates, chlorates, and chromates composited with powdered metal or other high energy fuel components controlled under this category (MT).

(e) Binders, and mixtures thereof, as follows:

- (1) AMMO (azidomethylmethyloxetane and its polymers) (CAS 90683-29-7);
- (2) BAMO 3-3 (bis(azidomethyl)oxetane and its polymers) (CAS 17607-20-4);
- (3) BTTN (butanetrioltrinitrate) (CAS 6659-60-5) (MT);
- (4) FAMAO (3-difluoroaminomethyl-3-azidomethyl oxetane) and its polymers;
- (5) FEFO (bis-(2-fluoro-2,2-dinitroethyl)formal) (CAS 17003-79-1);
- (6) GAP (glycidyl azide polymer) (CAS 143178-24-9) and its derivatives (MT for GAP);
- (7) 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

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- of less than 0.77 meq/g, and a viscosity at 30 °C of less than 47 poise (CAS 69102-90-5) (MT);
- (8) 4,5 diazidomethyl-2-methyl-1,2,3-triazole (iso-DAMTR) (MT);
- (9) NENAS (nitrateethylnitramine compounds), as follows:
- (i) N-Methyl 2-nitrateethylnitramine (Methyl-NENA) (CAS 17096-47-8) (MT);
 - (ii) N-Ethyl 2-nitrateethylnitramine (Ethyl-NENA) (CAS 85068-73-1) (MT);
 - (iii) N-Propyl 2-nitrateethylnitramine (CAS 82486-83-7);
 - (iv) N-Butyl-2-nitrateethylnitramine (BuNENA) (CAS 82486-82-6);
 - (v) N-Pentyl 2-nitrateethylnitramine (CAS 85954-06-9);
- (10) poly-NIMMO (poly nitratomethylmethyloxetane, poly-NMMO, (poly[3-nitratomethyl-3-methyl oxetane])) (CAS 84051-81-0);
- (11) PNO (Poly(3-nitratooxetane));
- (12) TVOPA 1,2,3-Tris [1,2-bis(difluoroamino) ethoxy]propane; tris vinoxyl propane adduct; (CAS 53159-39-0);
- (13) polynitrorthocarbonates;
- (14) FPF-1 (poly-2,2,3,3,4,4-hexafluoro pentane-1,5-diolformal) (CAS 376-90-9);
- (15) FPF-3 (poly-2,4,4,5,5,6,6-heptafluoro-2-trifluoromethyl-3-oxaheptane-1,7-diolformal);
- (16) PGN (Polyglycidyl nitrate or poly(nitratomethyl oxirane); poly-GLYN); (CAS 27814-48-8);
- (17) N-methyl-p-nitroaniline (MT);
- (18) low (less than 10,000) molecular weight, alcohol-functionalised, poly(epichlorohydrin); poly(epichlorohydrindiol); and triol;
- (19) dinitropropyl based plasticisers, as follows (MT):
- (i) BDNPA (bis (2,2-dinitropropyl) acetal) (CAS 5108-69-0);
 - (ii) BDNPF (bis (2,2-dinitropropyl) formal) (CAS 5917-61-3).
- (f) Additives, as follows:
- (1) basic copper salicylate (CAS 62320-94-9);
 - (2) BHEGA (Bis-(2-hydroxyethyl)glycolamide) (CAS 17409-41-5);
 - (3) BNO (Butadienenitrile oxide);
 - (4) ferrocene derivatives, as follows (MT):
 - (i) butacene (CAS 125856-62-4);
 - (ii) catocene (2,2-Bis-ethylferrocenyl propane) (CAS 37206-42-1);
 - (iii) ferrocene carboxylic acids and ferrocene carboxylic acid esters;
 - (iv) n-butylferrocene (CAS 31904-29-7);
 - (v) ethylferrocene (CAS 1273-89-8);
 - (vi) propylferrocene;
 - (vii) pentylferrocene (CAS 1274-00-6);
 - (viii) dicyclopentylferrocene;
 - (ix) dicyclohexylferrocene;
 - (x) diethylferrocene (CAS 173-97-8);

- (xi) dipropylferrocene;
- (xii) dibutylferrocene (CAS 1274-08-4);
- (xiii) dihexylferrocene (CAS 93894-59-8);
- (xiv) acetylferrocene (CAS 1271-55-2)/1,1'-diacetyl ferrocene (CAS 1273-94-5);
- (xv) other ferrocene derivatives that do not contain a six carbon aromatic functional group attached to the ferrocene molecule (MT if usable as rocket propellant burning rate modifier);
- (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 (MT for MAPO);
- (12) methyl BAPO (Bis(2-methyl aziridinyl) methylamino phosphine oxide) (CAS 85068-72-0);
- (13) 3-Nitraza-1,5 pentane diisocyanate (CAS 7406-61-9);
- (14) organo-metallic coupling agents, as follows:
 - (i) neopentyl[diallyl]oxy, tri [dioctyl] phosphatotitanate (CAS 103850-22-2); also known as titanium IV, 2,2[bis 2-propenolato-methyl, butanolato, tris (dioctyl) phosphato] (CAS 110438-25-0), or LICA 12 (CAS 103850-22-2);
 - (ii) titanium IV, [(2-propenolato-1) methyl, n-propanolatomethyl] butanolato-1, tris(dioctyl)pyrophosphate, or KR3538;
 - (iii) titanium IV, [2-propenolato-1)methyl, propanolatomethyl] butanolato-1, tris(dioctyl) phosphate;
- (15) PCDE (Polycyanodifluoroaminoethylene oxide);
- (16) certain bonding agents, as follows (MT):
 - (i) 1,1R,1S-trimesoyl-tris(2-ethylaziridine) (HX-868, BITA) (CAS 7722-73-8);
 - (ii) polyfunctional aziridine amides with isophthalic, trimesic, isocyanuric, or trimethyladipic backbone also having a 2-methyl or 2-ethyl aziridine group;
- (17) superfine iron oxide (Fe₂O₃, hematite) with a specific surface area more than 250 m²/g and an average particle size of 0.003 micrometres or less (CAS 1309-37-1);
- (18) TEPAN (HX-879) (tetraethylenepentaamineacrylonitrile) (CAS 68412-45-3); cyanoethylated polyamines and their salts (MT for TEPAN (HX-879));
- (19) TEPANOL (HX-878) (Tetraethylenepentaamineacrylo-nitrileglycidol) (CAS 68412-46-4); cyanoethylated polyamines adducted with glycidol and their salts (MT for TEPANOL (HX-878));
- (20) TPB (triphenyl bismuth) (CAS 603-33-8) (MT);
- (21) Tris (ethoxyphenyl) bismuth (TEPB) (CAS 90591-48-3).

Note: Subsubparagraph (16)(ii)—included are:

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- (a) 1,1H-Isophthaloyl-bis(2-methylaziridine) (HX-752) (CAS 7652-64-4); and
- (b) 2,4,6-tris(2-ethyl-1-aziridinyl)-1,3,5-triazine (HX-874) (CAS 18924-91-9); and
- (c) 1,1'-trimethyladipoylbis(2-ethylaziridine) (HX-877) (CAS 71463-62-2).

(g) Precursors, as follows:

- (1) BCMO (3-3-bis(chloromethyl)oxetane) (CAS 78-71-7);
- (2) DADN (1,5-diacetyl-3,7-dinitro-1, 3, 5, 7-tetraazacyclooctane);
- (3) dinitroazetidine-t-butyl salt (CAS 125735-38-8);
- (4) CL-20 precursors (any molecule containing hexaazaisowurtzitane) (for example, HBIW (hexabenzylhexaazaisowurtzitane), TAIW (tetraacetyldibenzylhexa-azaisowurtzitane));
- (5) TAT (1, 3, 5, 7-tetraacetyl-1, 3, 5, 7-tetraaza-cyclooctane) (CAS 41378-98-7);
- (6) tetraazadecalin (CAS 5409-42-7);
- (7) 1,3,5-trichlorobenzene (CAS 108-70-3);
- (8) 1,2,4-trihydroxybutane (1,2,4-butanetriol) (CAS 3068-00-6).

(h) Any explosive, propellant, pyrotechnic, fuel, oxidiser, binder, additive, or precursor that (MT for articles designated as such):

- (1) is classified; or
- (2) is being developed using classified information.

(i) Developmental explosives, propellants, pyrotechnics, fuels, oxidisers, binders, additives, or precursors therefor funded by the United States Government via contract or other funding authorisation.

Note 1: This paragraph does not control explosives, propellants, pyrotechnics, fuels, oxidisers, binders, additives, or precursors therefor:

- (a) in production; or
- (b) identified in the relevant United States Government contract or other funding authorisation as being developed for both civil and military applications.

Note 2: Note 1 does not apply to defence articles enumerated on this list, whether in production or development.

Note 3: This paragraph applies only to those contracts and funding authorisations that are dated 5 January 2015, or later.

(j) Technical data and defence services directly related to the defence articles described in paragraphs (a) to (i) (MT for articles designated as such).

(k) The following interpretations explain and amplify the terms used in this category and elsewhere in this list:

- (1) Category V contains explosives, energetic materials, propellants and pyrotechnics and specially formulated fuels for aircraft, missile and naval applications. Explosives are solid, liquid or gaseous substances or mixtures of substances, which, in their primary, booster or main charges in warheads, demolition or other military applications, are required to detonate;
- (2) the resulting product of the combination or conversion of any substance controlled by this category into an item not controlled will no longer be controlled by this category provided the controlled item cannot easily be recovered through dissolution, melting, sieving, etc. As an example, beryllium converted to a near net shape using hot isostatic processes will

result in an uncontrolled part. A cured thermoset containing beryllium powder is not controlled unless meeting an explosive or propellant control. The mixture of beryllium powder in a cured thermoset shape is not controlled by this category. The mixture of controlled beryllium powder mixed with a typical propellant binder will remain controlled by this category. The addition of dry silica powder to dry beryllium powder will remain controlled;

- (3) subparagraph (c)(4)(ii)(A) does not apply to boron and boron carbide enriched with boron-10 (20% or more of total boron-10 content);
- (4) theoretical specific impulse (Isp) is calculated using standard conditions (1000 psi chamber pressure expanded to 14.7 psi) and measured in units of pound-force-seconds per pound-mass (lbf-s/lbm) or simplified to seconds (s). Calculations will be based on shifting equilibrium;
- (5) particle size is the mean particle diameter on a weight basis. Best industrial practices will be used in determining particle size and the controls may not be undermined by addition of larger or smaller sized material to shift the mean diameter;

(l)-(w) [Reserved]

- (x) Commodities, software, and technical data used in or with defence articles controlled in this category.

Note: Use of this paragraph is limited to exports of defence articles controlled in this category where the purchase documentation includes commodities, software, or technical data.

Note 1: To assist the exporter, an item has been categorised by the most common use. Also, where appropriate, references have been provided to the related controlled precursors.

Note 2: Chemical Abstract Service (CAS) registry numbers do not cover all the substances and mixtures controlled by this category. The numbers are provided as examples to assist the government agencies in the license review process and the exporter when completing their licence application and export documentation.

11 Category VI—Surface Vessels of War and Special Naval Equipment

- (a) Warships and other combatant vessels (that is, battleships, aircraft carriers, destroyers, frigates, cruisers, corvettes, littoral combat ships, mine sweepers, mine hunters, mine countermeasure ships, dock landing ships, amphibious assault ships), Coast Guard Cutters, or foreign-origin vessels specially designed to provide functions equivalent to those of the vessels listed above.

Note: Vessels specially designed for military use that are not identified this paragraph, including any demilitarised vessels, regardless of origin or designation, manufactured before 1950 and unmodified since 1949. Vessels with modifications made to incorporate safety features required by law, are cosmetic, for example, different paint, or that add parts or components otherwise available before 1950 are considered “unmodified” for the purposes of this paragraph.

- (b) Other vessels not controlled in paragraph (a), as follows:
 - (1) high-speed air cushion vessels for transporting cargo and personnel, ship-to-shore and across a beach, with a payload over 25 tonnes;
 - (2) surface vessels integrated with nuclear propulsion plants or specially designed to support naval nuclear propulsion plants;
 - (3) vessels armed or specially designed to be used as a platform to deliver munitions or otherwise destroy or incapacitate targets (for example, firing

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lasers, launching torpedoes, rockets, or missiles, or firing munitions greater than .50 calibre);

(4) vessels incorporating any mission systems controlled under this list.

Note 1: Vessels specially designed for military use that are not identified in this paragraph, including any demilitarised vessels, regardless of origin or designation, manufactured before 1950 and unmodified since 1949. Vessels with modifications made to incorporate safety features required by law, are cosmetic (for example, different paint) or that add parts or components otherwise available before 1950 are considered “unmodified” for the purposes of this paragraph.

Note 2: Subparagraph (4)—“Mission systems” are defined as “systems” that are defence articles that perform specific military functions such as by providing military communication, electronic warfare, target designation, surveillance, target detection, or sensor capabilities.

(c) Developmental vessels, and specially designed parts, components, accessories, and attachments therefor, funded by the United States Government via contract or other funding authorisation.

Note 1: This paragraph does not control vessels, and specially designed parts, components, accessories, and attachments therefor:

- (a) in production; or
- (b) identified in the relevant United States Government contract or other funding authorisation as being developed for both civil and military applications.

Note 2: Note 1 does not apply to defence articles enumerated on this list, in production or development.

Note 3: This provision applies to those contracts and funding authorisations that are dated 8 July 2014, or later.

(d) [Reserved]

(e) Naval nuclear propulsion plants and prototypes, and special facilities for construction, support, and maintenance therefor.

(f) Vessel and naval equipment, parts, components, accessories, attachments, associated equipment, and systems, as follows:

(1) hulls or superstructures, including support structures therefor, that:

- (i) are specially designed for any vessels controlled in paragraph (a);
- (ii) have armour, active protection systems, or developmental armour systems;
- (iii) are specially designed to survive 12.5% or greater damage across the length as measured between perpendiculars;

(2) systems that manage, store, create, distribute, conserve, and transfer energy, and specially designed parts and components therefor, that have:

- (i) storage exceeding 30MJ; and
- (ii) a discharge rate less than 3 seconds; and
- (iii) a cycle time under 45 seconds;

(3) shipborne auxiliary systems for chemical, biological, radiological, and nuclear (CBRN) compartmentalisation, over-pressurisation and filtration systems, and specially designed parts and components therefor;

(4) control and monitoring systems for autonomous unmanned vessels capable of on-board, autonomous perception and decision-making necessary for the vessel to navigate while avoiding fixed and moving hazards, and obeying rules-of-the road without human intervention;

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- (5) any machinery, device, component, or equipment, including production, testing and inspection equipment, and tooling, specially designed for plants or facilities controlled in paragraph (e);
 - (6) parts, components, accessories, attachments, and equipment specially designed for integration of articles controlled by Categories II, IV, or XVIII or catapults for launching aircraft or arresting gear for recovering aircraft (MT for launcher mechanisms specially designed for rockets, space launch vehicles, or missiles capable of achieving a range greater than or equal to 300 km).
 - (7) shipborne active protection systems (that is, defensive systems that actively detect and track incoming threats and launch a ballistic, explosive, energy, or electromagnetic countermeasure(s) to neutralise the threat prior to contact with a vessel) and specially designed parts and components therefor;
 - (8) minesweeping and mine hunting equipment (including mine countermeasures equipment deployed by aircraft), and specially designed parts and components therefor;
 - (9) any part, component, accessory, attachment, equipment, or system that:
 - (i) is classified; or
 - (ii) contains classified software directly related to defence articles in this list; or
 - (iii) is being developed using classified information.

Note: Subparagraph (6)—“Range” is the maximum distance that the specified rocket system is capable of travelling in the mode of stable flight as measured by the projection of its trajectory over the surface of the Earth. The maximum capability based on the design characteristics of the system, when fully loaded with fuel or propellant, will be taken into consideration in determining range. The range for rocket systems will be determined independently of any external factors such as operational restrictions, limitations imposed by telemetry, data links, or other external constraints. For rocket systems, the range will be determined using the trajectory that maximises range, assuming International Civil Aviation Organization (ICAO) standard atmosphere with zero wind.

Note: For controls related to ship signature management, see Category XIII.

- (g) Technical data and defence services directly related to the defence articles enumerated in paragraphs (a) to (f) (MT for technical data and defence services related to articles designated as such.)
 - (h)-(w) [Reserved]
 - (x) Commodities, software, and technical data used in or with defence articles controlled in this category.
- Note: Use of this paragraph is limited to exports of defence articles controlled in this category where the purchase documentation includes commodities, software, or technical.

12 Category VII—Ground Vehicles

- (a) Armoured combat ground vehicles as follows:
 - (1) tanks;
 - (2) infantry fighting vehicles.

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- (b) Ground vehicles (not enumerated in paragraph (a)) and trailers that are armed or are specially designed to be used as a firing or launch platform to deliver munitions or otherwise destroy or incapacitate targets (for example, firing lasers, launching rockets, firing missiles, firing mortars, firing artillery rounds, or firing other ammunition greater than .50 calibre) (MT if specially designed for rockets, space launch vehicles, missiles, drones, or unmanned aerial vehicles capable of delivering a payload of at least 500 kg to a range of at least 300 km).

Note: "Payload" is the total mass that can be carried or delivered by the specified rocket, space launch vehicle, missile, drone, or unmanned aerial vehicle that is not used to maintain flight. For definition of "range" as it pertains to aircraft systems, see note 2 to paragraph (a) of Category VIII. For definition of "range" as it pertains to rocket systems, see note to paragraph (f)(6) of Category VI.

- (c) Ground vehicles and trailers equipped with any mission systems controlled under this list (MT if specially designed for rockets, space launch vehicles, missiles, drones, or unmanned aerial vehicles capable of delivering a payload of at least 500 kg to a range of at least 300 km).

Note 1: "Mission systems" are defined as "systems" that are defence articles that perform specific military functions, such as by providing military communication, target designation, surveillance, target detection, or sensor capabilities.

Note 2: "Payload" is the total mass that can be carried or delivered by the specified rocket, space launch vehicle, missile, drone, or unmanned aerial vehicle that is not used to maintain flight. For definition of "range" as it pertains to aircraft systems, see note 2 to paragraph (a) of Category VIII. For definition of "range" as it pertains to rocket systems, see note to paragraph (f)(6) of Category VI.

- (d) [Reserved]

- (e) Armoured support vehicles capable of off-road or amphibious use specially designed to transport or deploy personnel or materiel, or to move with other vehicles over land in close support of combat vehicles or troops (for example, personnel carriers, resupply vehicles, combat engineer vehicles, recovery vehicles, reconnaissance vehicles, bridge launching vehicles, ambulances, and command and control vehicles).

- (f) [Reserved]

- (g) Ground vehicle parts, components, accessories, attachments, associated equipment, and systems as follows:

- (1) armoured hulls, armoured turrets, and turret rings;
- (2) active protection systems (that is, defensive systems that actively detect and track incoming threats and launch a ballistic, explosive, energy, or electromagnetic countermeasure(s) to neutralise the threat prior to contact with a vehicle) and specially designed parts and components therefor;
- (3) composite armour parts and components specially designed for the vehicles in this category;
- (4) spaced armour components and parts, including slat armour parts and components specially designed for the vehicles in this category;
- (5) reactive armour parts and components;
- (6) electromagnetic armour parts and components, including pulsed power specially designed parts and components therefor;
- (7) built in test equipment (BITE) to evaluate the condition of weapons or other mission systems for vehicles identified in this category, excluding

- equipment that provides diagnostics solely for a subsystem or component involved in the basic operation of the vehicle;
- (8) gun mount, stabilisation, turret drive, and automatic elevating systems, and specially designed parts and components therefor;
 - (9) self-launching bridge components rated class 60 or above for deployment by vehicles in this category;
 - (10) suspension components as follows:
 - (i) rotary shock absorbers specially designed for the vehicles weighing more than 30 tonnes in this category;
 - (ii) torsion bars specially designed for the vehicles weighing more than 50 tonnes in this category;
 - (11) kits specially designed to convert a vehicle in this category into either an unmanned or a driver-optional vehicle. For a kit to be controlled by this paragraph, it must, at a minimum, include equipment for:
 - (i) remote or autonomous steering; and
 - (ii) acceleration and braking; and
 - (iii) a control system;
 - (12) fire control computers, mission computers, vehicle management computers, integrated core processors, stores management systems, armaments control processors, vehicle-weapon interface units and computers;
 - (13) test or calibration equipment for the mission systems of the vehicles in this category, except those enumerated elsewhere; or
 - (14) any part, component, accessory, attachment, equipment, or system that (MT for those articles designated as such):
 - (i) is classified; or
 - (ii) contains classified software directly related to defence articles in this list; or
 - (iii) is being developed using classified information.

Note: Subparagraphs (3) to (6)—see Category XIII(m)(1)-(4) for interpretations which explain and amplify terms used in these subparagraphs.

- (h) Technical data and defence services directly related to the defence articles enumerated in paragraphs (a) to (g). (MT for technical data and defence services related to articles designated as such).

(i)-(w) [Reserved]

- (x) Commodities, software, and technical data used in or with defence articles controlled in this category.

Note: Use of this paragraph is limited to exports of defence articles controlled in this category where the purchase documentation includes commodities, software, or technical data.

Note 1: Ground vehicles specially designed for military applications that are not identified in this category, including any unarmed ground vehicles, regardless of origin or designation, manufactured before 1956 and unmodified since 1955. Ground vehicles with modifications made to incorporate safety features required by law, are cosmetic (for example, different paint, repositioning of bolt holes), or that add parts or components otherwise available before 1956 are considered “unmodified” for the purposes of this paragraph.

Note 2: Armoured ground vehicles are:

- (a) ground vehicles that have integrated, fully armoured hulls or cabs, or

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- (b) ground vehicles on which add-on armour has been installed to provide ballistic protection. Armoured support vehicles do not include those that are merely capable of being equipped with add-on armour.

Note 3: Ground vehicles include any vehicle meeting the definitions or control parameters regardless of the surface (for example, highway, off-road or rail) upon which the vehicle is designed to operate.

13 Category VIII—Aircraft and Related Articles

- (a) Aircraft, as follows:
- (1) bombers;
 - (2) fighters, fighter bombers, and fixed-wing attack aircraft;
 - (3) turbofan- or turbojet-powered trainers used to train pilots for fighter, attack, or bomber aircraft;
 - (4) attack helicopters;
 - (5) unarmed military unmanned aerial vehicles (UAVs) (MT if the UAV has a range equal to or greater than 300 km);
 - (6) armed unmanned aerial vehicles (UAVs) (MT if the UAV has a range equal to or greater than 300 km);
 - (7) military intelligence, surveillance, and reconnaissance aircraft;
 - (8) electronic warfare, airborne warning and control aircraft;
 - (9) air refuelling aircraft;
 - (10) target drones (MT if the drone has a range equal to or greater than 300 km);
 - (11) aircraft incorporating any mission system controlled under this list;
 - (12) aircraft capable of being refuelled in flight including hover-in-flight refuelling (HIFR);
 - (13) optionally Piloted Vehicles (OPV) (that is, aircraft specially designed to operate with and without a pilot physically located in the aircraft) (MT if the OPV has a range equal to or greater than 300 km);
 - (14) aircraft with a roll-on/roll-off ramp, capable of airlifting payloads over 35,000 lbs. to ranges over 2,000 nm without being refuelled in-flight, and landing onto short or unimproved airfields;
 - (15) aircraft not enumerated in paragraphs (a)(1) to (14) as follows:
 - (i) United States-origin aircraft that bear an original military designation of A, B, E, F, K, M, P, R, or S;
 - (ii) foreign-origin aircraft specially designed to provide functions equivalent to those of the aircraft listed in subparagraph (i);
 - (16) are armed or are specially designed to be used as a platform to deliver munitions or otherwise destroy targets (for example, firing lasers, launching rockets, firing missiles, dropping bombs, or strafing).

Note 1: Aircraft specially designed for military applications that are not identified in paragraph (a), including any unarmed military aircraft, regardless of origin or designation, manufactured prior to 1956 and unmodified since manufacture. Aircraft with modifications made to incorporate safety of flight features or other modifications such as transponders and air data recorders are considered “unmodified” for the purposes of this paragraph.

Note 2: “Range” is the maximum distance that the specified aircraft system is capable of travelling in the mode of stable flight as measured by the projection of its trajectory over the surface of the Earth. The maximum capability based on the design characteristics of the system, when fully loaded with fuel or propellant, will be taken into consideration in determining range. The range for aircraft systems will be

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determined independently of any external factors such as operational restrictions, limitations imposed by telemetry, data links, or other external constraints. For aircraft systems, the range will be determined for a one-way distance using the most fuel-efficient flight profile (for example, cruise speed and altitude), assuming International Civil Aviation Organization (ICAO) standard atmosphere with zero wind.

Note 3: Subparagraph (11)—“Mission systems” are defined as “systems” that are defence articles that perform specific military functions such as by providing military communication, electronic warfare, target designation, surveillance, target detection, or sensor capabilities.

Note 4: Subparagraph (11)—this does not include tethered aerostats. Mission systems incorporated on otherwise controlled aerostats are controlled as the mission systems themselves just as if they were mounted, for example, on a tower or a pole.

(b) - (c) [Reserved]

(d) Ship-based launching and recovery equipment specially designed for defence articles described in paragraph (a) of this category and land-based variants thereof (MT if the ship-based launching and recovery equipment is for an unmanned aerial vehicle, drone, or missile that has a range equal to or greater than 300 km).

Note: Fixed land-based arresting gear is not included in this paragraph. For the definition of “range,” see the note 2 to paragraph (a).

(e) Inertial navigation systems (INS), aided or hybrid inertial navigation systems, Inertial Measurement Units (IMUs), and Attitude and Heading Reference Systems (AHRS) specially designed for aircraft controlled in this category and all specially designed components, parts, and accessories therefor (MT if the INS, IMU, or AHRS is for an unmanned aerial vehicle, drone, or missile that has a “range” equal to or greater than 300 km). For other inertial reference systems and related components refer to Category XII(d).

(f) Developmental aircraft funded by the United States Government via contract or other funding authorisation, and specially designed parts, components, accessories, and attachments therefor.

Note 1: This paragraph does not control aircraft and specially designed parts, components, accessories, and attachments therefor:

- (a) in production; or
- (b) identified in the relevant United States Government contract or other funding authorisation as being developed for both civil and military applications.

Note 2: Note 1 does not apply to defence articles enumerated on this list in production or development.

Note 3: This provision applies to those contracts or other funding authorisations that are dated 16 April 2014, or later.

(g) [Reserved]

(h) Aircraft parts, components, accessories, attachments, associated equipment and systems, as follows:

- (1) parts, components, accessories, attachments, and equipment specially designed for the following United States-origin aircraft: the B-1B, B-2, F-15SE, F/A-18 E/F/G, F-22, F-35 and future variants thereof; or the F-117 or United States Government technology demonstrators. Parts, components, accessories, attachments, and equipment of the F-15SE and F/A-18 E/F/G that are common to earlier models of these aircraft.

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- (2) face gear gearboxes, split-torque gearboxes, variable speed gearboxes, synchronisation shafts, interconnecting drive shafts, or rotorcraft gearboxes with internal pitch line velocities exceeding 20,000 feet per minute and able to operate 30 minutes with loss of lubrication, and specially designed parts and components therefor;
- (3) tail boom folding systems, stabilator folding systems or automatic rotor blade folding systems, and specially designed parts and components therefor;
- (4) wing folding systems, and specially designed parts and components therefor, for:
 - (i) aircraft powered by power plants controlled under Category IV(d); or
 - (ii) aircraft powered by gas turbine engines with any of the following characteristics:
 - (A) the portion of the wing outboard of the wing fold is required for sustained flight;
 - (B) fuel can be stored outboard of the wing fold;
 - (C) control surfaces are outboard of the wing fold;
 - (D) hard points are outboard of the wing fold;
 - (E) hard points inboard of the wing fold are capable of in-flight ejection;
 - (F) the aircraft is designed to withstand maximum vertical manoeuvring accelerations greater than +3.5g/-1.5g;
- (5) tail hooks and arresting gear, and specially designed parts and components therefor;
- (6) bomb racks, missile launchers, missile rails, weapon pylons, pylon-to-launcher adapters, unmanned aerial vehicle (UAV) airborne launching systems, external stores support systems for ordnance or weapons, and specially designed parts and components therefor (MT if the bomb rack, missile launcher, missile rail, weapon pylon, pylon-to-launcher adapter, UAV airborne launching system, or external stores support system is for a UAV, drone, or missile that has a “range” equal to or greater than 300 km);
- (7) damage or failure-adaptive flight control systems specially designed for aircraft controlled in this category;
- (8) threat-adaptive autonomous flight control systems;
- (9) non-surface-based flight control systems and effectors (for example, thrust vectoring from gas ports other than main engine thrust vector);
- (10) radar altimeters with output power management or signal modulation (that is, frequency hopping, chirping, direct sequence-spectrum spreading), LPI (low probability of intercept) capabilities (MT if for an unmanned aerial vehicle, drone, or missile that has a “range” equal to or greater than 300 km);
- (11) air-to-air refuelling systems and hover-in-flight refuelling (HIFR) systems, and specially designed parts and components therefor;
- (12) unmanned aerial vehicle (UAV) flight control systems and vehicle management systems with swarming capability (that is, UAVs interact with each other to avoid collisions and stay together, or, if weaponised,

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- coordinate targeting) (MT if for a UAV, drone or missile that has a “range” equal to or greater than 300 km);
- (13) aircraft Lithium-ion batteries that provide greater than 38VDC nominal;
 - (14) lift fans, clutches, and roll posts for short take-off, vertical landing (STOVL) aircraft and specially designed parts and components for such lift fans and roll posts;
 - (15) integrated helmets incorporating optical sights or slewing devices, which include the ability to aim, launch, track, or manage munitions (for example, Helmet Mounted Cueing Systems, Joint Helmet Mounted Cueing Systems (JHMCS), Helmet Mounted Displays, Display and Sight Helmets (DASH)), and specially designed parts, components, accessories, and attachments therefor;
 - (16) fire control computers, stores management systems, armaments control processors, aircraft-weapon interface units and computers (for example, AGM-88 HARM Aircraft Launcher Interface Computer (ALIC));
 - (17) mission computers, vehicle management computers, and integrated core processors specially designed for aircraft controlled in this category;
 - (18) drive systems and flight control systems specially designed to function after impact of a 7.62mm or larger projectile;
 - (19) thrust reversers specially designed to be deployed in flight for aircraft controlled in this category;
 - (20) any part, component, accessory, attachment, equipment, or system that:
 - (i) is classified; or
 - (ii) contains classified software directly related to defence articles in this list; or
 - (iii) is being developed using classified information;
 - (21) - (22) [Reserved]
 - (23) electricity-generating fuel cells specially designed for aircraft controlled in this category;
 - (24) thermal engines specially designed for aircraft controlled in this category;
 - (25) thermal batteries specially designed for aircraft controlled in this category (MT if the thermal battery is for an unmanned aerial vehicle, drone, or missile that has a “range” equal to or greater than 300 km);
 - (26) thermionic generators specially designed for aircraft controlled in this category.

Note: Subparagraph (1): Specially designed does not control parts, components, accessories, and attachments that are common to aircraft described in paragraph (a) of this category but not identified in this subparagraph, and those identified in this subparagraph. For example, a part common to only the F-14 and F-35 is not considered specially designed.

- (i) Technical data and defence services directly related to the defence articles described in paragraphs (a) through (h) of this category and defence services using classified technical data (MT for technical data and defence services related to articles designated as such.)
- (j) - (w) [Reserved]
- (x) Commodities, software, and technical data used in or with defence articles controlled in this category.

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Note: Use of this paragraph is limited to license applications for defence articles controlled in this category where the purchase documentation includes commodities, software, or technical data.

Note: Replacement systems, parts, components, accessories and attachments are subject to export controls.

14 Category IX—Military Training Equipment and Training

(a) Training equipment, as follows:

- (1) ground, surface, submersible, space, or towed airborne targets that:
 - (i) have an infrared, radar, acoustic, magnetic, or thermal signature that mimic a specific defence article, specific other item, or specific person; or
 - (ii) are instrumented to provide hit/miss performance information for defence articles controlled in this list;
- (2) devices that are mock-ups of articles enumerated in this list used for maintenance training or disposal training for ordnance enumerated in this list, that reveal technical data or contain parts, components, accessories, or attachments controlled in this list;
- (3) air combat manoeuvring instrumentation and ground stations therefor;
- (4) physiological flight trainers for fighter aircraft or attack helicopters;
- (5) radar trainers specially designed for training on radar controlled by Category XI;
- (6) training devices specially designed to be attached to a crew station, mission system, or weapon of an article controlled in this list;
- (7) anti-submarine warfare trainers;
- (8) missile launch trainers;
- (9) radar target generators;
- (10) infrared scene generators;
- (11) any training device that:
 - (i) is classified; or
 - (ii) contains classified software directly related to defence articles in this list; or
 - (iii) is being developed using classified information.

Note 1: Training equipment does not include combat games without item signatures or tactics, techniques, and procedures covered by this list.

Note 2: Subparagraph (1)—target drones are controlled in Category VIII(a).

Note 3: Subparagraph (a)(6)—this subparagraph includes stimulators that are built-in or add-on devices that cause the actual equipment to act as a trainer.

(b) Simulators, as follows:

- (1) system specific simulators that replicate the operation of an individual crew station, a mission system, or a weapon of an end-item that is controlled in this list;
- (2) [Reserved]
- (3) [Reserved]
- (4) software and associated databases not elsewhere enumerated in this list that can be used to model or simulate the following:
 - (i) trainers enumerated in paragraph (a);

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- (ii) battle management;
 - (iii) military test scenarios/models;
 - (iv) effects of weapons enumerated in this list;
 - (5) simulators that:
 - (i) are classified; or
 - (ii) contain classified software directly related to defence articles in this list; or
 - (iii) are being developed using classified information.
 - (c) [Reserved]
 - (d) [Reserved]
 - (e) Technical data and defence services:
 - (1) directly related to the defence articles enumerated in paragraphs (a) and (b); or
 - (2) directly related to the software and associated databases enumerated in paragraph (b)(4) even if no defence articles are used or transferred; or
 - (3) military training not directly related to defence articles or technical data enumerated in this list.
 - (f) - (w) [Reserved]
 - (x) Commodities, software, and technical data used in or with defence articles controlled in this category.
 - Note: Use of this paragraph is limited to exports of defence articles controlled in this category where the purchase documentation includes commodities, software, or technical data.
- Note: Parts, components, accessories, or attachments of a simulator in this category that are common to the simulated system or simulated end-item are controlled under the same category as the parts, components, accessories, and attachments of the simulated system or simulated end-item.

15 Category X—Personal Protective Equipment

- (a) Personal protective equipment, as follows:
 - (1) body armour;
 - (2) personal protective clothing, equipment or face paints specially designed to protect against or reduce detection by radar, infrared (IR) or other sensors at wavelengths greater than 900 nanometres;
 - (3) [Reserved]
 - (4) [Reserved]
 - (5) integrated helmets, not specified in Category VIII(h)(15) or Category XII, incorporating optical sights or slewing devices, which include the ability to aim, launch, track or manage munitions;
 - (6) helmets and helmet shells;
 - (7) goggles, spectacles, visors, vision blocks, canopies or filters for optical sights or viewers, employing other than common broadband absorptive dyes or UV inhibitors as a means of protection (for example, narrow band filters or dyes, or broadband limiters or coatings with high visible transparency) having an optical density greater than 3, and that protect against:

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- (i) multiple visible (in-band) laser wavelengths; or
- (ii) thermal flashes associated with nuclear detonations; or
- (iii) near infrared or ultraviolet (out-of-band) laser wavelengths;
- (8) developmental personal protective equipment and specially designed parts, components, accessories, and attachments therefor, developed for the United States Government via contract or other funding authorisation.

Note 1: Subparagraph (1)—see Category XIII(e) for controls on related materials.

Note 2: Subparagraph (2)—see Category XIII(j) for controls on related materials.

Note 3: Subparagraph (7)—see paragraphs (d)(2) and (3) for controls on related parts, components, and materials.

Note 4: Subparagraph (7)—see Category XII for sensor protection equipment.

Note 5: Subparagraph (8)—this subparagraph does not control personal protective equipment and specially designed parts, components, accessories, and attachments (a) in production, or (b) identified in the relevant United States Government contract or other funding authorisation as being developed for both civil and military applications.

Note 6: Subparagraph (8)—note 5 does not apply to defence articles enumerated on this list in production or development.

Note 7: Subparagraph (8)—this subparagraph applies only to those contracts and funding authorisations that are dated 5 January 2015, or later.

(b) [Reserved]

(c) [Reserved]

(d) Parts, components, assemblies, accessories, attachments, and associated equipment for the personal protective equipment controlled in this category, as follows:

- (1) ceramic or composite plates;
- (2) lenses, substrates, or filters “specially designed” for the articles covered in paragraph (a)(7);
- (3) materials and coatings specially designed for the articles covered in paragraph (a)(7) with optical density greater than 3, as follows:
 - (i) narrowband absorbing dyes;
 - (ii) broadband optical switches or limiters (that is, nonlinear material, tunable or switchable agile filters, optical power limiters, near infrared interference based filters);
 - (iii) narrowband interference based notch filters (that is, multi-layer dielectric coatings, rugate, holograms or hybrid (that is, interference with dye)) protecting against multiple laser wavelength and having high visible band transparency;
- (4) any component, part, accessory, attachment, equipment, or system that:
 - (i) is classified; or
 - (ii) contains classified software directly related to defence articles in this list; or
 - (iii) is being developed using classified information.

(e) Technical data and defence services directly related to the defence articles described in paragraphs (a) to (d).

(f) - (w) [Reserved]

- (x) Commodities, software, and technical data used in or with defence articles controlled in this category.

Note: Use of this paragraph is limited to exports of defence articles controlled in this category where the purchase documentation includes commodities, software, or technical data.

16 Category XI—Military Electronics

- (a) Electronic equipment and systems not included in Category XII, as follows:
- (1) underwater hardware, equipment or systems, as follows:
 - (i) active or passive acoustic array sensing systems or acoustic array equipment capable of real-time processing that survey or detect, and also track, localise (that is, determine range and bearing), classify, or identify, surface vessels, submarines, other undersea vehicles, torpedoes, or mines, having any of the following:
 - (A) multi-static capability;
 - (B) operating frequency less than 20 kHz;
 - (C) operating bandwidth greater than 10 kHz;
 - (ii) underwater single acoustic sensor system that distinguishes non-biologic tonals and locates the origin of the sound;
 - (iii) non-acoustic systems that survey or detect, and also track, localise (that is, determine range and bearing), classify, or identify, surface vessels, submarines, other undersea vehicles, torpedoes, or mines;
 - (iv) acoustic modems, networks, and communications equipment with real-time adaptive compensation or employing Low Probability of Intercept (LPI);
 - (v) low Frequency/Very Low Frequency (LF/VLF) electronic modems, routers, interfaces, and communications equipment, specially designed for submarine communications;
 - (vi) autonomous systems and equipment that enable cooperative sensing and engagement by fixed (bottom mounted/seabed) or mobile Autonomous Underwater Vehicles (AUVs);
 - (2) underwater acoustic countermeasures and counter-countermeasures systems or equipment;
 - (3) radar systems and equipment, as follows:
 - (i) airborne radar that maintains positional state of an object or objects of interest, other than weather phenomena, in a received radar signal through time;
 - (ii) Synthetic Aperture Radar (SAR) incorporating image resolution less than (better than) 0.3 m, or incorporating Coherent Change Detection (CCD) with geo-registration accuracy less than (better than) 0.3 m, not including concealed object detection equipment operating in the frequency range from 30 GHz to 3,000 GHz and having a spatial resolution of 0.5 milliradians up to and including 1 milliradians at a standoff distance of 100 m;
 - (iii) Inverse Synthetic Aperture Radar (ISAR);
 - (iv) radar that geodetically-locates (that is, geodetic latitude, geodetic longitude, and geodetic height) with a target location error 50 (TLE50) less than or equal to 10 m at ranges greater than 1 km;

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- (v) any Ocean Surveillance Radar with an average-power-aperture product of greater than 50 Wm²;
- (vi) any ocean surveillance radar that transmits a waveform with an instantaneous bandwidth greater than 100 MHz and has an antenna rotation rate greater than 60 revolutions per minute (RPM);
- (vii) air surveillance radar with free space detection of 1 square metre RCS target at 85 nmi or greater range, scaled to RCS values as RCS to the ¹/₄ power;
- (viii) air surveillance radar with free space detection of 1 square metre RCS target at an altitude of 65,000 feet and an elevation angle greater than 20 degrees (that is, counter-battery);
- (ix) air surveillance radar with multiple elevation beams, phase or amplitude monopulse estimation, or 3D height-finding;
- (x) air surveillance radar with a beam solid angle less than or equal to 16 degrees² that performs free space tracking of 1 square metre RCS target at a range greater or equal to 25 nmi with revisit rate greater or equal to ¹/₃ Hz;
- (xi) instrumentation radar for anechoic test facility or outdoor range that maintains positional state of an object of interest in a received radar signal through time or provides measurement of RCS of a static target less than or equal to minus 10dBsm, or RCS of a dynamic target;
- (xii) radar incorporating pulsed operation with electronics steering of transmit beam in elevation and azimuth;
- (xiii) radar with mode(s) for ballistic tracking or ballistic extrapolation to source of launch or impact point of articles controlled in Categories III, IV, or XV;
- (xiv) active protection radar and missile warning radar with mode(s) implemented for detection of incoming munitions;
- (xv) over the horizon high frequency sky-wave (ionosphere) radar;
- (xvi) radar that detects a moving object through a physical obstruction at distance greater than 0.2 m from the obstruction;
- (xvii) radar having moving target indicator (MTI) or pulse-Doppler processing where any single Doppler filter provides a normalised clutter attenuation of greater than 60dB;
- (xviii) radar having electronic protection or electronic counter-countermeasures (ECCM) other than manual gain control, automatic gain control, radio frequency selection, constant false alarm rate, and pulse repetition interval jitter;
- (xix) radar employing electronic attack (EA) mode(s) using the radar transmitter and antenna;
- (xx) radar employing electronic support (ES) mode(s) (that is, the ability to use a radar system for ES purposes in one or more of the following: as a high-gain receiver, as a wide-bandwidth receiver, as a multi-beam receiver, or as part of a multi-point system);
- (xxi) radar employing non-cooperative target recognition (NCTR) (that is, the ability to recognise a specific platform type without cooperative action of the target platform);
- (xxii) radar employing automatic target recognition (ATR) (that is, recognition of target using structural features (for example, tank

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- versus car) of the target with system resolution better than (less than) 0.3 m);
- (xxiii) radar that sends interceptor guidance commands or provides illumination keyed to an interceptor seeker;
 - (xxiv) radar employing waveform generation for LPI other than frequency modulated continuous wave (FMCW) with linear ramp modulation;
 - (xxv) radar that sends and receives communications;
 - (xxvi) radar that tracks or discriminates ballistic missile warhead from debris or countermeasures;
 - (xxvii) bi-static/multi-static radar that exploits greater than 125 kHz bandwidth and is lower than 2 GHz centre frequency to passively detect or track using radio frequency (RF) transmissions (for example, commercial radio and television stations);
 - (xxviii) radar target generators, projectors, or simulators, specially designed for radars controlled by this category; or
 - (xxix) radar and laser radar systems specially designed for defence articles in paragraph (a)(1) of Category IV or paragraphs (a)(5), (a)(6), or (a)(13) of Category VIII (MT if specially designed for rockets, SLVs, missiles, drones or UAVs capable of delivering a payload of at least 500 kg to a range of at least 300 km);
- (4) electronic combat, that is electronic warfare, systems and equipment, as follows:
- (i) 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;
 - (ii) systems and equipment that detect and automatically discriminate acoustic energy emanating from weapons fire (for example, gunfire, artillery, rocket propelled grenades, or other projectiles), determining location or direction of weapons fire in less than two seconds from receipt of event signal, and able to operate on-the-move (for example, operating on personnel, land vehicles, sea vessels, or aircraft while in motion);
 - (iii) 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 (for example, active or passive electronic attack, electronic countermeasure, electronic counter-countermeasure equipment, jamming, and counter jamming equipment);
- (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:
- (i) are specially designed to integrate, incorporate, network, or employ defence articles that are controlled in this list that do not use the term specially designed; or
 - (ii) incorporate United States government identification friend or foe (IFF) Modes 4 or 5; or
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- (iii) implement active or passive ECCM used to counter acts of communication disruption (for example, radios that incorporate HAVE QUICK I/II, SINGARS, SATURN); or
 - (iv) specially designed, rated, certified, or otherwise specified or described to be in compliance with United States Government NSTISSAM TEMPEST 1-92 standards or CNSSAM TEMPEST 01-02, to implement techniques to suppress compromising emanations of information bearing signals; or
 - (v) transmit voice or data signals specially designed to elude electromagnetic detection.
- (6) [Reserved]
 - (7) developmental electronic equipment or systems funded by the United States Government via contract or other funding authorisation;
 - (8) unattended ground sensor (UGS) systems or equipment having all of the following:
 - (i) automatic target detection;
 - (ii) automatic target tracking, classification, recognition, or identification;
 - (iii) self-forming or self-healing networks;
 - (iv) self-localisation for geo-locating targets;
 - (9) electronic sensor systems or equipment for non-acoustic antisubmarine warfare (ASW) or mine warfare (for example, magnetic anomaly detectors (MAD), electric-field, electromagnetic induction);
 - (10) electronic sensor systems or equipment for detection of concealed weapons, having a standoff detection range of greater than 45 m for personnel or detection of vehicle-carried weapons, not including concealed object detection equipment operating in the frequency range from 30 GHz to 3,000 GHz and having a spatial resolution of 0.5 milliradians up to and including 1 milliradians at a standoff distance of 100 m;
 - (11) test sets specially designed for testing defence articles controlled in paragraphs (a)(3), (a)(4), (a)(5), or (b);
 - (12) direction finding equipment for determining bearings to specific electromagnetic sources or terrain characteristics specially designed for defence articles in paragraph (a)(1) of Category IV or paragraphs (a)(5), (a)(6), or (a)(13) of Category VIII (MT if specially designed for rockets, SLVs, missiles, drones, or UAVs capable of delivering a payload of at least 500 kg to a range of at least 300 km. See note 9).

Note 1: The term Low Probability of Intercept used in this paragraph and elsewhere in this category is defined as a class of measures that disguise, delay, or prevent the interception of acoustic or electromagnetic signals. LPI techniques can involve permutations of power management, energy management, frequency variability, out-of-receiver-frequency band, low-side lobe antenna, complex waveforms, and complex scanning. LPI is also referred to as Low Probability of Intercept, Low Probability of Detection, and Low Probability of Identification.

Note 2: Subsubparagraph (1)(ii)—the term tonals implies discrete frequencies in the broadband and narrowband spectra, emanating from man-made objects.

Note 3: Subsubparagraph (1)(iv)—adaptive compensation is the capability of an underwater modem to assess the water conditions to select the best algorithm to receive and transmit data.

Note 4: Subparagraph (3)—this subparagraph does not control:

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- (a) systems or equipment that require aircraft transponders in order to meet control parameters; and
 - (b) precision approach radar (PAR) equipment conforming to ICAO standards and employing electronically steerable linear (1- dimensional) arrays or mechanically positioned passive antennas; and
 - (c) radio altimeter equipment.
- Note 5: Subsubparagraph (3)(xii)—this subsubparagraph does not control radars not otherwise controlled in this list, operating with a peak transmit power less than or equal to 250 watts.
- Note 6: Subsubparagraph (3)(xvii)—normalised clutter attenuation is defined as the reduction in the power level of received distributed clutter when normalised to the thermal noise level.
- Note 7: Subsubparagraph (3)(xxix)—laser radar systems embody specialised transmission, scanning, receiving, and signal processing techniques for utilisation of lasers for echo ranging, direction finding, and discrimination of targets by location, radial speed, and body reflection characteristics.
- Note 8: Subsubparagraph (3)(xxix)—for the definition of “range” as it pertains to rocket systems, see note 1 to paragraph (a) of Category IV. “Payload” is the total mass that can be carried or delivered by the specified rocket, SLV, or missile that is not used to maintain flight.
- Note 9: Subsubparagraph (3)(xxix)—this subparagraph includes terrain contour mapping equipment, scene mapping and correlation (both digital and analogue) equipment, Doppler navigation radar equipment, passive interferometer equipment, and imaging sensor equipment (both active and passive).
- Note 10: Subsubparagraph (4)(i)—ES provides tactical situational awareness, automatic cueing, targeting, electronic order of battle planning, electronic intelligence (ELINT), communication intelligence (COMINT), or signals intelligence (SIGINT).
- Note 11: Subparagraph (7)—this subparagraph does not control electronic systems or equipment (a) in production, or (b) identified in the relevant United States Government contract or other funding authorisation as being developed for both civil and military applications.
- Note 12: Subparagraph (7)—note 9 does not apply to defence articles enumerated in this list in production or development.
- Note 13: Subparagraph (7)—this subparagraph applies only to those contracts and funding authorisations that are dated 1 July 2015, or later.
- Note 14: Subparagraph (12) includes terrain contour mapping equipment, scene mapping and correlation (both digital and analogue) equipment, Doppler navigation radar equipment, passive interferometer equipment, and imaging sensor equipment (both active and passive).
- (b) Electronic systems, equipment or software, not elsewhere enumerated in this subchapter, 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.
 - (c) Parts, components, accessories, attachments and associated equipment, as follows:
 - (1) Application Specific Integrated Circuits (ASICs) and Programmable Logic Devices (PLD) programmed for defence articles in this list;
 - (2) Printed Circuit Boards (PCBs) and populated circuit card assemblies for which the layout is specially designed for defence articles in this list;
 - (3) multichip modules for which the pattern or layout is specially designed for defence articles in this list;

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- (4) transmit/receive modules or transmit modules that have any two perpendicular sides, with either length d (in cm) equal to or less than 15 divided by the lowest operating frequency in GHz [$d \leq 15 \text{ cm} * \text{GHz} / f \text{ GHz}$], with an electronically variable phase shifter or phasers that are a Monolithic Microwave Integrated Circuit (MMIC), or incorporate a MMIC or discrete RF power transistor;
- (5) high-energy storage capacitors with a repetition rate of 6 discharges or more per minute and full energy life greater than or equal to 10,000 discharges, at greater than 0.2 Amps per Joule peak current, that have either or both of the following:
 - (i) volumetric energy density greater than or equal to 1.5 J/cc;
 - (ii) mass energy density greater than or equal to 1.3 kJ/kg;
- (6) radio frequency circulators of any dimension equal to or less than one quarter ($\frac{1}{4}$) wavelength of the highest operating frequency and isolation greater than 30 dB;
- (7) polarimeter that detects and measures polarisation of radio frequency signals within a single pulse;
- (8) digital radio frequency memory (DRFM) with RF instantaneous input bandwidth greater than 400 MHz, and 4 bit or higher resolution whose output signal is a translation of the input signal (for example, changes in magnitude, time, frequency) and specially designed parts and components therefor;
- (9) vacuum electronic devices, as follows:
 - (i) multiple electron beam or sheet electron beam devices rated for operation at frequencies of 16 GHz or above, and with a saturated power output greater than 10,000 W (70 dBm) or a maximum average power output greater than 3,000 W (65 dBm);
 - (ii) cross-field amplifiers with a gain of 15 dB to 17 dB or a duty factor greater than 5%;
- (10) antenna, and specially designed parts and components therefor, that:
 - (i) 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; or
 - (ii) form adaptive null attenuation greater than 35 dB with convergence time less than one second; or
 - (iii) detect signals across multiple RF bands with matched left hand and right hand spiral antenna elements for determination of signal polarisation; or
 - (iv) determine signal angle of arrival less than two degrees (for example, interferometer antenna);
- (11) radomes or electromagnetic antenna windows that:
 - (i) incorporate radio frequency selective surfaces; or
 - (ii) operate in multiple non-adjacent frequency bands for radar applications; or
 - (iii) incorporate a structure that is specially designed to provide ballistic protection from bullets, shrapnel, or blast; or

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- (iv) have a melting point greater than 1,300°C and maintain a dielectric constant less than 6 at temperatures greater than 500°C; or
 - (v) are manufactured from ceramic materials with a dielectric constant less than 6 at any frequency from 100 MHz to 100 GHz (MT if usable in rockets, SLVs, or missiles capable of achieving a range greater than or equal to 300 km; or if usable in drones or UAVs capable of delivering a payload of at least 500 kg to a range of at least 300 km. See note 9 to paragraph (a)); or
 - (vi) maintain structural integrity at stagnation pressures greater than 6,000 pounds per square foot; or
 - (vii) withstand combined thermal shock greater than $4.184 \times 10^6 \text{ J/m}^2$ accompanied by a peak overpressure of greater than 50 kPa (MT if usable in rockets, SLVs, missiles, drones, or UAVs capable of delivering a payload of at least 500 kg to a range of at least 300 km and usable in protecting against nuclear effects (for example, Electromagnetic Pulse (EMP), X-rays, combined blast and thermal effects). See note 9 to paragraph (a));
- (12) underwater sensors (acoustic vector sensors, hydrophones, or transducers) or projectors, specially designed for systems controlled by paragraphs (a)(1) and (a)(2) of this category, having any of the following:
- (i) a transmitting frequency below 10 kHz for sonar systems;
 - (ii) sound pressure level exceeding 224 dB (reference 1 mPa at 1 m) for equipment with an operating frequency in the band from 10 kHz to 24 kHz inclusive;
 - (iii) sound pressure level exceeding 235 dB (reference 1 mPa at 1 m) for equipment with an operating frequency in the band between 24 kHz and 30 kHz;
 - (iv) forming beams of less than 1° on any axis and having an operating frequency of less than 100 kHz;
 - (v) designed to operate with an unambiguous display range exceeding 5,120 m;
 - (vi) 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;
 - (B) incorporating other than lead zirconate titanate as the transduction element;
- (13) parts or components containing piezoelectric materials which are specially designed for underwater hardware, equipment, or systems controlled by paragraph (c)(12);
- (14) tuners specially designed for systems and equipment in paragraphs (a)(4) and (b);
- (15) electronic assemblies and components, capable of operation at temperatures in excess of 125 °C and specially designed for UAVs or drones controlled by Category VIII, rockets, space launch vehicles (SLV), or missiles controlled by Category IV capable of achieving a range greater than or equal to 300 km (MT);
- (16) hybrid (combined analogue/digital) computers specially designed for modelling, simulation, or design integration of systems enumerated in paragraphs (a)(1), (d)(1), (d)(2), (h)(1), (h)(2), (h)(4), (h)(8), and (h)(9) of
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Category IV or paragraphs (a)(5), (a)(6), or (a)(13) of Category VIII (MT if for rockets, SLVs, missiles, drones or UAVs capable of delivering a payload of at least 500 kg to a range of at least 300 km for their subsystems);

- (17) chaff and flare rounds specially designed for the systems and equipment described in paragraph (a)(4)(iii) of this category, and parts and components therefor containing materials controlled in Category V;
- (18) parts, components, or accessories specially designed for an information assurance/information security system or radio controlled in this list that modify its published properties (for example, frequency range, algorithms, waveforms, CODECs, or modulation/demodulation schemes);
- (19) any part, component, accessory, attachment, equipment, or system that (MT for those articles designated as such):
 - (i) is classified; or
 - (ii) contains classified software directly related to defence articles; or
 - (iii) is being developed using classified information.

Note 1: Subparagraph (1)—an ASIC is an integrated circuit developed and produced for a specific application or function regardless of number of customers.

Note 2: Subparagraph (1)—unprogrammed PLDs are not controlled by this paragraph.

Note 3: Subparagraph (10)—this category does not control Traffic Collision Avoidance Systems (TCAS) equipment.

Note 4: Subparagraph (19)—parts and components controlled by this paragraph are limited to those that store, process or transmit classified software.

- (d) Technical data and defence services directly related to the defence articles enumerated in paragraphs (a) to (c) (MT for technical data and defence services related to articles designated as such).

(e) - (w) [Reserved]

- (x) Commodities, software and technology used in or with defence articles controlled in this category.

Note: Use of this paragraph is limited to exports of defence articles controlled in this category where the purchase documentation includes commodities, software or technology.

17 Category XII—Fire Control, Range Finder, Optical and Guidance and Control Equipment

- (a) Fire control systems; gun and missile tracking and guidance systems; gun range, position, height finders, spotting instruments and laying equipment; aiming devices (electronic, optic, and acoustic); bomb sights, bombing computers, military television sighting and viewing units, and periscopes for the articles in this list.
- (b) Lasers specifically designed, modified or configured for military application including those used in military communication devices, target designators and range finders, target detection systems, and directed energy weapons.
- (c) Infrared focal plane array detectors specifically designed, modified, or configured for military use; image intensification and other night sighting equipment or systems specifically designed, modified or configured for military

use; second generation and above military image intensification tubes (defined below) specifically designed, developed, modified, or configured for military use, and infrared, visible and ultraviolet devices specifically designed, developed, modified, or configured for military application. Replacement tubes or focal plane arrays identified in this paragraph being exported for commercial systems are subject to export controls.

Note: For the purposes of this paragraph, *second and third generation image intensification tubes* are defined as having a peak response within the 0.4 to 1.05 micron wavelength range and incorporating a microchannel plate for electron image amplification having a hole pitch (center-to-center spacing) of less than 25 microns and having either:

- (a) an S-20, S-25 or multialkali photocathode; or
 - (b) a GaAs, GaInAs, or other compound semiconductor photocathode.
- (d) Inertial platforms and sensors for weapons or weapon systems; guidance, control and stabilisation systems except for those systems covered in Category VIII; astro-compasses and star trackers and military accelerometers and gyros. For aircraft inertial reference systems and related components refer to Category VIII.
 - (e) Components, parts, accessories, attachments and associated equipment specifically designed or modified for the articles in paragraphs (a) to (d), except for such items as are in normal commercial use.
 - (f) Technical data and defence services directly related to the defence articles enumerated in paragraphs (a) to (e).

18 Category XIII—Materials and Miscellaneous Articles

- (a) Cameras and specialised processing equipment therefor, photointerpretation, stereoscopic plotting, and photogrammetry equipment which are specifically designed, developed, modified, adapted, or configured for military purposes, and components specifically designed or modified therefor.
- (b) Information security or information assurance systems and equipment, cryptographic devices, software and components, as follows:
 - (1) military or intelligence cryptographic (including key management) systems, equipment, assemblies, modules, integrated circuits, components and software (including their cryptographic interfaces) capable of maintaining secrecy or confidentiality of information or information systems, including equipment or software for tracking, telemetry and control (TT&C) encryption and decryption;
 - (2) military or intelligence cryptographic (including key management) systems, equipment, assemblies, modules, integrated circuits, components and software (including their cryptographic interfaces) capable of generating spreading or hopping codes for spread spectrum systems or equipment;
 - (3) military or intelligence cryptanalytic systems, equipment, assemblies, modules, integrated circuits, components and software;
 - (4) military and intelligence systems, equipment, assemblies, modules, integrated circuits, components or software (including all previous or derived versions) authorised to control access to or transfer data between different security domains as listed on the Unified Cross Domain Management Office (UCDMO) Control List (UCL);

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(5) ancillary equipment specially designed for the articles in subparagraphs (1) to (4).

(c) [Reserved]

(d) Materials, as follows:

(1) ablative materials fabricated or semi-fabricated from advanced composites (for example, silica, graphite, carbon, carbon/carbon, and boron filaments) specially designed for the articles in Category IV or XV (MT if usable for nozzles, re-entry vehicles, nose tips or nozzle flaps usable in rockets, space launch vehicles (SLVs) or missiles capable of achieving a range greater than or equal to 300 km);

(2) carbon/carbon billets and preforms that are reinforced with continuous unidirectional fibres, tows, tapes, or woven cloths in three or more dimensional planes (MT if usable for rocket, SLV or missile systems and usable in rockets, SLVs or missiles capable of achieving a range greater than or equal to 300 km).

Note 1: "Range" is the maximum distance that the specified rocket system is capable of travelling in the mode of stable flight as measured by the projection of its trajectory over the surface of the Earth. The maximum capability based on the design characteristics of the system, when fully loaded with fuel or propellant, will be taken into consideration in determining range. The range for rocket systems will be determined independently of any external factors such as operational restrictions, limitations imposed by telemetry, data links, or other external constraints. For rocket systems, the range will be determined using the trajectory that maximises range, assuming International Civil Aviation Organization (ICAO) standard atmosphere with zero wind.

Note 2: This paragraph does not control carbon/carbon billets and preforms where reinforcement in the third dimension is limited to interlocking of adjacent layers only.

(e) Armour (for example, organic, ceramic, metallic) and armour materials, as follows:

(1) spaced armour with E_m greater than 1.4;

(2) transparent armour having E_m greater than or equal to 1.3 or having E_m less than 1.3;

(3) transparent ceramic plate greater than $\frac{1}{4}$ inch-thick and larger than 8 inches x 8 inches, excluding glass, for transparent armour;

(4) non-transparent ceramic plate or blanks, greater than $\frac{1}{4}$ inches thick and larger than 8 inches x 8 inches for transparent armour. This includes spinel and aluminum oxynitride (ALON);

(5) composite armour with E_m greater than 1.4;

(6) metal laminate armour with E_m greater than 1.4;

(7) developmental armour funded by the United States Government via contract or other funding authorisation.

Note 1: This paragraph does not control armour:

(a) in production; or

(b) identified in the relevant United States Government contract or other funding authorisation as being developed for both civil and military applications.

Note 2: Note 1 does not apply to defence articles enumerated on this list in production or development.

Note 3: This paragraph applies to those contracts and funding authorisations that are dated 8 July 2014, or later.

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- (f) Any article enumerated in this category that (MT for those articles designated as such):
- (1) is classified; or
 - (2) contains classified software directly related to defence articles in this list; or
 - (3) is being developed using classified information.
- (g) Concealment and deception equipment, as follows (MT for applications usable for rockets, SLVs, missiles, drones, or unmanned aerial vehicles (UAVs) capable of achieving a range greater than or equal to 300 km and their subsystems. See note 1 to paragraph (d)):
- (1) polymers loaded with carbonyl iron powder, ferrites, iron whiskers, fibres, flakes, or other magnetic additives having a surface resistivity of less than 5000 ohms/square and greater than 10 ohms/square with electrical isotropy of less than 5%;
 - (2) multi-layer camouflage systems specially designed to reduce detection of platforms or equipment in the infrared or ultraviolet frequency spectrums;
 - (3) high temperature (greater than 300°F operation) ceramic or magnetic radar absorbing material (RAM) specially designed for use on defence articles or military items;
 - (4) broadband (greater than 30% bandwidth) lightweight (less than 2 lbs/sq ft) magnetic radar absorbing material (RAM) specially designed for use on defence articles or military items.
- (h) Energy conversion devices not otherwise enumerated in this list, as follows:
- (1) fuel cells specially designed for platforms or soldier systems specified in this list;
 - (2) thermal engines specially designed for platforms or soldier systems specified in this list;
 - (3) thermal batteries (MT if designed or modified for rockets, SLVs, missiles, drones, or UAVs capable of achieving a range equal to or greater than 300 km. See note 1 to paragraph (d));
 - (4) thermionic generators specially designed for platforms or soldier systems enumerated in this list.
- Note: Subparagraph (3)—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.
- (i) Signature reduction software, and technical data as follows (MT for software specially designed for reduced observables, for applications usable for rockets, SLVs, missiles, drones, or UAVs capable of achieving a range (see note 1 to paragraph (d)) greater than or equal to 300 km, and their subsystems, including software specially designed for analysis of signature reduction; MT for technical data for the development, production, or use of equipment, materials, or software designated as such, including databases specially designed for analysis of signature reduction):
- (1) software associated with the measurement or modification of system signatures for defence articles to reduce detectability or observability;
 - (2) software for design of low-observable platforms;

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- (3) software for design, analysis, prediction, or optimisation of signature management solutions for defence articles;
 - (4) infrared signature measurement or prediction software for defence articles or radar cross section measurement or prediction software;
 - (5) signature management technical data, including codes and algorithms for defence articles to reduce detectability or observability;
 - (6) signature control design methodology for defence articles to reduce detectability or observability;
 - (7) technical data for use of micro-encapsulation or micro-spheres to reduce infrared, radar, or visual detection of platforms or equipment;
 - (8) multi-layer camouflage system technical data for reducing detection of platforms or equipment;
 - (9) multi-spectral surface treatment technical data for modifying infrared, visual or radio frequency signatures of platforms or equipment;
 - (10) technical data for modifying visual, electro-optical, radiofrequency, electric, magnetic, electromagnetic, or wake signatures (for example, low probability of intercept (LPI) techniques, methods or applications) of defence platforms or equipment through shaping, active, or passive techniques;
 - (11) technical data for modifying acoustic signatures of defence platforms or equipment through shaping, active, or passive techniques.
- (j) Equipment, materials, coatings, and treatments not elsewhere specified, as follows:
- (1) specially treated or formulated dyes, coatings, and fabrics used in the design, manufacture, or production of personnel protective clothing, equipment, or face paints designed to protect against or reduce detection by radar, infrared, or other sensors at wavelengths greater than 900 nanometres (see Category X(a)(2));
 - (2) equipment, materials, coatings, and treatments that are specially designed to modify the electro-optical, radiofrequency, infrared, electric, laser, magnetic, electromagnetic, acoustic, electro-static, or wake signatures of defence articles through control of absorption, reflection, or emission to reduce detectability or observability (MT for applications usable for rockets, SLVs, missiles, drones, or UAVs capable of achieving a range greater than or equal to 300 km, and their subsystems. See note 1 to paragraph (d)).
- (k) Tooling and equipment, as follows.
- (1) tooling and equipment specially designed for production of low observable (LO) components;
 - (2) portable platform signature field repair validation equipment (for example, portable optical interrogator that validates integrity of a repair to a signature reduction structure), and their subsystems. See note 1 to paragraph (d)).
- (l) Technical data and defence services directly related to the defence articles described in paragraphs (a) to (h), (j) and (k) and defence services directly related to the defence articles described in this category. (MT for technical data and defence services related to articles designated as such).

- (m) The following interpretations explain and amplify terms used in this category and elsewhere in this list:
- (1) composite armour is defined as having more than one layer of different materials or a matrix;
 - (2) spaced armours are metallic or non-metallic armours that incorporate an air space or obliquity or discontinuous material path effects as part of the defeat mechanism;
 - (3) reactive armour employs explosives, propellants, or other materials between plates for the purpose of enhancing plate motion during a ballistic event or otherwise defeating the penetrator;
 - (4) electromagnetic armour (EMA) employs electricity to defeat threats such as shaped charges;
 - (5) materials used in composite armour could include layers of metals, plastics, elastomers, fibres, glass, ceramics, ceramic-glass reinforced plastic laminates, encapsulated ceramics in a metallic or non-metallic matrix, functionally gradient ceramic-metal materials, or ceramic balls in a cast metal matrix;
 - (6) for this category, a material is considered transparent if it allows 75% or greater transmission of light, corrected for index of refraction, in the visible spectrum through a 1 mm thick nominal sample;
 - (7) the material controlled in paragraph (e)(4) of this category has not been treated to reach the 75% transmission level referenced in (m)(6) of this category;
 - (8) metal laminate armours are two or more layers of metallic materials which are mechanically or adhesively bonded together to form an armour system;
 - (9) E_m is the line-of-sight target mass effectiveness ratio and provides a measure of the tested armour's performance to that of rolled homogenous armour, where E_m is defined as follows:

$$E_m = \frac{\rho_{RHA} (P_o - P_r)}{AD_{TARGET}}$$

where:

ρ_{RHA} is density of RHA, (7.85 g/cm³).

P_o is Baseline Penetration of RHA, (mm).

P_r is Residual Line of Sight Penetration, either positive or negative (mm RHA equivalent).

AD_{TARGET} is Line-of-Sight Areal Density of Target (kg/m²).

If witness plate is penetrated, P_r is the distance from the projectile to the front edge of the witness plate. If not penetrated, P_r is negative and is the distance from the back edge of the target to the projectile.

(n) - (w) [Reserved]

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- (x) Commodities, software and technical data used in or with defence articles controlled in this category.

Note: Use of this paragraph is limited to exports of defense articles controlled in this category where the purchase documentation includes commodities, software or technical data.

19 Category XIV—Toxicological Agents, Including Chemical Agents, Biological Agents, and Associated Equipment

- (a) Chemical agents, to include:
- (1) nerve agents:
 - (i) 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) (CWC Schedule 1A); and
 - (ii) 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) (CWC Schedule 1A); and
 - (iii) 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) (CWC Schedule 1A); and
 - (2) amiton: O,O-Diethyl S-[2(diethylamino)ethyl] phosphorothiolate and corresponding alkylated or protonated salts (CAS 78-53-5) (CWC Schedule 2A); and
 - (3) vesicant agents:
 - (i) sulfur mustards, such as: 2-Chloroethylchloromethylsulfide (CAS 2625-76-5) (CWC Schedule 1A); Bis(2-chloroethyl)sulfide (CAS 505-60-2) (CWC Schedule 1A); Bis(2-chloroethylthio)methane (CAS 63839-13-6) (CWC Schedule 1A); 1,2-bis (2-chloroethylthio)ethane (CAS 3563-36-8) (CWC Schedule 1A); 1,3-bis (2-chloroethylthio)-n-propane (CAS 63905-10-2) (CWC Schedule 1A); 1,4-bis (2-chloroethylthio)-n-butane (CWC Schedule 1A); 1,5-bis (2-chloroethylthio)-n-pentane (CWC Schedule 1A); Bis (2-chloroethylthiomethyl)ether (CWC Schedule 1A); Bis (2-chloroethylthioethyl)ether (CAS 63918-89-8) (CWC Schedule 1A); and
 - (ii) lewisites, such as: 2-chlorovinylchloroarsine (CAS 541-25-3) (CWC Schedule 1A); Tris (2-chlorovinyl) arsine (CAS 40334-70-1) (CWC Schedule 1A); Bis (2-chlorovinyl) chloroarsine (CAS 40334-69-8) (CWC Schedule 1A); and
 - (iii) nitrogen mustards, such as: HN1: bis (2-chloroethyl) ethylamine (CAS 538-07-8) (CWC Schedule 1A); HN2: bis (2-chloroethyl) methylamine (CAS 51-75-2) (CWC Schedule 1A); HN3: tris (2-chloroethyl)amine (CAS 555-77-1) (CWC Schedule 1A); and
 - (iv) ethyldichloroarsine (ED); and

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- (v) methyldichloroarsine (MD); and
 - (4) incapacitating agents, such as:
 - (i) 3-Quinuclidinyl benzilate (BZ) (CAS 6581-06-2) (CWC Schedule 2A); and
 - (ii) diphenylchloroarsine (DA) (CAS 712-48-1); and
 - (iii) diphenylcyanoarsine (DC).
 - (b) Biological agents and biologically derived substances specifically developed, configured, adapted, or modified for the purpose of increasing their capability to produce casualties in humans or livestock, degrade equipment or damage crops.
 - (c) Chemical agent 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) (CWC Schedule 1B); Methylphosphinyldifluoride;
 - (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)phosphonite and corresponding alkylated and protonated salts, such as: QL: O-Ethyl-2-di-isopropylaminoethyl methylphosphonite (CAS 57856-11-8) (CWC Schedule 1B);
 - (3) chlorosarin: O-Isopropyl methylphosphonochloridate (CAS 1445-76-7) (CWC Schedule 1B);
 - (4) chlorosoman: O-Pinakolyl methylphosphonochloridate (CAS 7040-57-5) (CWC Schedule 1B);
 - (5) DC: Methylphosphonyl dichloride (CAS 676-97-1) (CWC Schedule 2B); Methylphosphinyldichloride;
 - (d) Tear gases and riot control agents including:
 - (1) adamsite (Diphenylamine chloroarsine or DM) (CAS 578-94-9); and
 - (2) CA (Bromobenzyl cyanide) (CAS 5798-79-8); and
 - (3) CN (Phenylacetyl chloride or w-Chloroacetophenone) (CAS 532-27-4); and
 - (4) CR (Dibenz-(b,f)-1,4-oxazepine) (CAS 257-07-8); and
 - (5) CS (o-Chlorobenzylidenemalononitrile or o-Chlorobenzalmalononitrile) (CAS 2698-41-1); and
 - (6) dibromodimethyl ether (CAS 4497-29-4); and
 - (7) dichlorodimethyl ether (ClCi) (CAS 542-88-1); and
 - (8) ethyldibromoarsine (CAS 683-43-2); and
 - (9) bromo acetone; and
 - (10) bromo methylethylketone; and
 - (11) iodo acetone; and
 - (12) phenylcarbylamine chloride; and
 - (13) ethyl iodoacetate;
 - (e) Defoliants, as follows:
 - (1) agent Orange (2,4,5-Trichlorophenoxyacetic acid mixed with 2,4-dichlorophenoxyacetic acid);
 - (2) LNF (Butyl 2-chloro-4-fluorophenoxyacetate);
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- (f) Equipment and its components, parts, accessories, and attachments specifically designed or modified for military operations and compatibility with military equipment as follows:
 - (1) the dissemination, dispersion or testing of the chemical agents, biological agents, tear gases and riot control agents, and defoliants listed in paragraphs (a), (b), (d) and (e), respectively;
 - (2) the detection, identification, warning or monitoring of the chemical agents and biological agents listed in paragraph (a) and (b);
 - (3) sample collection and processing of the chemical agents and biological agents listed in paragraph (a) and (b);
 - (4) individual protection against the chemical and biological agents listed in paragraphs (a) and (b);
 - (5) collective protection against the chemical agents and biological agents listed in paragraph (a) and (b);
 - (6) decontamination or remediation of the chemical agents and biological agents listed in paragraph (a) and (b).
- (g) Antibodies, polynucleotides, biopolymers or biocatalysts specifically designed or modified for use with articles controlled in paragraph (f).
- (h) Medical countermeasures, to include pre- and post-treatments, vaccines, antidotes and medical diagnostics, specifically designed or modified for use with the chemical agents listed in paragraph (a) and vaccines with the sole purpose of protecting against biological agents identified in paragraph (b). Examples include: barrier creams specifically designed to be applied to skin and personal equipment to protect against vesicant agents controlled in paragraph (a); atropine auto injectors specifically designed to counter nerve agent poisoning.
- (i) Modelling or simulation tools specifically designed or modified for chemical or biological weapons design, development or employment. The concept of modelling and simulation includes software covered by paragraph (m) specifically designed to reveal susceptibility or vulnerability to biological agents or materials listed in paragraph (b).
- (j) Test facilities specifically designed or modified for the certification and qualification of articles controlled in paragraph (f).
- (k) Equipment, components, parts, accessories, and attachments, exclusive of incinerators (including those which have specially designed waste supply systems and special handling facilities), specifically designed or modified for destruction of the chemical agents in paragraph (a) or the biological agents in paragraph (b). This destruction equipment includes facilities specifically designed or modified for destruction operations.
- (l) Tooling and equipment specifically designed or modified for the production of articles controlled by paragraph (f).
- (m) Technical data and defence services related to the defence articles enumerated in paragraphs (a) to (l).
- (n) The following interpretations explain and amplify the terms used in this category and elsewhere in this list:

- (1) a chemical agent in paragraph (a) is a substance having military application, which by its ordinary and direct chemical action, produces a powerful physiological effect;
- (2) the biological agents or biologically derived substances in paragraph (b) are those agents and substances capable of producing casualties in humans or livestock, degrading equipment or damaging crops and which have been modified for the specific purpose of increasing such effects. Examples of such modifications include increasing resistance to UV radiation or improving dissemination characteristics. This does not include modifications made only for civil applications (for example, medical or environmental use);
- (3) the destruction equipment controlled by this category related to biological agents in paragraph (b) is that equipment specifically designed to destroy only the agents identified in paragraph (b);
- (4) the individual protection against the chemical and biological agents controlled by this category includes:
 - (i) military protective clothing and masks, but not those items designed for domestic preparedness (for example, civil defence). Domestic preparedness devices for individual protection that integrate components and parts identified in this subparagraph are excluded from this category when such components are:
 - (A) integral to the device; and
 - (B) inseparable from the device; and
 - (C) incapable of replacement without compromising the effectiveness of the device; and
 - (ii) components and parts identified in this subparagraph exported for integration into domestic preparedness devices for individual protection are included in this category;
- (5) technical data and defence services in paragraph (l) include libraries, databases and algorithms specifically designed or modified for use with articles controlled in paragraph (f);
- (6) the tooling and equipment covered by paragraph (l) includes moulds used to produce protective masks, over-boots, and gloves controlled by paragraph (f) and leak detection equipment specifically designed to test filters controlled by paragraph (f);
- (7) the resulting product of the combination of any controlled or non-controlled substance compounded or mixed with any item controlled by this list is also subject to the controls of this category.

Note 1: This category does not control formulations containing 1% or less CN or CS or individually packaged tear gases or riot control agents for personal self-defence purposes.

Note 2: Paragraphs (a) and (d) do not include the following:

- (a) cyanogen chloride;
- (b) hydrocyanic acid;
- (c) chlorine;
- (d) carbonyl chloride (Phosgene);
- (e) ethyl bromoacetate;
- (f) xylol bromide;
- (g) benzyl bromide;
- (h) benzyl iodide;

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- (i) chloro acetone;
- (j) chloropicrin (trichloronitromethane);
- (k) fluorine;
- (l) liquid pepper.

Note 3: Chemical Abstract Service (CAS) registry numbers do not cover all the substances and mixtures controlled by this category. The numbers are provided as examples to assist the government agencies in the license review process and the exporter when completing their license application and export documentation.

Note 4: This note is left intentionally blank.

Note 5: Pharmacological formulations containing nitrogen mustards and certain reference standards for these drugs are not considered to be chemical agents when:

- (a) the drug is in the form of a final medical product; or
- (b) the reference standard contains salts of HN2 [bis(2-chloroethyl) methylamine], the quantity to be shipped is 150 milligrams or less, and individual shipments do not exceed twelve per calendar year per end user.

Technical data for the production of HN1 [bis(2-chloroethyl)ethylamine]; HN2 [bis(2-chloroethyl)methylamine], HN3 [tris(2-chloroethyl)amine]; or salts of these, such as tris (2-chloroethyl)amine hydrochloride, remains controlled under this category.

20 Category XV—Spacecraft Systems and Associated Equipment

- (a) Spacecraft, including communications satellites and space vehicles, whether designated developmental, experimental, research, or scientific, or having a commercial, civil, or military end-use, that:
 - (1) are specially designed to mitigate effects (for example, scintillation) of or for detection of a nuclear detonation;
 - (2) autonomously track ground, airborne, missile, or space objects in real-time using imaging, infrared, radar, or laser systems;
 - (3) conduct signals intelligence (SIGINT) or measurement and signatures intelligence (MASINT);
 - (4) are specially designed to be used in a constellation or formation that when operated together, in essence or effect, form a virtual satellite (for example, functioning as if one satellite) with the characteristics or functions of other items in paragraph (a);
 - (5) are anti-satellite or anti-spacecraft (for example, kinetic, RF, laser, charged particle);
 - (6) have space-to-ground weapons systems (for example, kinetic or directed energy);
 - (7) have any of the following electro-optical remote sensing capabilities or characteristics:
 - (i) electro-optical visible and near infrared (VNIR) (that is, 400nm to 1,000nm) or infrared (that is, greater than 1,000nm to 30,000nm) with less than 40 spectral bands and having a clear aperture greater than 0.35 metres;
 - (ii) electro-optical hyperspectral with 40 spectral bands or more in the VNIR, short-wavelength infrared (SWIR) (that is, greater than 1,000nm to 2,500nm) or any combination of the aforementioned and having a Ground Sample Distance (GSD) less than 30 metres;

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- (iii) electro-optical hyperspectral with 40 spectral bands or more in the mid-wavelength infrared (MWIR) (that is, greater than 2,500nm to 5,500nm) having a narrow spectral bandwidth of $\Delta\lambda$ less than or equal to 20nm full width at half maximum (FWHM) or having a wide spectral bandwidth with $\Delta\lambda$ greater than 20nm FWHM and a GSD less than 200 metres;
- (iv) electro-optical hyperspectral with 40 spectral bands or more in the long-wavelength infrared (LWIR) (that is, greater than 5,500nm to 30,000nm) having a narrow spectral bandwidth of $\Delta\lambda$ less than or equal to 50nm FWHM or having a wide spectral bandwidth with $\Delta\lambda$ greater than 50nm FWHM and a GSD less than 500 metres;
- (8) have radar remote sensing capabilities or characteristics (for example, active electronically scanned array (AESA), synthetic aperture radar (SAR), inverse synthetic aperture radar (ISAR), ultra-wideband SAR), except those having a centre frequency equal to or greater than 1 GHz but less than or equal to 10 GHz and having a bandwidth less than 300 MHz;
- (9) provide Positioning, Navigation, and Timing (PNT) signals;
- (10) provide space-based logistics, surveillance, assembly, repair, or servicing of any spacecraft (for example, refuelling) and have integrated propulsion other than that required for attitude control;
- (11) provide for sub-orbital or in-space human habitation and have integrated propulsion other than that required for attitude control;
- (12) that are not commercial communications satellites and that have integrated propulsion other than for attitude control or achieving initial orbit;
- (13) are classified, contain classified software or hardware, are manufactured using classified production data, or are being developed using classified information (for example, having classified requirements, specifications, functions, or operational characteristics or include classified cryptographic items controlled under Category XIII of this list).

Note 1: This paragraph does not control the International Space Station (ISS) and its specially designed parts and components.

Note 2: Attitude control is the exercise of control over spacecraft orientation (for example, pointing) within an orbital plane, which may include orbit maintenance using the attitude control thrusters.

Note 3: Subparagraph (7)—Ground Sample Distance (GSD) is measured from a spacecraft's nadir (that is, local vertical) position.

Note 4: Subparagraph (7)—optical remote sensing spacecraft or satellite spectral bandwidth is the smallest difference in wavelength (that is, $\Delta\lambda$) that can be distinguished at full width at half maximum (FWHM) of wavelength λ .

Note 5: Subparagraph (7)—an optical satellite or spacecraft is not Significant Military Equipment.

Note 6: Subparagraph (9)—this subparagraph does not control a satellite or spacecraft that provides only a differential correction broadcast for the purposes of positioning, navigation, or timing.

- (b) Ground control systems or training simulators, specially designed for telemetry, tracking and control (TT&C) of spacecraft in paragraph (a)).
- (c) Global Positioning System (GPS) receiving equipment specifically designed for military application or GPS receiving equipment with any of the following characteristics, and specifically designed parts and components therefor:

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- (1) specially designed for encryption or decryption (for example, Y-Code) of GPS precise positioning service (PPS) signals (MT if designed or modified for airborne applications);
- (2) [Reserved]
- (3) specifically designed for use with a null steering antenna, an electronically steerable antenna or including a null steering antenna designed to reduce or avoid jamming signals (MT if designed or modified for airborne applications);
- (4) specially designed for use with rockets, missiles, SLVs, drones or unmanned air vehicle systems capable of delivering at least a 500 kg payload to a range of at least 300 km (MT if designed or modified for rockets, missiles, SLVs, drones or unmanned air vehicle systems controlled in this list).

Note: Subparagraph (4)—“Payload” is the total mass that can be carried or delivered by the specified rocket, missile, SLV, drone or unmanned aerial vehicle that is not used to maintain flight. For the definition of “range” as it pertains to rocket systems, see note 1 to paragraph (a) of Category IV. For the definition of “range” as it pertains to aircraft systems, see note 2 to paragraph (a) of Category VIII.

- (d) [Reserved]
- (e) Spacecraft parts, components, accessories, attachments, equipment, or systems, as follows:
 - (1) antenna systems specially designed for spacecraft that:
 - (i) have a dimension greater than 25 metres in diameter or length of the major axis; or
 - (ii) employ active electronic scanning; or
 - (iii) are adaptive beam forming; or
 - (iv) are for interferometric radar;
 - (2) space-qualified optics (that is, lens or mirror), including optical coating, having active properties (for example, adaptive, deformable) with a largest lateral clear aperture dimension greater than 0.35 metres;
 - (3) space-qualified focal plane arrays (FPA) having a peak response in the wavelength range exceeding 900nm and readout integrated circuit (ROIC), whether separate or integrated, specially designed therefor;
 - (4) space-qualified mechanical (that is, active) cryocooler or active cold finger, and associated control electronics specially designed therefor;
 - (5) space-qualified active vibration suppression, including active isolation and active dampening, and associated control electronics therefor;
 - (6) optical bench assemblies specially designed to enable spacecraft to meet or exceed the parameters described in paragraph (a);
 - (7) space-qualified kinetic or directed-energy systems (for example, RF, laser, charged particle) specially designed for spacecraft in paragraph (a)(5) or (6), and specially designed parts and components therefor (for example, power conditioning and beam-handling/switching, propagation, tracking, and pointing equipment);
 - (8) [Reserved]
 - (9) space-qualified cesium, rubidium, hydrogen maser, or quantum (for example, based upon Al, Hg, Yb, Sr, Be Ions) atomic clocks, and specially designed parts and components therefor;

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- (10) attitude determination and control systems, and specially designed parts and components therefor, that provide a spacecraft's geolocation accuracy, without using Ground Location Points, better than or equal to:
 - (i) 5 metres (CE90) from low earth orbit (LEO); or
 - (ii) 30 metres (CE90) from medium earth orbit (MEO); or
 - (iii) 150 metres (CE90) from geosynchronous orbit (GEO); or
 - (iv) 225 metres (CE90) from high earth orbit (HEO);
 - (11) space-based systems, and specially designed parts and components therefor, as follows:
 - (i) nuclear reactors and associated power conversion systems (for example, liquid metal or gas-cooled fast reactors);
 - (ii) radioisotope-based power systems (for example, radioisotope thermoelectric generators);
 - (iii) nuclear thermal propulsion systems (for example, solid core, liquid core, gas core fission);
 - (iv) plasma based propulsion systems;
 - (12) thrusters (for example, rocket engines) that provide greater than 150 lbf (that is, 667.23 N) vacuum thrust (MT for rocket motors or engines having a total impulse capacity equal to or greater than 8.41×10^5 newton seconds);
 - (13) control moment gyroscope (CMG) specially designed for spacecraft;
 - (14) space-qualified monolithic microwave integrated circuits (MMIC) that combine transmit and receive (T/R) functions on a single die as follows:
 - (i) having a power amplifier with maximum saturated peak output power (in watts), P_{sat} , greater than 200 divided by the maximum operating frequency (in GHz) squared [$P_{sat} > 200 \text{ W} \cdot \text{GHz}^2 / f_{\text{GHz}}^2$];
 - (ii) having a common path (for example, phase shifter-digital attenuator) circuit with greater than 3 bits phase shifting at operating frequencies 10 GHz or below, or greater than 4 bits phase shifting at operating frequencies above 10 GHz;
 - (15) space-qualified oscillator for radar in paragraph (a) of this category with phase noise less than $-120 \text{ dBc/Hz} + (20 \log_{10}(\text{RF}) \text{ (in GHz)})$ measured at $2 \text{ KHz} \cdot \text{RF}$ (in GHz) from carrier;
 - (16) space-qualified star tracker or star sensor 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 therefore (MT);
 - (17) primary, secondary or hosted payload that performs any of the functions described in paragraph (a);
 - (18) secondary or hosted payload, and specially designed parts and components therefor, developed with US Government funding;
 - (19) spacecraft heat shields or heat sinks specially designed for atmospheric entry or re-entry, and specially designed parts and components therefor (MT if usable in rockets, SLVs, missiles, drones or UAVs capable of delivering a payload of at least 500 kg to a range of at least 300 km);
 - (20) equipment modules, stages, or compartments that contain propulsion other than that required for attitude control and can be separated or jettisoned from another spacecraft (see note 2 to paragraph (a));
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- (21) any part, component, accessory, attachment, equipment, or system that:
- (i) is classified; or
 - (ii) contains classified software; or
 - (iii) is being developed using classified information.

Note 1: For the purposes of this paragraph, an article is space-qualified if it is designed, manufactured, or qualified through successful testing, for operation at altitudes greater than 100 km above the surface of the Earth. The use of an altitude of 100 km above the surface of the Earth in this paragraph does not represent a legal demarcation between national air space and outer space under United States or international law.

Note 2: (1) A determination that a specific article (or commodity) (for example, by product serial number) is space-qualified by virtue of testing alone does not mean that other articles in the same production run or model series are space-qualified if not individually tested. (2) A specific article not designed or manufactured for use at altitudes greater than 100 km above the surface of the Earth is not space-qualified before it is successfully tested. (3) The terms “designed” and “manufactured” in this definition are synonymous with “specially designed.”

Note 3: “Payload” is the total mass that can be carried or delivered by the specified rocket, SLV, missile, drone, or UAV that is not used to maintain flight. For the definition of “range” as it pertains to aircraft systems, see note 2 to paragraph (a) of Category VIII. For the definition of “range” as it pertains to rocket systems, see note 1 to paragraph (a) of Category IV.

Note 4: Subparagraph (17)—**primary payload** is that complement of equipment designed from the outset to accomplish the prime mission function of the spacecraft payload mission set. The primary payload may operate independently from the secondary payload(s). **Secondary payload** is that complement of equipment designed from the outset to be fully integrated into the spacecraft payload mission set. The secondary payload may operate separately from the primary payload. **Hosted payload** is a complement of equipment or sensors that uses the available or excess capacity (mass, volume, power, etc.) of a spacecraft to accommodate an additional, independent mission. The hosted payload may share the spacecraft bus support infrastructure. The hosted payload performs an additional, independent mission which does not dictate control or operation of the spacecraft. A hosted payload is not capable of operating as an independent spacecraft. *Spacecraft bus* (distinct from the spacecraft payload), provides the support infrastructure of the spacecraft (for example, command and data handling, communications and antenna(s), electrical power, propulsion, thermal control, attitude and orbit control, guidance, navigation and control, structure and truss, life support (for crewed mission)) and location (for example, attachment, interface) for the spacecraft payload. *Spacecraft payload* is that complement of equipment attached to the spacecraft bus that performs a particular mission in space (for example, communications, observation, science).

Note 5: Subparagraph (17)—all spacecraft that incorporate primary or secondary payloads that perform a function described in paragraph (a) are controlled by that paragraph.

Note 6: Subparagraph (18)—this subparagraph does not control payloads that are identified in the relevant United States Government contract or other funding authorisation or agreement as being developed for both military and either civil or commercial applications.

Note 7: Subparagraph (18)—this subparagraph applies only to those contracts or funding authorisations or agreements that are dated 13 May 2015, or later.

- (f) Technical data and defence services directly related to the articles described in paragraphs (a) to (e) and classified technical data. Defence services include the furnishing of assistance (including training) in the integration of a satellite or spacecraft to a launch vehicle, including both planning and onsite support, regardless of the jurisdiction, ownership, or origin of the satellite or spacecraft, or whether technical data is used. It also includes the furnishing of assistance (including training) in the launch failure analysis of a satellite or spacecraft,

regardless of the jurisdiction, ownership, or origin of the satellite of spacecraft, or whether technical data is used (MT for technical data and defence services related to articles designated as such).

Note 1: Activities and technology/technical data directly related to or required for the spaceflight (for example, sub-orbital, orbital, lunar, interplanetary, or otherwise beyond Earth orbit) passenger or participant experience, regardless of whether the passenger or participant experience is for space tourism, scientific or commercial research, commercial manufacturing/production activities, educational, media, or commercial transportation purposes, are not subject to export controls. Such activities and technology/technical data include those directly related to or required for:

- (a) spacecraft access, ingress, and egress, including the operation of all spacecraft doors, hatches, and airlocks; or
- (b) physiological training (for example, human-rated centrifuge training or parabolic flights, pressure suit or spacesuit training/operation); or
- (c) medical evaluation or assessment of the spaceflight passenger or participant; or
- (d) training for and operation by the passenger or participant of health and safety related hardware (for example, seating, environmental control and life support, hygiene facilities, food preparation, exercise equipment, fire suppression, communications equipment, safety-related clothing or headgear) or emergency procedures; or
- (e) viewing of the interior and exterior of the spacecraft or terrestrial mock-ups; or
- (f) observing spacecraft operations (for example, pre-flight checks, landing, in-flight status); or
- (g) training in spacecraft or terrestrial mock-ups for connecting to or operating passenger or participant equipment used for purposes other than operating the spacecraft; or
- (h) donning, wearing, or utilising the passenger's or participant's flight suit, pressure suit, or spacesuit, and personal equipment.

Note 2: This paragraph does not control the data transmitted to or from a satellite or spacecraft, whether real or simulated, when limited to information about the health, operational status, or function of, or measurements or raw sensor output from, the spacecraft, spacecraft payload(s), or their associated subsystems or components. Examples of such data and technology, which are commonly referred to as “housekeeping data,” include:

- (a) system, hardware, component configuration, and operation status information pertaining to temperatures, pressures, power, currents, voltages, and battery charges; and
- (b) spacecraft or payload orientation or position information, such as state vector or ephemeris information; and
- (c) payload raw mission or science output, such as images, spectra, particle measurements, or field measurements; and
- (d) command responses; and
- (e) accurate timing information; and
- (f) link budget data. The act of processing such telemetry data—that is, converting raw data into engineering units or readable products—or encrypting it does not, in and of itself, cause the telemetry data to become subject to export controls. All classified technical data directly related to items controlled in Category XV, and defence services using the classified technical data, remain subject to export controls.

Note 3: Note 2 does not affect controls in paragraph (f) on software source code or commands that control a spacecraft, payload, or associated subsystem.

(g) - (w) [Reserved]

(x) Commodities, software and technology used in or with defence articles controlled in this category.

Note: Use of this paragraph is limited to exports of defense articles controlled in this category where the purchase documentation includes commodities, software or technology.

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21 Category XVI—Nuclear Weapons Related Articles

- (a) [Reserved]
- (b) Modelling or simulation tools that model or simulate the environments generated by nuclear detonations or the effects of these environments on systems, subsystems, components, structures or humans.
- (c) [Reserved]
- (d) Parts, components, accessories, attachments, associated equipment and production, testing and inspection equipment and tooling, specially designed for the articles in paragraph (b).
- (e) Technical data, and defence services directly related to the defence articles directly related to paragraph (b).
- (f) - (w) [Reserved]
- (x) Commodities, software and technical data used in or with defence articles controlled in this category.

Note: Use of this paragraph is limited to exports of defence articles controlled in this category where the purchase documentation includes commodities, software or technical data.

22 Category XVII—Classified Articles, Technical Data and Defence Services Not Otherwise Enumerated

- (a) All articles, technical data and defence services relating thereto which are classified in the interests of national security and which are not otherwise enumerated in this list.

23 Category XVIII—Directed Energy Weapons

- (a) Directed energy weapon systems specifically designed or modified for military applications (for example, destruction, degradation or rendering mission-abort of a target). These include, but are not limited to:
 - (1) laser systems, including continuous wave or pulsed laser systems, specifically designed or modified to cause blindness;
 - (2) lasers of sufficient continuous wave or pulsed power to effect destruction similar to the manner of conventional ammunition;
 - (3) particle beam systems;
 - (4) particle accelerators that project a charged or neutral particle beam with destructive power;
 - (5) high power radio-frequency (RF) systems;
 - (6) high pulsed power or high average power radio frequency beam transmitters that produce fields sufficiently intense to disable electronic circuitry at distant targets;
 - (7) prime power generation, energy storage, switching, power conditioning, thermal management or fuel-handling equipment;
 - (8) target acquisition or tracking systems;
 - (9) systems capable of assessing target damage, destruction or mission-abort;
 - (10) beam-handling, propagation or pointing equipment;

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- (11) equipment with rapid beam slew capability for rapid multiple target operations;
 - (12) negative ion beam funneling equipment;
 - (13) equipment for controlling and slewing a high-energy ion beam.
- (b) Equipment specifically designed or modified for the detection or identification of, or defence against, articles controlled in paragraph (a).
 - (c) Tooling and equipment specifically designed or modified for the production of defence articles controlled by this category.
 - (d) Test and evaluation equipment and test models specifically designed or modified for the defence articles controlled by this category. This includes, but is not limited to, diagnostic instrumentation and physical test models.
 - (e) Components, parts, accessories, attachments and associated equipment specifically designed or modified for the articles in paragraphs (a) to (d).
 - (f) Technical data and defence services directly related to the defence articles enumerated in paragraphs (a) to (e).
 - (g) The following interpretations explain and amplify terms used in this category and elsewhere in this list:
 - (a) the components, parts, accessories, attachments and associated equipment include, but are not limited to adaptive optics and phase conjugators components, space-qualified accelerator components, targets and specifically designed target diagnostics, current injectors for negative hydrogen ion beams, and space-qualified foils for neutralising negative hydrogen isotope beams;
 - (b) the particle beam systems in subparagraph (a)(3) include devices embodying particle beam and electromagnetic pulse technology and associated components and subassemblies (for example, ion beam current injectors, particle accelerators for neutral or charged particles, beam handling and projection equipment, beam steering, fire control, and pointing equipment, test and diagnostic instruments, and targets) which are specifically designed or modified for directed energy weapon applications;
 - (c) the articles controlled in this category include any end item, component, accessory, attachment, part, firmware, software or system that has been designed or manufactured using technical data and defence services controlled by this category;
 - (d) the articles specifically designed or modified for military application controlled in this category include any articles specifically developed, configured, or adapted for military application.

24 Category XIX—Gas Turbine Engines and Associated Equipment

- (a) Turbofan and Turbojet engines (including technology demonstrators) capable of 15,000 lbf (66.7 kN) of thrust or greater that have any of the following:
 - (1) with or specially designed for thrust augmentation (afterburner);
 - (2) thrust or exhaust nozzle vectoring;
 - (3) parts or components controlled in paragraph (f)(6);

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- (4) specially designed for sustained 30 second inverted flight or negative g manoeuvre;
 - (5) specially designed for high power extraction (greater than 50% of engine thrust at altitude) at altitudes greater than 50,000 feet.
- (b) Turboshaft and Turboprop engines (including technology demonstrators) capable of 1500 mechanical shp (1119 kW) or greater and are specially designed with oil sump sealing when the engine is in the vertical position.
 - (c) Engines (including technology demonstrators) specially designed for armed or military unmanned aerial vehicle systems, cruise missiles, or target drones (MT if for an engine used in an unmanned aerial vehicle, drone, or missile that has a “range” equal to or greater than 300 km).
 - (d) GE38, AGT1500, CTS800, TF40B, T55, TF60, and T700 engines.
 - (e) Digital engine control systems (for example, Full Authority Digital Engine Controls (FADEC) and Digital Electronic Engine Controls (DEEC)) specially designed for gas turbine engines controlled in this category (MT if the digital engine control system is for an unmanned aerial vehicle, drone, or missile that has a range equal to or greater than 300 km).

Note: Digital electronic control systems autonomously control the engine throughout its whole operating range from demanded engine start until demanded engine shut-down, in both normal and fault conditions. For the definition of “range,” see note 2 to paragraph (a) of Category VIII.

- (f) Parts, components, accessories, attachments, associated equipment, and systems as follows:
 - (1) parts, components, accessories, attachments, and equipment specially designed for the following United States-origin engines (and military variants thereof): AE1107C, F101, F107, F112, F118, F119, F120, F135, F136, F414, F415, J402, GE38, TF40B, and TF60;
 - (2) hot section components (that is, combustion chambers and liners; high pressure turbine blades, vanes, disks and related cooled structure; cooled low pressure turbine blades, vanes, disks and related cooled structure; cooled augmenters; and cooled nozzles) specially designed for gas turbine engines controlled in this category;
 - (3) uncooled turbine blades, vanes, disks, and tip shrouds specially designed for gas turbine engines controlled in this category;
 - (4) combustor cowls, diffusers, domes, and shells specially designed for gas turbine engines controlled in this category;
 - (5) engine monitoring systems (that is, prognostics, diagnostics, and health) specially designed for gas turbine engines and components controlled in this category;
 - (6) any part, component, accessory, attachment, equipment, or system that:
 - (i) is classified; or
 - (ii) contains classified software directly related to defence articles; or
 - (iii) is being developed using classified information;
 - (7) [Reserved].

Note: Subparagraph (1)—specially designed does not control parts, components, accessories, and attachments that are common to engines enumerated in paragraph (a) to (d) but not

identified in this subparagraph, and those identified in this subparagraph. For example, a part common to only the F110 and F136 is not specially designed. A part common to only the F119 and F135 - two engine models identified in paragraph (f)(1) - is specially designed.

(g) Technical data and defence services directly related to the defence articles described in paragraphs (a) to (f) and defence services using classified technical data. (MT for technical data and defence services related to articles designated as such).

(h) - (w) [Reserved]

(x) Commodities, software and technical data used in or with defence articles controlled in this category.

Note: Use of this paragraph is limited to exports of defence articles controlled in this category where the purchase documentation includes commodities, software or technical data.

25 Category XX—Submersible Vessels and Related Articles

(a) Submersible and semi-submersible vessels that are:

- (1) submarines specially designed for military use; or
- (2) mine countermeasure vehicles; or
- (3) anti-submarine warfare vehicles; or
- (4) armed or are specially designed to be used as a platform to deliver munitions or otherwise destroy or incapacitate targets (for example, firing torpedoes, launching rockets, firing missiles, deploying mines, deploying countermeasures) or deploy military payloads; or
- (5) swimmer delivery vehicles specially designed for the deployment, recovery, or support of swimmers or divers from submarines; or
- (6) integrated with nuclear propulsion systems; or
- (7) equipped with any mission systems controlled under this list; or
- (8) developmental vessels funded by the United States Government via contract or other funding authorisation.

Note 1: Subparagraph (7)—“Mission system” is defined as a “system” that are defence articles that perform specific military functions such as by providing military communication, electronic warfare, target designation, surveillance, target detection or sensor capabilities.

Note 2: Subparagraph (8)—this subparagraph does not control vessels, and specially designed parts, components, accessories, attachments, and associated equipment therefor:
(a) in production; or
(b) identified in the relevant United States Government contract or other funding authorisation as being developed for both civil and military applications.

Note 3: Subparagraph (8)—note 2 does not apply to defence articles enumerated on this list in production or development.

Note 4: Subparagraph (8)—this subparagraph applies to those contracts and funding authorisations that are dated 8 July 2014, or later.

(b) Engines, electric motors, and propulsion plants as follows:

- (1) naval nuclear propulsion plants and prototypes, and special facilities for construction, support, and maintenance therefor;
- (2) electric motors specially designed for submarines that have the following:
 - (i) power output of more than 0.75 MW (1,000 hp);

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- (ii) quick reversing;
- (iii) liquid cooled;
- (iv) totally enclosed.

- (c) Parts, components, accessories, attachments, and associated equipment, including production, testing, and inspection equipment and tooling, specially designed for any of the articles in paragraphs (a) and (b) of this category (MT for launcher mechanisms specially designed for rockets, space launch vehicles, or missiles capable of achieving a range greater than or equal to 300 km).

Note: “Range” is the maximum distance that the specified rocket system is capable of travelling in the mode of stable flight as measured by the projection of its trajectory over the surface of the Earth. The maximum capability based on the design characteristics of the system, when fully loaded with fuel or propellant, will be taken into consideration in determining range. The range for rocket systems will be determined independently of any external factors such as operational restrictions, limitations imposed by telemetry, data links, or other external constraints. For rocket systems, the range will be determined using the trajectory that maximises range, assuming International Civil Aviation Organization (ICAO) standard atmosphere with zero wind.

- (d) Technical data and defence services directly related to the defence articles described in paragraphs (a) to (c). (MT for technical data and defence services related to articles designated as such).

(e) - (w) [Reserved]

- (x) Commodities, software and technical data used in or with defence articles controlled in this category.

Note: Use of this paragraph is limited to exports of defence articles controlled in this category where the purchase documentation includes commodities, software or technical data.

Division 2—Missile Technology Control Regime

Missile Technology Control Regime

The following items constitute all items on the Missile Technology Control Regime Annex which are covered by this list. To the extent an item mentioned in this Division is also mentioned elsewhere in Part 1, a reference appears in parentheses listing the category in which it appears.

Item 1—Category I

Complete rocket systems (including ballistic missile systems, space launch vehicles, and sounding rockets (see Category IV(a) and (b)) and unmanned air vehicle systems (including cruise missile systems, see Category VIII (a), target drones and reconnaissance drones (see Category VIII (a)) capable of delivering at least a 500 kg payload to a range of at least 300 km.

Item 2—Category I

Complete subsystems usable in the systems in Item 1 as follows:

- (a) individual rocket stages (see Category IV(h));
- (b) reentry vehicles (see Category IV(g)), and equipment designed or modified therefor, as follows, except as provided in Note 1 below for those designed for non-weapon payloads:
 - (1) heat shields and components thereof fabricated of ceramic or ablative materials (see Category IV(f));
 - (2) heat sinks and components thereof fabricated of light-weight, high heat capacity materials;
 - (3) electronic equipment specially designed for reentry vehicles (see Category XI(a)(7));
- (c) solid or liquid propellant rocket engines, having a total impulse capacity of 1.1×10 N-sec (2.5×10 lb-sec) or greater (see Category IV, (h)).
- (d) “guidance sets” capable of achieving system accuracy of 3.33 percent or less of the range (for example, a CEP of 10 km or less at a range of 300 km), except as provided in Note 1 below for those designed for missiles with a range under 300 km or manned aircraft (see Category XII(d));
- (e) thrust vector control sub-systems, except as provided in Note (1) below for those designed for rocket systems that do not exceed the range/payload capability of Item 1 (see Category IV);
- (f) warhead safing, arming, fuzing, and firing mechanisms, except as provided in Note (1) below for those designed for systems other than those in Item 1 (see Category IV(h)).

Note 1: The exceptions in subitems (b), (d), (e), and (f) above may be treated as Category II if the subsystem is exported subject to end use statements and quantity limits appropriate for the excepted end use stated above.

Note 2: CEP (circle of equal probability) is a measure of accuracy, and defined as the radius of the circle centered at the target, at a specific range, in which 50 percent of the payloads impact.

Note 3: A “guidance set” integrates the process of measuring and computing a vehicle's position and velocity (that is, navigation) with that of computing and sending commands to the vehicle's flight control systems to correct the trajectory.

Part 1 Articles Eligible for Trade under the Defense Trade Cooperation Treaty

Division 2 Missile Technology Control Regime

- Note 4: Examples of methods of achieving thrust vector control which are covered by subitem (e) include:
- (a) flexible nozzle;
 - (b) fluid or secondary gas injection;
 - (c) movable engine or nozzle; Deflection of exhaust gas stream (jet vanes or probes); or
 - (d) use of thrust tabs.

Item 3—Category II

Propulsion components and equipment usable in the systems in Item 1, as follows:

- (a) lightweight turbojet and turbofan engines (including turbocompound engines) that are small and fuel efficient (see Category IV(h) and Category VIII(b));
- (b) ramjet/Scramjet/pulse jet/combined cycle engines, including devices to regulate combustion, and specially designed components therefor (see Category IV(h) and Category VIII(b));
- (c) rocket motor cases, “interior lining”, “insulation” and nozzles therefor (see § Category IV(h) and Category V(c));
- (d) staging mechanisms, separation mechanisms, and interstages therefor (see Category IV(c) and (h));
- (e) liquid and slurry propellant (including oxidizers) control systems, and specially designed components therefor, designed or modified to operate in vibration environments of more than 100 g RMS between 20 Hz and 2,000 Hz (see Category IV(c) and (h));
- (f) hybrid rocket motors and specially designed components therefor (see Category IV(h)).

Note 1: Subitem 3(a) engines may be exported as part of a manned aircraft or in quantities appropriate for replacement parts for manned aircraft.

Note 2: In subitem 3(c), “interior lining” suited for the bond interface between the solid propellant and the case or insulating liner is usually a liquid polymer based dispersion of refractory or insulating materials, for example, carbon filled HTPB or other polymer with added curing agents to be sprayed or screeded over a case interior (see Category V(c)).

Note 3: In subitem 3(c), “insulation” intended to be applied to the components of a rocket motor, that is, the case, nozzle inlets, case closures, 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.

Note 4: The only servo valves and pumps covered in (e) above, are the following:

- (a) Servo valves designed for flow rates of 24 liters per minute or greater, at an absolute pressure of 7,000 kPa (1,000 psi) or greater, that have an actuator response time of less than 100 msec;
- (b) Pumps, for liquid propellants, with shaft speeds equal to or greater than 8,000 RPM or with discharge pressures equal to or greater than 7,000 kPa (1,000 psi).

Note 5: Subitem 3(e) systems and components may be exports as part of a satellite.

Item 4—Category II

Propellants and constituent chemicals for propellants as follows:

- (a) propulsive substances:
 - (1) hydrazine with a concentration of more than 70 percent and its derivatives including monomethylhydrazine (MMH);
 - (2) unsymmetric dimethylhydrazine (UDHM);

- (3) ammonium perchlorate;
- (4) spherical aluminum powder with particle of uniform diameter of less than $500 \times 10^{-6}\text{M}$ (500 microns) and an aluminum content of 97 percent or greater;
- (5) metal fuels in particle sizes less than $500 \times 10^{-6}\text{M}$ (500 microns), whether spherical, atomized, spheroidal, flaked or ground, consisting of 97 percent or more of any of the following: zirconium, beryllium, boron, magnesium, zinc, and alloys of these;
- (6) nitroamines (cyclotetramethylenetetranitramene (HMX), cyclotrimethylenetrinitramine (RDX));
- (7) perchlorates, chlorates or chromates mixed with powdered metals or other high energy fuel components;
- (8) carboranes, decaboranes, pentaboranes and derivatives thereof;
- (9) liquid oxidizers, as follows:
 - (A) nitrogen dioxide/dinitrogen tetroxide;
 - (B) inhibited Red Fuming Nitric Acid (IRFNA);
 - (C) compounds composed of fluorine and one or more of other halogens, oxygen or nitrogen.
- (b) polymeric substances:
 - (1) hydroxyterminated polybutadiene (HTPB);
 - (2) glycidylazide polymer (GAP).
- (c) other high energy density propellants such a Boron Slurry having an energy density of 40×10 joules/kg or greater.
- (d) other propellants additives and agents:
 - (1) bonding agents as follows:
 - (i) tris (1(2methyl)aziridinyl phosphine oxide (MAPO);
 - (ii) trimesol 1(2)ethyl)aziridine (HX868, BITA);
 - (iii) "tepanol" (HX878), reaction product of tetraethylenepentamine, acrylonitrile and glycidol;
 - (iv) "tepan" (HX879), reaction product of tet enepentamine and acrylonitrile;
 - (v) polyfunctional aziridene amides with isophthalic, trimesic, isocyanuric, or trimethyladipic backbone also having a 2methyl or 2ethyl aziridine group (HX752, HX872 and HX877);
 - (2) curing agents and catalysts as follows:
 - (i) triphenyl bismuth (TPB);
 - (3) burning rate modifiers as follows:
 - (i) catocene;
 - (ii) N-butylferrocene;
 - (iii) other ferrocene derivatives;
 - (4) nitrate esters and nitrate plasticisers as follows:
 - (i) 1,2,4butanetriol trinitrate (BTTN);
 - (5) stabilisers as follows:
 - (i) N-methylpnitroaniline.

Item 8—Category II

Structural materials usable in the systems in Item 1, as follows:

- (a) composite structures, laminates, and manufactures thereof, including resin impregnated fibre prepreps and metal coated fibre preforms therefor, specially designed for use in the systems in Item 1 and the subsystems in Item 2 made either with organix matrix or metal matrix utilizing fibrous or filamentary reinforcements having a specific tensile strength greater than 7.62×10^4 m (3×10^6 inches) and a specific modules greater than 3.18×10^6 m (1.25×10^8 inches), (see Category IV (f), and Category XIII (d));
- (b) resaturated pyrolized (that is, carbon-carbon) materials designed for rocket systems, (see Category IV (f));
- (c) fine grain recrystallized bulk graphites (with a bulk density of at least 1.72 g/cc measured at 15 degrees C), pyrolytic, or fibrous reinforced graphites useable for rocket nozzles and reentry vehicle nose tips (see Category IV (f) and Category XIII);
- (d) ceramic composites materials (dielectric constant less than 6 at frequencies from 100 Hz to 10,000 MHz) for use in missile radomes, and bulk machinable silicon-carbide reinforced unfired ceramic useable for nose tips (see Category IV (f)).

Item 9—Category II

Instrumentation, navigation and direction finding equipment and systems, and associated production and test equipment as follows; and specially designed components and software therefor:

- (a) integrated flight instrument systems, which include gyrostabilizers or automatic pilots and integration software therefor; designed or modified for use in the systems in Item 1 (See Category XII(d));
- (b) gyro-astro compasses and other devices which derive position or orientation by means of automatically tracking celestial bodies or satellites (see Category XV(d));
- (c) accelerometers with a threshold of 0.05 g or less, or a linearity error within 0.25 percent of full scale output, or both, which are designed for use in inertial navigation systems or in guidance systems of all types (see Category VIII(e) and Category XII (d));
- (d) all types of gyros usable in the systems in Item 1, with a rated drift rate stability of less than 0.5 degree (1 sigma or rms) per hour in a 1g environment (see Category VIII(e) and Category XII(d));
- (e) continuous output accelerometers or gyros of any type, specified to function at acceleration levels greater than 100 g (see Category XII(d));
- (f) inertial or other equipment using accelerometers described by subitems (c) and (e) above, and systems incorporating such equipment, and specially designed integration software therefor (see Category VIII (e) and Category XII(d)).

Note 1: Subitems (a) to (f) may be exported as part of a manned aircraft or satellite or in quantities appropriate for replacement parts for manned aircraft.

Note 2: In subitem (d):

- (a) drift rate is defined as the time rate of output deviation from the desired output. It consists of random and systematic components and is expressed as an equivalent angular displacement per unit time with respect to inertial space.

- (b) stability is defined as 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.

Item 10—Category II

Flight control systems and “technology” as follows; designed or modified for the systems in Item 1.

- (a) hydraulic, mechanical, electro-optical, or electro-mechanical flight control systems (including fly-by-wire systems), (see Category IV (h));
- (b) attitude control equipment, (see Category IV, (c) and (h));
- (c) design technology for integration of air vehicle fuselage, propulsion system and lifting control surfaces to optimize aerodynamic performance throughout the flight regime of an unmanned air vehicle, (see Category VIII (k));
- (d) design technology for integration of the flight control, guidance, and propulsion data into a flight management system for optimization of rocket system trajectory, (see Category IV (i)).

Note: Subitems (a) and (b) may be exported as part of a manned aircraft or satellite or in quantities appropriate for replacement parts for manned aircraft.

Item 11—Category II

Avionics equipment, “technology” and components as follows; designed or modified for use in the systems in Item 1, and specially designed software therefor:

- (a) radar and laser radar systems, including altimeters (see Category XI(a)(3));
- (b) passive sensors for determining bearings to specific electromagnetic sources (direction finding equipment) or terrain characteristics (see Category XI(b) and (d));
- (c) global Positioning System (GPS) or similar satellite receivers:
 - (1) capable of providing navigation information under the following operational conditions:
 - (i) at speeds in excess of 515 m/sec (1,000 nautical miles/hours); and
 - (ii) at altitudes in excess of 18 km (60,000 feet), (see Category XV(d)(2); or
 - (2) designed or modified for use with unmanned air vehicles covered by Item 1 (see Category XV(d)(4)).
- (d) electronic assemblies and components specifically designed for military use and operation at temperatures in excess of 125 degrees C (see Category XI(a)(7)).
- (e) design technology for protection of avionics and electrical subsystems against electromagnetic pulse (EMP) and electromagnetic interference (EMI) hazards from external sources, as follows, (see Category XI(b)):
 - (1) design technology for shielding systems;
 - (2) design technology for the configuration of hardened electrical circuits and subsystems;
 - (3) determination of hardening criteria for the above.

Note 1: Item 11 equipment may be exported as part of a manned aircraft or satellite or in quantities appropriate for replacement parts for manned aircraft.

Part 1 Articles Eligible for Trade under the Defense Trade Cooperation Treaty

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- Note 2: Examples of equipment included in this item:
- (a) Terrain contour mapping equipment; and
 - (b) Scene mapping and correlation (both digital and analog) equipment; and
 - (c) Doppler navigation radar equipment; and
 - (d) Passive interferometer equipment; and
 - (e) Imaging sensor equipment (both active and passive);

Note 3: In subitem (a), laser radar systems embody specialized transmission, scanning, receiving and signal processing techniques for utilization of lasers for echo ranging, direction finding and discrimination of targets by location, radial speed and body reflection characteristics.

Item 12—Category II

Launch support equipment, facilities and software for the systems in Item 1, as follows:

- (a) apparatus and devices designed or modified for the handling, control, activation and launching of the systems in Item 1, (see Category IV(c));
- (b) vehicles designed or modified for the transport, handling, control, activation and launching of the systems in Item 1, (see Category VII(d));
- (c) telemetering and telecontrol equipment usable for unmanned air vehicles or rocket systems, (see Category XI(a));
- (d) precision tracking systems:
 - (1) tracking systems which use a transponder installed on the rocket system or unmanned air vehicle in conjunction with either surface or airborne references or navigation satellite systems to provide real-time measurements of in-flight position and velocity, (see Category XI(a));
 - (2) range instrumentation radars including associated optical/infrared trackers and the specially designed software therefor with all of the following capabilities (see Category XI(a)(3)):
 - (i) angular resolution better than 3 milli-radians (0.5 mils);
 - (ii) range of 30 km or greater with a range resolution better than 10 metres RMS;
 - (iii) velocity resolution better than 3 metres per second.
- (e) Software which processes post-flight, recorded data, enabling determination of vehicle position throughout its flight path (see Category IV(i)).

Item 13—Category II

Analog computers, digital computers, or digital differential analyzers designed or modified for use in the systems in Item 1 (see Category XI (a)(6), having either of the following characteristics:

- (a) rated for continuous operation at temperature from below minus 45 degrees C to above plus 55 degrees C; or
- (b) designed as ruggedized or “radiation hardened”.

Note: Item 13 equipment may be exported as part of a manned aircraft or satellite or in quantities appropriate for replacement parts for manned aircraft.

Item 14—Category II

Analog-to-digital converters, usable in the system in Item 1, having either of the following characteristics:

- (a) designed to meet military specifications for ruggedized equipment (see Category XI(d)); or,
- (b) designed or modified for military use (see Category XI(d)); and being one of the following types:
 - (1) analog-to-digital converter “microcircuits,” which are “radiation hardened” or have all of the following characteristics:
 - (i) having a resolution of 8 bits or more;
 - (ii) rated for operation in the temperature range from below minus 54 degrees C to above plus 125 degrees C; and
 - (iii) hermetically sealed;
 - (2) electrical input type analog-to-digital converter printed circuit boards or modules, with all of the following characteristics:
 - (i) having a resolution of 8 bits or more;
 - (ii) rated for operation in the temperature range from below minus 45 degrees C to above plus 55 degrees C; and
 - (iii) incorporated “microcircuits” listed in (1), above.

Item 15—Category II

This item is reserved.

Item 16—Category II

Specially designed software, or specially designed software with related specially designed hybrid (combined analog/digital) computers, for modelling, simulation, or design integration of the systems in Item 1 and Item 2 (see Category IV(i) and Category XI(a)(6)).

Note: The modelling includes in particular the aerodynamic and thermodynamic analysis of the system.

Item 17—Category II

Materials, devices, and specially designed software for reduced observables such as radar reflectivity, ultraviolet/infrared signatures on acoustic signatures (that is, stealth technology), for applications usable for the systems in Item 1 or Item 2 (see Category XIII (e) and (k)), for example:

- (a) structural material 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 spectra, except when specially used for thermal control of satellites.
- (c) specially designed software or databases for analysis of signature reduction.
- (d) specially designed radar cross section measurement systems (Category XI(a)(3)).

Item 18—Category II

Devices for use in protecting rocket systems and unmanned air vehicles against nuclear effects (for example Electromagnetic Pulse (EMP), X-rays, combined

Part 1 Articles Eligible for Trade under the Defense Trade Cooperation Treaty

Division 2 Missile Technology Control Regime

blast and thermal effects), and usable for the systems in Item 1, as follows (Category IV (c) and (h)):

- (a) “radiation Hardened” “microcircuits” and detectors (Category XI(c)(3))

Note: This commodity has been formally proposed for movement to category XV(e)(2) in the near future).

- (b) radomes designed to withstand a combined thermal shock greater than 1000 cal/sq cm accompanied by a peak over pressure of greater than 50 kPa (7 pounds per square inch) (see Category IV(h)).

Note: Subitem (a)—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.

Part 2—Exempted Technologies List

Exempted Technologies List

- (a) The following defence articles are exempted from the scope of the Treaty, regardless of which category may apply:
- (1) US origin defence articles, regardless of classification, (including those modified or improved), when used for marketing purposes, that have not previously been licensed for export by the United States Government;
 - (2) defence articles specific to the existence of or method of compliance with anti-tamper measures made at originating government direction;
 - (3) all classified defence articles not being released pursuant to a government written request, directive or contract that provides for the export of the defence article. For US origin defence articles, the written request, directive or contract must be from the United States Department of Defense. For Australian origin defence articles, the written request, directive or contract must be from the Australian Government.
- (b) The following specific defence articles are exempted from coverage under the Treaty:
- (1) defence articles listed in the Missile Technology Control Regime (MTCR) Annex, the Chemical Weapons Convention (CWC) Annex on Chemicals, the Convention on Biological and Toxin Weapons, and the Australia Group (AG) Common Control Lists (CCL);
 - (2) defence articles specific to reduced observables, or counter low observables in any part of the spectrum, including radio frequency (RF), infrared (IR), Electro-Optical, visual, ultraviolet (UV), acoustic, and magnetic;
 - (3) defence articles specific to sensor fusion beyond that required for display or identification correlation;
 - (4) defence articles specific to naval technology and systems in the following areas:
 - (i) naval nuclear propulsion information;
 - (ii) acoustic spectrum control and awareness;
 - (iii) submersible vessels, oceanographic and associated equipment designed or modified for military purposes;
 - (iv) torpedoes;
 - (5) defence articles and services specific to naval nuclear propulsion equipment;
 - (6) nuclear powered vessels;
 - (7) defence articles and services specific to submarine combat control systems;
 - (8) defence articles specific to countermeasures and counter-countermeasures, including electronic or optical (including IR);
 - (9) defence articles specific to Category XI(b) (for example, communications security (COMSEC) and TEMPEST), as well as their related defence articles in Category XI(c) and (d);
 - (10) defence articles specific to Category XIII(b) (military information security assurance systems, cryptographic devices, software and components);

- (11) defence articles specific to spacecraft/satellites;
- (12) defence articles and services specific to ground control stations for spacecraft telemetry, tracking and control; however, defence articles and services are not excluded under this entry if they do not control the spacecraft; receivers for receiving satellite transmissions are also not excluded under this entry;
- (13) defence articles and services specific to spacecraft and ground control station systems (only for telemetry, tracking and control as controlled in Category XV(b)), subsystems, components, parts, accessories, attachments and associated equipment;
- (14) defence articles specific to satellites, satellite payloads and their specifically designed or modified components as described in Category XV (a), (b), (e) and (f);
- (15) defence articles specific to GPS/PPS security modules;
- (16) defence articles specific to Category XV(d) radiation-hardened microcircuits and technology;
- (17) technical data and defence services directly related to other defence articles excluded from the exemptions for Category XV;
- (18) category XVI defence articles specific to design and testing of nuclear weapons;
- (19) defence articles specific to Category XVIII Directed energy weapons;
- (20) defence articles specific to the automatic target acquisition or recognition and cueing of multiple autonomous unmanned systems;
- (21) defence articles specific to Man Portable Air Defense Systems (MANPADS);
- (22) training or simulation equipment for MANPADS;
- (23) defence articles and services specific to anti-personnel landmines;
- (24) defence articles and services specific to cluster munitions;
- (25) defence articles and services specific to gas turbine engine hot section components and to Full Authority Digital Engine Control Systems (FADEC) or Digital Electronic Engine Controls (DEEC);
- (26) technical data and defence services for gas turbine stations; however, this does not include hardware;
- (27) software source code related to Category XX(a);
- (28) high Frequency and Phased Array Microwave Radar systems, with capabilities such as search, acquisition, tracking, moving target indication and imaging radar systems;
- (29) defence articles that the United States controls under the United States Munitions List for which Australian laws, regulations, or other commitments would prevent Australia from enforcing the control measures specified in the Treaty.

- Note 1: Subparagraph (2)—defence articles related to reduced observables or counter reduced observables is defined as:
- (a) signature reduction (radio frequency (RF), infrared (IR), Electro-Optical, visual, ultraviolet (UV), acoustic, magnetic, RF emissions) of defense platforms, including systems, subsystems, components, materials, (including dual-purpose materials used for Electromagnetic Interference (EM) reduction) technologies, and signature prediction, test and measurement equipment and software and material transmissivity/reflectivity prediction codes and optimization software; or
 - (b) electronically scanned array radar, high power radars, radar processing algorithms, periscope-mounted radar systems (PATRIOT), LADAR, multistatic and IR focal

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- plane array-based sensors, to include systems, subsystems, components, materials and technologies.
- Note 2: Subparagraph (3)—defence articles related to sensor fusion beyond that required for display or identification correlation is defined as techniques designed to automatically combine information from two or more sensors/sources for the purpose of target identification, tracking, designation, or passing of data in support of surveillance or weapons engagement. Sensor fusion involves sensors such as acoustic, infrared, electro optical, radio frequency, etc. Display or identification correlation refers to the combination of target detections from multiple sources for assignment of common target track designation.
- Note 3: Subsubparagraph (4)(i)—naval nuclear propulsion information is technical data that concerns the design, arrangement, development, manufacture, testing, operation, administration, training, maintenance, and repair of the propulsion plants of naval nuclear-powered ships and prototypes, including the associated shipboard and shore-based nuclear support facilities. Examples of defence articles covered by this exemption include nuclear propulsion plants and nuclear submarine technologies or systems; nuclear powered vessels (see Categories VI and XX).
- Note 4: Subsubparagraph (4)(ii)—examples of defence articles covered by this exemption include underwater acoustic vector sensors; acoustic reduction; off-board, underwater, active and passive sensing, propeller/propulsor technologies; fixed/mobile/floating/powered detection systems which include in-buoy signal processing for target detection and classification; automated control algorithms and classification embedded in on-board autonomous platforms which enable:
- (a) group behaviours for target detection and classification; or
 - (b) adaption to the environment or tactical situation for enhancing target detection and classification; “intelligent autonomy” algorithms which define the status, group (greater than 2) behaviours, and responses to detection stimuli by autonomous, underwater vehicles; and low frequency, broad-band “acoustic colour”, active acoustic “fingerprint” sensing for the purpose of long range, single pass identification of ocean bottom objects, buried or otherwise (controlled under Category XI(a)(1), (a)(2), (b), (c), and (d)).
- Note 5: Subsubparagraph (4)(iii)—examples of defence articles covered by this exemption includes manned or unmanned, tethered or untethered and swimmer delivery vehicles (controlled under Category XX(a) and (b)).
- Note 6: Subparagraph (5)—naval Nuclear propulsion plants includes all of Category VI(e). Naval nuclear propulsion information is technical data that concerns the design, arrangement, development, manufacture, testing, operation, administration, training, maintenance, and repair of the propulsion plants of naval nuclear-powered ships and prototypes, including the associated shipboard and shore-based nuclear support facilities. Examples of defence articles covered by this exclusion include nuclear propulsion plants and nuclear submarine technologies or systems; nuclear powered vessels (See Categories VI and XX).
- Note 7: Subparagraph (8)—examples of countermeasures and counter-countermeasures related to defence articles not exportable under the Treaty are:
- (a) IR countermeasures; or
 - (b) classified techniques and capabilities; or
 - (c) exports for precision radio frequency location that directly or indirectly supports fire control and is used for situation awareness, target identification, target acquisition, and weapons targeting and Radio Direction Finding (RDF) capabilities. Precision RF location is defined as angle of arrival accuracy of less than five degrees (RMS) and RF emitter location of less than ten percent range error; or
 - (d) providing the capability to reprogram; or
 - (e) acoustics (including underwater), active and passive countermeasure and counter-countermeasures; or
 - (f) other electromagnetic active and passive countermeasures that are described in Category XI.
- Note 8: Subparagraph (18)—the phrase “specific to design and testing of nuclear weapons” includes all items controlled in Category XVI(a) and (b), any items in Category XVI(c)
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Part 2 Exempted Technologies List

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- that are used directly as part of such testing, and the items in Category XVI(d) or (e) directly related to the exempted articles in Category XVI (a), (b), or (c).
- Note 9: Subparagraph (22)—defence articles specific to MANPADS include missiles which can be used without modification in other applications. It also includes production and test equipment and components specifically designed or modified for MANPAD systems, as well as training equipment specifically designed or modified for MANPAD systems.
- Note 10: Subparagraph (23)—this exclusion does not apply to de-mining equipment in support of the clearance of landmines and unexploded ordnance for humanitarian purposes.
- As used in this exclusion, “anti-personnel landmine” means any mine placed under, on, or near the ground or other surface area, or delivered by artillery, rocket, mortar, or similar means or dropped from an aircraft and which is designed to be detonated or exploded by the presence, proximity, or contact of a person; any device or material which is designed, constructed, or adapted to kill or injure and which functions unexpectedly when a person disturbs or approaches an apparently harmless object or performs an apparently safe act; any manually-emplaced munition or device designed to kill, injure, or damage and which is actuated by remote control or automatically after a lapse of time.
- Note 11: Subparagraph (24)—the cluster munitions that are subject to this exclusion are set forth below:
- The Convention on Cluster Munitions, signed December 3, 2008, and entered into force on August 1, 2010, defines a “cluster munition” as:
- A conventional munition that is designed to disperse or release explosive submunitions each weighing less than 20 kilograms, and includes those explosive submunitions. Under the Convention, a “cluster munition” does not include the following munitions:
- (a) a munition or submunition designed to dispense flares, smoke, pyrotechnics or chaff; or a munition designed exclusively for an air defence role;
 - (b) a munition or submunition designed to produce electrical or electronic effects;
 - (c) a munition that, in order to avoid indiscriminate area effects and the risks posed by unexploded submunitions, has all of the following characteristics:
 - 1) each munition contains fewer than ten explosive submunitions;
 - 2) each explosive submunition weighs more than four kilograms;
 - 3) each explosive submunition is equipped with an electronic self-destruction mechanism; and
 - 4) each explosive submunition is equipped with an electronic self-deactivating feature.
- No military assistance shall be furnished for cluster munitions, no defence export licence for cluster munitions may be issued, and no cluster munitions or cluster munitions technology shall be sold or transferred.
- Note 12: Subparagraph (25)—a complete gas turbine engine with embedded hot section components or digital engine controls is eligible for export or transfer under the Treaty. Technical data, other than required for routine external maintenance and operation, related to the hot section or digital engine controls, as well as individual hot section parts or components are not eligible for the Treaty exemption whether shipped separately or accompanying a complete engine. Gas turbine hot section exempted Defence Article components and technology are combustion chambers and liners; high pressure turbine blades, vanes, disks and related cooled structure; cooled low pressure turbine blades, vanes, disks and related cooled structure; cooled augmenters; and cooled nozzles. Examples of gas turbine engine hot section developmental technologies are Integrated High Performance Turbine Engine Technology (IHPTET), Versatile, Affordable Advanced Turbine Engine (VAATE), and Ultra-Efficient Technology (UEET), which are also excluded from export under the exemptions.
- Note 13: Subparagraph (26)—a complete gas turbine engine with embedded hot section components or digital engine controls is eligible for export or transfer under the Treaty. Technical data, other than required for routine external maintenance and operation, related to the hot section or digital engine controls, as well as individual hot section parts or components are not eligible for the Treaty exemption whether shipped separately or accompanying a complete engine. Gas turbine hot section exempted Defence Article components and technology are combustion chambers and liners; high
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pressure turbine blades, vanes, disks and related cooled structure; cooled low pressure turbine blades, vanes, disks and related cooled structure; cooled augmenters; and cooled nozzles. Examples of gas turbine engine hot section developmental technologies are Integrated High Performance Turbine Engine Technology (IHPTET), Versatile, Affordable Advanced Turbine Engine (VAATE), and Ultra-Efficient Technology (UEET), which are also excluded from export under the exemptions.

- Note 14: Subparagraph (27)—software source code beyond that source code required for basic operation, maintenance, and training for programs, systems, and/or subsystems is not eligible for use of the Treaty exemptions, unless such export is pursuant to a written solicitation or contract issued or awarded by the U.S. Department of Defense for an end-use specified under the Treaty.
- Note 15: Subparagraph (28)—the radar systems described in (b)(16) are controlled in Category XI(a)(3)(i) through (v). As used in (b)(16), however, the term ‘systems’ includes equipment, devices, software, assemblies, modules, components, practices, processes, methods, approaches, schema, frameworks and models.
- Note 16: Subparagraph (28)—the radar systems described are controlled in Category XI(a)(3)(i) through (v). As used in this entry, the term “systems” includes equipment, devices, software, assemblies, modules, components, practices, processes, methods, approaches, schema, frameworks, and models.
- Note 17: Subparagraph (29)—as of 6 February 2013, no defence articles are subject to this exemption.
- (c) Exports of the following US origin defence articles are not eligible for use of the Treaty unless such export is pursuant to a written solicitation or contract issued or awarded by the US Department of Defense pursuant to Article 3(1)(a), Article 3(1)(b), or Article 3(1)(d) of the Defence Trade Cooperation Treaty and is consistent with paragraph (a) and paragraph (b) of this exemption list:
- (1) defence articles specific to developmental systems that have not obtained Milestone B approval from the United States Government milestone approval authority;
 - (2) technical data or defence services for night vision equipment described in Category XII (c) beyond basic operations, maintenance and training data;
 - (3) manufacturing know-how, such as information that provides detailed manufacturing processes and techniques needed to translate a detailed design into a qualified, finished defence article, specific to the defence articles controlled in Categories II(d), III(d)(1), III(d)(2), IV(a), IV(b), IV(d), IV(g), VIII(a), VIII(b), VIII(e), X(a)(1), X(a)(2), XI(a)(3), XI(a)(4), XII(d) or XX(a) and their specially designed components;
 - (4) software source code specific to defence articles controlled in Categories II(c), II(d), II(i), III(d)(1), III(d)(2), IV(a), IV(b), IV(c), IV(g), VI(a), VI(c), VIII(a), VIII(e), IX(a), IX(b), XI(a), XII(a), XII(b), XII(c), XII(d), XIII(a), XVI(c) or XX(a) beyond that source code required for basic operation, maintenance and training for the programs, systems, and/or subsystems.

Schedule 1—Repeals

Defense Trade Cooperation Munitions List 2013

1 The whole of the List

Repeal the List.