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**§ 120.43 [Reserved]**

**§ 120.44 Foreign defense article or defense service.**

*Foreign defense article or defense service* means any article or service described on the U.S. Munitions List of non-U.S. origin. Unless otherwise provided in this subchapter, the terms *defense article* and *defense service* refer to both U.S. and foreign origin defense articles and defense services described on the U.S. Munitions List. A defense article or defense service is determined exclusively in accordance with the Arms Export Control Act and this subchapter, regardless of any designation (either affirming or contrary) that may be attributed to the same article or service by any foreign government or international organization.

[78 FR 52686, Aug. 26, 2013]

**PART 121—THE UNITED STATES MUNITIONS LIST**

ENUMERATION OF ARTICLES

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ENUMERATION OF ARTICLES

**§ 121.1 General. The United States Munitions List.**

(a) The following articles, services, and related technical data are designated as defense articles and defense services pursuant to sections 38 and 47(7) of the Arms Export Control Act. Changes in designations will be published in the FEDERAL REGISTER. Information and clarifications on whether specific items are defense articles and services under this subchapter may appear periodically through the Internet Web site of the Directorate of Defense Trade Controls.

(b)(1) *Order of review.* In order to classify your article on the U.S. Munitions List, you should begin with a review of the general characteristics of your item. This will usually guide you to the appropriate category on the U.S. Munitions List. Once the appropriate category is identified, you should match the particular characteristics and functions of your article to a specific entry within the appropriate category.

(2) *Composition of an entry.* Within each U.S. Munitions List category, defense articles are enumerated by an alpha paragraph designation. These designations may include subparagraph(s) to further define the enumerated defense article. Each U.S. Munitions List category starts with end-platform designations followed by major systems and equipment, and parts, components, accessories, and attachments. Most U.S. Munitions List categories contain an entry on technical data (see §120.10 of this subchapter) and defense services (see §120.9 of this subchapter) related to the enumerated defense articles of that U.S. Munitions List category.

(3) *Significant military equipment.* An asterisk may precede an entry in a U.S. Munitions List category. The asterisk means the enumerated defense article is deemed to be “Significant Military Equipment” to the extent specified in §120.7 of this subchapter. Note that technical data directly related to the

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manufacture or production of any defense articles enumerated in any category designated as Significant Military Equipment (SME) is also designated as SME.

(c) *Missile Technology Control Regime (MTCR) Annex.* Inclusion in §121.16 of this subchapter, or annotation with the parenthetical “(MT)” at the end of a U.S. Munitions List paragraph, indicates those defense articles and defense services that are on the MTCR Annex. See §120.29 of this subchapter.

(d) *Specially designed.* When applying the definition of specially designed (see §120.41 of this subchapter), follow the sequential analysis set forth as follows:

(1) if your commodity or software is controlled for reasons other than having a specially designed control parameter on the U.S. Munitions List, no further review of the definition of specially designed is required.

(2) if your commodity or software is not enumerated on the U.S. Munitions List, it may be controlled because of a specially designed control parameter. If so, begin any analysis with §120.41(a) and proceed through each subsequent paragraph. If a commodity or software would not be controlled as a result of the application of the standards in §120.41(a), then it is not necessary to work through §120.41(b).

(3) if a commodity or software is controlled as a result of §120.41(a), then it is necessary to continue the analysis and to work through each of the elements of §120.41(b).

(4) commodities or software described in any §120.41(b) subparagraph are not specially designed commodities or software controlled on the U.S. Munitions List, but may be subject to the jurisdiction of another U.S. Government regulatory agency (see §120.5 of this subchapter).

(e) *Classified.* For the purpose of this subchapter, “classified” means classified pursuant to Executive Order 13526, or predecessor order, and a security classification guide developed pursuant thereto or equivalent, or to the corresponding classification rules of another government or international organization.

### CATEGORY I—FIREARMS, CLOSE ASSAULT WEAPONS AND COMBAT SHOTGUNS

\* (a) Nonautomatic and semi-automatic firearms to caliber .50 inclusive (12.7 mm).

\* (b) Fully automatic firearms to .50 caliber inclusive (12.7 mm).

\* (c) Firearms or other weapons (e.g. insurgency-counterinsurgency, close assault weapons systems) having a special military application regardless of caliber.

\* (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 (a) through (d) of this category and their specifically designed, modified or adapted components and parts.

(f) Riflescopes manufactured to military specifications (See category XII(c) for controls on night sighting devices.)

\* (g) Barrels, cylinders, receivers (frames) or complete breech mechanisms for the articles in paragraphs (a) through (d) of this category.

(h) Components, parts, accessories and attachments for the articles in paragraphs (a) through (g) of this category.

(i) Technical data (as defined in §120.10 of this subchapter) and defense services (as defined in §120.9 of this subchapter) directly related to the defense articles enumerated in paragraphs (a) through (h) of this category. Technical data directly related to the manufacture or production of any defense articles enumerated elsewhere in this category that are designated as Significant Military Equipment (SME) shall itself be designated SME.

(j) The following interpretations explain and amplify the terms used in this category and throughout this subchapter:

(1) A firearm is a weapon not over .50 caliber (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: This coverage by the U.S. Munitions List in paragraphs (a) through (i) of this category excludes 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 (e.g., 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. The Department of Commerce regulates the export of such items. See the Export Administration Regulations (15 CFR parts 730–799). In addition, license exemptions for the items in this category are available in various parts of this subchapter (e.g. §§ 123.17, 123.18 and 125.4).

#### CATEGORY II—GUNS AND ARMAMENT

\* (a) Guns over caliber .50 (12.7mm, whether towed, airborne, self-propelled, or fixed, including but not limited to, howitzers, mortars, cannons and 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 (e.g., parasitic, structural, coatings, screening) techniques, and equipment specifically designed, developed, configured, adapted or modified to alter or reduce the signature (e.g., muzzle flash suppression, radar, infrared, visual, laser/electro-optical, acoustic) of defense articles controlled by this category.

\* (f) Engines specifically designed or modified for the self-propelled guns and howitzers in paragraph (a) of this category.

(g) Tooling and equipment specifically designed or modified for the production of defense 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) Autoloading systems for electronic programming of projectile function for the defense 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) through (i) of this category. This includes but is not limited to mounts and carriages for the articles controlled in this category.

(k) Technical data (as defined in § 120.10 of this subchapter) and defense services (as defined in § 120.9 of this subchapter) directly related to the defense articles enumerated in paragraphs (a) through (j) of this category. Technical data directly related to the manufacture or production of any defense articles enumerated elsewhere in this category that are designated as Significant Military Equipment (SME) shall itself be designated SME.

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

(1) The kinetic energy weapons systems in paragraph (d) of this category include but are not limited to:

(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 armor, 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 defense 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.

#### CATEGORY III—AMMUNITION/ORDNANCE

\* (a) Ammunition/ordnance for the articles in Categories I and II of this section.

(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 defense 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) of this category;

\* (2) Safing, arming and fuzing components (including target detection and localization devices) for the articles in paragraph (a) of this category; and

(3) All other components, parts, accessories, attachments and associated equipment for the articles in paragraphs (a) through (c) of this category.

(e) Technical data (as defined in § 120.10 of this subchapter) and defense services (as defined in § 120.9 of this subchapter) directly related to the defense articles enumerated in paragraphs (a) through (d) of this category. Technical data directly related to the manufacture or production of any defense articles

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enumerated elsewhere in this category that are designated as Significant Military Equipment (SME) shall itself be designated SME.

(f) The following explains and amplifies the terms used in this category and elsewhere in this subchapter:

(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 submunitions therefor), boosters, firing components therefor, primers, and other detonating devices for the defense 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) of this category 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 defense 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

### CATEGORY IV—LAUNCH VEHICLES, GUIDED MISSILES, BALLISTIC MISSILES, ROCKETS, TORPEDOES, BOMBS AND MINES

\* (a) Rockets (including but not limited to meteorological and other sounding rockets), bombs, grenades, torpedoes, depth charges, land and naval mines, as well as launchers for such defense articles, and demolition blocks and blasting caps. (See § 121.11.)

\* (b) Launch vehicles and missile and anti-missile systems including but not limited to guided, tactical and strategic missiles, launchers, and systems.

(c) Apparatus, devices, and materials for the handling, control, activation, monitoring, detection, protection, discharge, or detonation of the articles in paragraphs (a) and (b) of this category. (See § 121.5.)

\* (d) Missile and space launch vehicle powerplants.

\* (e) Military explosive excavating devices.

\* (f) Ablative materials fabricated or semi-fabricated from advanced composites (e.g., silica, graphite, carbon, carbon/carbon, and boron filaments) for the articles in this category that are derived directly from or specifically developed or modified for defense articles.

\* (g) Non/nuclear warheads for rockets and guided missiles.

(h) All specifically designed or modified components, parts, accessories, attachments, and associated equipment for the articles in this category.

(i) Technical data (as defined in § 120.10 of this subchapter) and defense services (as defined in § 120.9 of this subchapter) directly related to the defense articles enumerated in paragraphs (a) through (h) of this category. (See § 125.4 of this subchapter for exemptions.) Technical data directly related to the manufacture or production of any defense articles enumerated elsewhere in this category that are designated as Significant Military Equipment (SME) shall itself be designated SME.

### CATEGORY V—EXPLOSIVES AND ENERGETIC MATERIALS, PROPELLANTS, INCENDIARY AGENTS AND THEIR CONSTITUENTS

\* (a) Explosives, and mixtures thereof:

(1) ADNBF (aminodinitrobenzofuroxan or 7-Amino 4,6-dinitrobenzofurazane-1-oxide) (CAS 97096-78-1);

(2) BNCP (cis-bis (5-nitrotetrazolato) tetra amine-cobalt (III) perchlorate) (CAS 117412-28-9);

(3) CL-14 (diamino dinitrobenzofuroxan or 5,7-diamino-4,6-dinitrobenzofurazane-1-oxide) (CAS 117907-74-1);

(4) CL-20 (HNIW or Hexanitrohexaazaisowurtzitane); (CAS 135285-90-4); chlathrates of CL-20 (see paragraphs (g)(3) and (4) of this category);

(5) CP (2-(5-cyanotetrazolato) penta aminocobalt (III) perchlorate); (CAS 70247-32-4);

(6) DADE (1,1-diamino-2,2-dinitroethylene, FOX7);

(7) DDFP (1,4-dinitrodifurazanopiperazine);

(8) DDPO (2,6-diamino-3,5-dinitropyrazine-1-oxide, PZO); (CAS 194486-77-6);

(9) DIPAM (3,3'-Diamino-2,2',4,4',6,6'-hexanitrobiphenyl or dipicramide) (CAS 17215-44-0);

(10) DNGU (DINGU or dinitroglycoluril) (CAS 55510-04-8);

(11) Furazans, as follows:

(i) DAAOF (diaminoazoxyfuran);

(ii) DAAzF (diaminoazofurazan) (CAS 78644-90-3);

(12) HMX and derivatives (see paragraph (g)(5) of this category):

(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);

(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);

(13) HNAD (hexanitroadamantane) (CAS 143850-71-9);

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- (14) HNS (hexanitrostilbene) (CAS 20062–22–0);
- (15) 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);
- (16) NTNMH (1-(2-nitrotriazolo)-2-dinitromethylene hydrazine);
- (17) NTO (ONTA or 3-nitro-1,2,4-triazol-5-one) (CAS 932–64–9);
- (18) Polynitrocubanes with more than four nitro groups;
- (19) PYX (2,6-Bis(picrylamino)-3,5-dinitropyridine) (CAS 38082–89–2);
- (20) RDX and derivatives:
- (i) RDX (cyclotrimethylenetrinitramine), cyclonite, T4, hexahydro-1,3,5-trinitro-1,3,5-triazine, 1,3,5-trinitro-1,3,5-triazacyclohexane, hexogen, or hexogene) (CAS 121–82–4);
- (ii) Keto-RDX (K–6 or 2,4,6-trinitro-2,4,6-triazacyclohexanone) (CAS 115029–35–1);
- (21) TAGN (Triaminoguanidinenitrate) (CAS 4000–16–2);
- (22) TATB (Triaminotrinitrobenzene) (CAS 3058–38–6) (see paragraph (g)(7) of this category);
- (23) TEDDZ (3,3,7,7-tetrakis(difluoroamine) octahydro-1,5-dinitro-1,5-diazocine);
- (24) Tetrazoles, as follows:
- (i) NTAT (nitrotriazol aminotetrazole);
- (ii) NTNT (1-N-(2-nitrotriazolo)-4-nitrotetrazole);
- (25) Tetryl (trinitrophenylmethylnitramine) (CAS 479–45–8);
- (26) TNAD (1,4,5,8-tetranitro-1,4,5,8-tetraazadecalin) (CAS 135877–16–6)(see paragraph (g)(6) of this category);
- (27) TNAZ (1,1,3-trinitroazetidine) (CAS 97645–24–4) (see paragraph (g)(2) of this category);
- (28) TNGU (SORGUYL or tetranitroglycoluril) (CAS 55510–03–7);
- (29) TNP (1,4,5,8-tetranitro-pyridazino [4,5-d] pyridazine) (CAS 229176–04–9);
- (30) 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);
- (31) 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) NTDNA (2-nitrotriazole 5-dinitramide) (CAS 75393–84–9);
- (viii) NTDNT (1-N-(2-nitrotriazolo) 3,5-dinitro-triazole);
- (ix) PDNT (1-picryl-3,5-dinitrotriazole);
- (x) TACOT (tetranitrobenzotriazolobenzotriazole) (CAS 25243–36–1);
- (32) Any explosive not listed elsewhere in paragraph (a) of this category with a detonation velocity exceeding 8,700m/s at maximum density or a detonation pressure exceeding 34 Gpa (340 kbar).
- (33) Other organic explosives not listed elsewhere in paragraph (a) of this category yielding detonation pressures of 25 Gpa (250 kbar) or more that will remain stable at temperatures of 523K (250 °C) or higher for periods of 5 minutes or longer;
- (34) Diaminotrinitrobenzene (DATB) (CAS 1630–08–6);
- (35) Any other explosive not elsewhere identified in this category specifically designed, modified, adapted, or configured (e.g., formulated) for military application.
- \* (b) Propellants:
- (1) Any United Nations (UN) Class 1.1 solid propellant with a theoretical specific impulse (under standard conditions) of more than 250 seconds for non-metallized, or 270 seconds for metallized compositions;
- (2) Any UN Class 1.3 solid propellant with a theoretical specific impulse (under standard conditions) of more than 230 seconds for non-halogenized, or 250 seconds for non-metallized compositions;
- (3) Propellants having a force constant of more than 1,200 kJ/Kg;
- (4) 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);
- (5) Elastomer modified cast double based propellants with extensibility at maximum stress greater than 5% at 233 K (–40 C);
- (6) Any propellant containing substances listed in Category V;
- (7) Any other propellant not elsewhere identified in this category specifically designed, modified, adapted, or configured (e.g., formulated) for military application.
- (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;
- (3) Hydrazine and derivatives:
- (i) Hydrazine (CAS 302–01–2) in concentrations of 70% or more (not hydrazine mixtures specially formulated for corrosion control);
- (ii) Monomethyl hydrazine (CAS 60–34–4);
- (iii) Symmetrical dimethyl hydrazine (CAS 540–73–8);
- (iv) Unsymmetrical dimethyl hydrazine (CAS 57–14–7);

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(4) Liquid fuels specifically formulated for use by articles covered by Categories IV, VI, and VIII;

(5) Spherical aluminum powder (CAS 7429-90-5) in particle sizes of 60 micrometers or less manufactured from material with an aluminum content of 99% or more;

(6) Metal fuels in particle form whether spherical, atomized, spheroidal, flaked or ground, manufactured from material consisting of 99% or more of any of the following:

(i) Metals and mixtures thereof:

(A) Beryllium (CAS 7440-41-7) in particle sizes of less than 60 micrometers;

(B) Iron powder (CAS 7439-89-6) with particle size of 3 micrometers or less produced by reduction of iron oxide with hydrogen;

(ii) 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 micrometers;

(B) Zirconium (CAS 7440-67-7), magnesium (CAS 7439-95-4) or alloys of these in particle sizes of less than 60 micrometers;

(iii) Explosives and fuels containing the metals or alloys listed in paragraphs (c)(6)(i) and (c)(6)(ii) of this category whether or not the metals or alloys are encapsulated in aluminum, magnesium, zirconium, or beryllium;

(7) Pyrotechnics and pyrophoric materials specifically formulated for military purposes to enhance or control the production of radiated energy in any part of the IR spectrum.

(8) Titanium subhydride (TiH<sub>n</sub>) of stoichiometry equivalent to  $n = 0.65-1.68$ ;

(9) Military materials containing thickeners for hydrocarbon fuels specially formulated for use in flame throwers or incendiary munitions; metal stearates or palmates (also known as octol); and M1, M2 and M3 thickeners;

(10) Any other pyrotechnic, fuel and related substance and mixture thereof not elsewhere identified in this category specifically designed, modified, adapted, or configured (e.g., formulated) for military application.

(d) Oxidizers, to include:

(1) ADN (ammonium dinitramide or SR-12) (CAS 140456-78-6);

(2) AP (ammonium perchlorate) (CAS 7790-98-9);

(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);

(8) Hydrazine nitrate (CAS 37836-27-4);

(9) Hydrazine perchlorate (CAS 27978-54-7);

(10) Liquid oxidizers comprised of or containing inhibited red fuming nitric acid (IRFNA) (CAS 8007-58-7) or oxygen difluoride;

(11) Perchlorates, chlorates, and chromates composited with powdered metal or other high energy fuel components controlled by this category;

(12) Any other oxidizer not elsewhere identified in this category specifically designed, modified, adapted, or configured (e.g., formulated) for military application.

\* (e) Binders, and mixtures thereof:

(1) AMMO (azidomethylmethyloxetane and its polymers) (CAS 90683-29-7) (see paragraph (g)(1) of this category);

(2) BAMO (bisazidomethylmethyloxetane and its polymers) (CAS 17607-20-4) (see paragraph (g)(1) of this category);

(3) BTTN (butanetrioltrinitrate) (CAS 6659-60-5) (see paragraph (g)(8) of this category);

(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 (glycidylazide polymer) (CAS 143178-24-9) and its derivatives;

(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 of less than 0.77 meq/g, and a viscosity at 30 °C of less than 47 poise (CAS 69102-90-5);

(8) NENAS (nitrate ethylnitramine compounds) (CAS 17096-47-8, 85068-73-1 and 82486-82-6);

(9) Poly-NIMMO (poly nitratomethylmethyloxetane, poly-NMNO, (poly[3-nitratomethyl-3-methyl oxetane]) (CAS 84051-81-0);

(10) Energetic monomers, plasticizers and polymers containing nitro, azido nitrate, nitraza or difluoromaino groups specially formulated for military use;

(11) TVOPA 1,2,3-Tris [1,2-bis(difluoroamino) ethoxy]propane; tris vinox propane adduct; (CAS 53159-39-0);

(12) Polynitrorthocarbonates;

(13) FPF-1 (poly-2,2,3,3,4,4-hexafluoro pentane-1,5-diolformal) (CAS 376-90-9);

(14) FPF-3 (poly-2,4,4,5,5,6,6-heptafluoro-2-trifluoromethyl-3-oxaheptane-1,7-diolformal);

(15) PGN (Polyglycidyl nitrate or poly(nitratomethyl oxirane); poly-GLYN); (CAS 27814-48-8);

(16) N-methyl-p-nitroaniline;

(17) Low (less than 10,000) molecular weight, alcohol-functionalized, poly(epichlorohydrin); poly(epichlorohydrindiol); and triol;

(18) Bis(2,2-dinitropropyl) formal and acetal;

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(19) Any other binder and mixture thereof not elsewhere identified in this category specifically designed, modified, adapted, or configured (e.g., formulated) for military application.

(f) Additives:

(1) Basic copper salicylate (CAS 62320-94-9);  
(2) BHEGA (Bis-(2-hydroxyethyl)glycolamide) (CAS 17409-41-5);

(3) Ferrocene Derivatives:

(i) Butacene (CAS 125856-62-4);  
(ii) Catocene (2,2-Bis-ethylferrocenyl propane) (CAS 37206-42-1);

(iii) Ferrocene carboxylic acids;  
(iv) n-butyl-ferrocene (CAS 31904-29-7);  
(4) Lead beta-resorcyate (CAS 20936-32-7);  
(5) Lead citrate (CAS 14450-60-3);  
(6) Lead-copper chelates of beta-resorcyate or salicylates (CAS 68411-07-4);  
(7) Lead maleate (CAS 19136-34-6);  
(8) Lead salicylate (CAS 15748-73-9);  
(9) Lead stannate (CAS 12036-31-6);

(10) 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;

(11) Methyl BAPO (Bis(2-methyl aziridinyl) methylamino phosphine oxide) (CAS 85068-72-0);

(12) 3-Nitrazo-1,5 pentane diisocyanate (CAS 7406-61-9);

(13) Organo-metallic coupling agents, specifically:

(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;

(14) Polyfunctional aziridine amides with isophthalic, trimesic (BITA or butylene imine trimesamide), isocyanuric, or trimethyladipic backbone structures and 2-methyl or 2-ethyl substitutions on the aziridine ring and its polymers;

(15) Superfine iron oxide (Fe<sub>2</sub>O<sub>3</sub>, hematite) with a specific surface area more than 250 m<sup>2</sup>/g and an average particle size of 0.003 [micro]m or less (CAS 1309-37-1);

(16) TEPAN (tetraethylenepentaamineacrylonitrile) (CAS 68412-45-3); cyanoethylated polyamines and their salts;

(17) TEPANOL (Tetraethylenepentaamineacrylonitrileglycidol) (CAS 110445-33-5); cyanoethylated polyamines adducted with glycidol and their salts;

(18) TPB (triphenyl bismuth) (CAS 603-33-8);

(19) PCDE (Polycyanodifluoroaminoethyleneoxide);

(20) BNO (Butadienenitrileoxide);

(21) Any other additive not elsewhere identified in this category specifically designed, modified, adapted, or configured (e.g., formulated) for military application.

(g) Precursors, as follows:

(1) BCMO (bischloromethyloxetane) (CAS 142173-26-0) (see paragraphs (e)(1) and (2) of this category);

(2) Dinitroazetidine-t-butyl salt (CAS 125735-38-8) (see paragraph (a)(27) of this category);

(3) HBIW (hexabenzylhexaazaisowurtzitane) (CAS 124782-15-6) (see paragraph (a)(4) of this category);

(4) TAIW (tetraacetyldibenzylhexaazaisowurtzitane) (see paragraph (a)(4) of this category);

(5) TAT (1, 3, 5, 7-tetraacetyl-1, 3, 5, 7-tetraaza-cyclooctane) (CAS 41378-98-7) (see paragraph (a)(12) of this category);

(6) Tetraazadecalin (CAS 5409-42-7) (see paragraph (a)(26) of this category);

(7) 1,3,5-trichlorobenzene (CAS 108-70-3) (see paragraph (a)(22) of this category);

(8) 1,2,4-trihydroxybutane (1,2,4-butanetriol) (CAS 3068-00-6) (see paragraph (e)(3) of this category);

(h) Technical data (as defined in §120.10 of this subchapter) and defense services (as defined in §120.9 of this subchapter) directly related to the defense articles enumerated in paragraphs (a) through (g) of this category. (See §125.4 of this subchapter for exemptions.) Technical data directly related to the manufacture or production of any defense articles enumerated elsewhere in this category that are designated as Significant Military Equipment (SME) shall itself be designated SME.

(1) The following interpretations explain and amplify the terms used in this category and elsewhere in this subchapter.

(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) Paragraph (c)(6)(ii)(A) of this category does not control boron and boron carbide enriched with boron-10 (20% or more of total boron-10 content).

(3) The resulting product of the combination of any controlled or non-controlled substance compounded or mixed with any item controlled by this subchapter is also subject to the controls of this category.

NOTE 1: To assist the exporter, an item has been categorized by the most common use.

Also, a reference has been provided to the related controlled precursors (e.g., see paragraph (a)(12) of this category). Regardless of where the item has been placed in the category, all exports are subject to the controls of this subchapter.

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 license application and export documentation.

CATEGORY VI—SURFACE VESSELS OF WAR AND SPECIAL NAVAL EQUIPMENT

\* (a) Warships and other combatant vessels (see § 121.15 of this subchapter).

(b) Other vessels not controlled in paragraph (a) of this category (see § 121.15 of this subchapter).

(c) Developmental vessels, and specially designed parts, components, accessories, and attachments therefor, funded by the Department of Defense via contract or other funding authorization.

NOTE 1 TO PARAGRAPH (C): This paragraph does not control vessels, and specially designed parts, components, accessories, and attachments therefor, (a) in production, (b) determined to be subject to the EAR via a commodity jurisdiction determination (see § 120.4 of this subchapter), or (c) identified in the relevant Department of Defense contract or other funding authorization as being developed for both civil and military applications.

NOTE 2 TO PARAGRAPH (C): Note 1 does not apply to defense articles enumerated on the U.S. Munitions List, whether in production or development.

NOTE 3 TO PARAGRAPH (C): This provision is applicable to those contracts and funding authorizations that are dated July 8, 2014, or later.

(d) [Reserved]

\* (e) Naval nuclear propulsion plants and prototypes, and special facilities for construction, support, and maintenance therefor (see § 123.20 of this subchapter).

(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) of this category;

(ii) Have armor, active protection systems, or developmental armor systems; or

(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;

(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) compartmentalization, over-pressurization 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;

\* (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) of this section (see § 123.20 of this subchapter);

(6) Parts, components, accessories, attachments, and equipment specially designed for integration of articles controlled by USML 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);

NOTE TO PARAGRAPH (F)(6): “Range” is the maximum distance that the specified rocket system is capable of traveling 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 maximizes range, assuming International Civil Aviation Organization (ICAO) standard atmosphere with zero wind.

(7) Shipborne active protection systems (i.e., defensive systems that actively detect and track incoming threats and launch a ballistic, explosive, energy, or electromagnetic countermeasure(s) to neutralize 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; or

\* (9) Any part, component, accessory, attachment, equipment, or system that:

(i) Is classified;



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(ii) Contains classified software directly related to defense articles in this subchapter or 600 series items subject to the EAR; or

(iii) Is being developed using classified information. “Classified” means classified pursuant to Executive Order 13526, or predecessor order, and a security classification guide developed pursuant thereto or equivalent, or to the corresponding classification rules of another government or international organization.

NOTE 1 TO PARAGRAPH (F): Parts, components, accessories, attachments, associated equipment, and systems specially designed for vessels enumerated in this category but not listed in paragraph (f) are subject to the EAR under ECCN 8A609.

NOTE 2 TO PARAGRAPH (F): For controls related to ship signature management, *see* USML Category XIII.

(g) Technical data (*see* § 120.10 of this subchapter) and defense services (*see* § 120.9 of this subchapter) directly related to the defense articles enumerated in paragraphs (a) through (f) of this category and classified technical data directly related to items controlled in ECCNs 8A609, 8B609, 8C609, and 8D609 and defense services using the classified technical data. (MT for technical data and defense services related to articles designated as such.)

(*See* § 125.4 of this subchapter for exemptions.)

(h)–(w) [Reserved]

(x) Commodities, software, and technical data subject to the EAR (*see* § 120.42 of this subchapter) used in or with defense articles controlled in this category.

NOTE TO PARAGRAPH (X): Use of this paragraph is limited to license applications for defense articles controlled in this category where the purchase documentation includes commodities, software, or technical data subject to the EAR (*see* § 123.1(b) of this subchapter).

### CATEGORY VII—GROUND VEHICLES

\* (a) Armored combat ground vehicles (*see* § 121.4 of this subchapter) as follows:

(1) Tanks; or

(2) Infantry fighting vehicles.

\* (b) Ground vehicles (not enumerated in paragraph (a) of this category) and trailers that are armed or are specially designed to serve as a firing or launch platform (*see* § 121.4 of this subchapter) (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).

(c) Ground vehicles and trailers equipped with any mission systems controlled under this subchapter (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) (*see* § 121.4 of this subchapter).

NOTE TO PARAGRAPHS (B) AND (C): “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 to paragraph (a) USML Category VIII. For definition of “range” as it pertains to rocket systems, *see* note to paragraph (f)(6) of USML Category VI.

(d) [Reserved]

\* (e) Armored support ground vehicles (*see* § 121.4 of this subchapter).

(f) [Reserved]

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

(1) Armored hulls, armored turrets, and turret rings;

(2) Active protection systems (*i.e.*, defensive systems that actively detect and track incoming threats and launch a ballistic, explosive, energy, or electromagnetic countermeasure(s) to neutralize the threat prior to contact with a vehicle) and specially designed parts and components therefor;

(3) Composite armor parts and components specially designed for the vehicles in this category;

(4) Spaced armor components and parts, including slat armor parts and components specially designed for the vehicles in this category;

(5) Reactive armor parts and components;

(6) Electromagnetic armor parts and components, including pulsed power specially designed parts and components therefor;

NOTE TO PARAGRAPHS (G)(3)–(6): *See* USML Category XIII(m)(1)–(4) for interpretations which explain and amplify terms used in these paragraphs.

(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, stabilization, 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 tons in this category; or

(ii) Torsion bars specially designed for the vehicles weighing more than 50 tons 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;
- (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;
- (ii) Contains classified software directly related to defense articles in this subchapter or 600 series items subject to the EAR; or
- (iii) Is being developed using classified information.

“Classified” means classified pursuant to Executive Order 13526, or predecessor order, and a security classification guide developed pursuant thereto or equivalent, or to the corresponding classification rules of another government or international organization.

NOTE TO PARAGRAPH (G): Parts, components, accessories, attachments, associated equipment, and systems specially designed for vehicles in this category but not listed in paragraph (g) are subject to the EAR under ECCN 0A606.

(h) Technical data (see § 120.10 of this subchapter) and defense services (see § 120.9 of this subchapter) directly related to the defense articles enumerated in paragraphs (a) through (g) of this category and classified technical data directly related to items controlled in ECCNs 0A606, 0B606, 0C606, and 0D606 and defense services using the classified technical data. (See § 125.4 of this subchapter for exemptions.) (MT for technical data and defense services related to articles designated as such.)

(i)–(w) [Reserved]

(x) Commodities, software, and technical data subject to the EAR (see § 120.42 of this subchapter) used in or with defense articles controlled in this category.

NOTE TO PARAGRAPH (X): Use of this paragraph is limited to license applications for defense articles controlled in this category where the purchase documentation includes commodities, software, or technical data subject to the EAR (see § 123.1(b) of this subchapter).

CATEGORY VIII—AIRCRAFT AND RELATED ARTICLES

(a) Aircraft (see § 121.3 of this subchapter) 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 300km);
- \* (6) Armed unmanned aerial vehicles (UAVs) (MT if the UAV has a range equal to or greater than 300km);
- \* (7) Military intelligence, surveillance, and reconnaissance aircraft;
- \* (8) Electronic warfare, airborne warning and control aircraft;
- (9) Air refueling aircraft and strategic air-lift aircraft;
- (10) Target drones (MT if the drone has a range equal to or greater than 300km);
- (11) Aircraft incorporating any mission system controlled under this subchapter;
- (12) Aircraft capable of being refueled in flight including hover-in-flight refueling (HIFR); or
- \* (13) Optionally Piloted Vehicles (OPV) (MT if the OPV has a range equal to or greater than 300km).

NOTE TO PARAGRAPH (a): “Range” is the maximum distance that the specified aircraft system is capable of traveling 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 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 (e.g., cruise speed and altitude), assuming International Civil Aviation Organization (ICAO) standard atmosphere with zero wind.

(b)–(c) [Reserved]

(d) Ship-based launching and recovery equipment specially designed for defense 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 TO PARAGRAPH (d): Fixed land-based arresting gear is not included in this paragraph. For the definition of “range,” see note to paragraph (a) of this category.

\* (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 or controlled in ECCN 9A610 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 USML Category XII(d).

(f) Developmental aircraft funded by the Department of Defense via contract or other funding authorization, and specially designed parts, components, accessories, and attachments therefor.

NOTE 1 TO PARAGRAPH (f): Paragraph (f) does not control aircraft and specially designed parts, components, accessories, and attachments therefor (a) in production; (b) determined to be subject to the EAR via a commodity jurisdiction determination (*see* § 120.4 of this subchapter), or (c) identified in the relevant Department of Defense contract or other funding authorization as being developed for both civil and military applications.

NOTE 2 TO PARAGRAPH (f): Note 1 does not apply to defense articles enumerated on the U.S. Munitions List, whether in production or development.

NOTE 3 TO PARAGRAPH (f): This provision is applicable to those contracts or other funding authorizations that are dated April 16, 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 U.S.-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 U.S. 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, unless listed in paragraph (h) of this category, are subject to the EAR;

NOTE TO PARAGRAPH (h)(1): Specially designed (*see* § 120.4(b)(3)(ii) of this subchapter) does not control parts, components, accessories, and attachments that are common to aircraft enumerated in paragraph (a) of this category but not identified in paragraph (h)(1), and those identified in paragraph (h)(1). For example, a part common to only the F-14 and F-35 is not specially designed for purposes of the ITAR. A part common to only the F-22 and F-35—two aircraft models identified in paragraph (h)(1)—is specially designed.

(2) Face gear gearboxes, split-torque gearboxes, variable speed gearboxes, synchronization 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, stabilator and automatic rotor blade folding systems, and specially designed parts and components therefor;

(4) Wing folding systems and specially designed parts and components therefor;

(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) 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 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 or controlled in ECCN 9A610;

(8) Threat-adaptive autonomous flight control systems;

(9) Non-surface-based flight control systems and effectors (e.g., thrust vectoring from gas ports other than main engine thrust vector);

(10) Radar altimeters with output power management or signal modulation (*i.e.*, 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 refueling systems and hover-in-flight refueling (HIFR) systems, and specially designed parts and components therefor;

(12) Unmanned aerial vehicle (UAV) flight control systems and vehicle management systems with swarming capability (*i.e.*, UAVs interact with each other to avoid collisions and stay together, or, if weaponized, coordinate targeting) (MT if for a UAV, drone or missile that has a “range” equal to or greater than 300 km);

(13) Lithium-ion batteries that provide greater than 28 VDC 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 (e.g., Helmet Mounted Cueing

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Systems, Joint Helmet Mounted Cueing Systems (JHMCS), Helmet Mounted Displays, Display and Sight Helmets (DASH));

(16) Fire control computers, stores management systems, armaments control processors, aircraft-weapon interface units and computers (e.g., 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 or controlled in ECCN 9A610;

(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 or controlled in ECCN 9A610;

\* (20) Any part, component, accessory, attachment, equipment, or system that:

(i) is classified;

(ii) contains classified software directly related to defense articles in this subchapter or 600 series items subject to the EAR; or

(iii) is being developed using classified information (see § 120.10(a)(2) of this subchapter).

“Classified” means classified pursuant to Executive Order 13526, or predecessor order, and a security classification guide developed pursuant thereto or equivalent, or to the corresponding classification rules of another government or international organization;

(21) Printed circuit boards or patterned multichip modules for which the layout is specially designed for defense articles in this category;

(22) Radomes or electromagnetic antenna windows specially designed for aircraft or UAVs that:

(i) incorporate radio frequency selective surfaces;

(ii) operate in multiple or more non-adjacent radar bands;

(iii) incorporate a structure that is specially designed to provide ballistic protection from bullets, shrapnel, or blast;

(iv) have a melting point greater than 1,300 °C and maintain a dielectric constant less than 6 at temperatures greater than 500 °C;

(v) are manufactured from ceramic materials with a dielectric constant less than 6 at any frequency from 100 MHz to 100 GHz;

(vi) maintain structural integrity at stagnation pressures greater than 6,000 pounds per square foot; or

(vii) withstand a combined thermal shock greater than  $4.184 \times 10^6$  J/m<sup>2</sup> accompanied by a peak overpressure of greater than 50 kPa (MT for radomes meeting this criteria);

(23) Fuel cells specially designed for aircraft controlled in this category or controlled in ECCN 9A610;

(24) Thermal engines specially designed for aircraft controlled in this category or controlled in ECCN 9A610;

(25) Thermal batteries specially designed for aircraft controlled in this category or controlled in ECCN 9A610 (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); or

(26) Thermionic generators specially designed for aircraft controlled in this category or controlled in ECCN 9A610.

(i) Technical data (see § 120.10 of this subchapter) and defense services (see § 120.9 of this subchapter) directly related to the defense articles enumerated in paragraphs (a) through (h) of this category and classified technical data directly related to items controlled in ECCNs 9A610, 9B610, 9C610, and 9D610 and defense services using classified technical data. (See § 125.4 of this subchapter for exemptions.) (MT for technical data and defense services related to articles designated as such.)

(j)–(w) [Reserved]

(x) Commodities, software, and technical data subject to the EAR (see § 120.42 of this subchapter) used in or with defense articles controlled in this category.

NOTE TO PARAGRAPH (x): Use of this paragraph is limited to license applications for defense articles controlled in this category where the purchase documentation includes commodities, software, or technical data subject to the EAR (see § 123.1(b) of this subchapter).

NOTE: Inertial navigation systems, aided or hybrid inertial navigation systems, Inertial Measurement Units, and Attitude and Heading Reference Systems in paragraph (e) and parts, components, accessories, and attachments in paragraphs (h)(2)–(5), (7), (13), (14), (17)–(19), and (21)–(26) are licensed by the Department of Commerce when incorporated in a military aircraft subject to the EAR and classified under ECCN 9A610. Replacement systems, parts, components, accessories and attachments are subject to the controls of the ITAR.

### CATEGORY IX—MILITARY TRAINING EQUIPMENT AND TRAINING

(a) Training equipment specifically designed, modified, configured or adapted for military purposes, including but not limited to weapons system trainers, radar trainers, gunnery training devices, antisubmarine warfare trainers, target equipment, armament training units, pilot-less aircraft trainers, navigation trainers and human-rated centrifuges.

(b) Simulation devices for the items covered by this subchapter.

(c) Tooling and equipment specifically designed or modified for the production of articles controlled by this category.

(d) Components, parts, accessories, attachments, and associated equipment specifically designed, modified, configured, or adapted

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for the articles in paragraphs (a), (b) and (c) of this category.

(e) Technical data (as defined in §120.10 of this subchapter) and defense services (as defined in §120.9 of this subchapter) directly related to the defense articles enumerated in paragraphs (a) through (d) of this category.

(f) The following interpretations explain and amplify terms used in this category and elsewhere in this subchapter:

(1) The weapons systems trainers in paragraph (a) of this category include individual crew stations and system specific trainers;

(2) The articles in this category include any end item, components, accessory, part, firmware, software or system that has been designed or manufactured using technical data and defense services controlled by this category;

(3) The defense services and related technical data in paragraph (f) of this category include software and associated databases that can be used to simulate trainers, battle management, test scenarios/models, and weapons effects. In any instance when the military training transferred to a foreign person does not use articles controlled by the U.S. Munitions List, the training may nevertheless be a defense service that requires authorization in accordance with this subchapter. See e.g., §120.9 and §124.1 of this subchapter for additional information on military training.

### CATEGORY X—PROTECTIVE PERSONNEL EQUIPMENT AND SHELTERS

(a) Protective personnel equipment specifically designed, developed, configured, adapted, modified, or equipped for military applications. This includes but is not limited to:

(1) Body armor;

(2) Clothing to protect against or reduce detection by radar, infrared (IR) or other sensors at wavelengths greater than 900 nanometers, and the specially treated or formulated dyes, coatings, and fabrics used in its design, manufacture, and production;

(3) Anti-Gravity suits (G-suits);

(4) Pressure suits capable of operating at altitudes above 55,000 feet sea level;

(5) Atmosphere diving suits designed, developed, modified, configured, or adapted for use in rescue operations involving submarines controlled by this subchapter;

(6) Helmets specially designed, developed, modified, configured, or adapted to be compatible with military communication hardware or optical sights or slewing devices;

(7) Goggles, glasses, or visors designed to protect against lasers or thermal flashes discharged by an article subject to this subchapter.

(b) Permanent or transportable shelters specifically designed and modified to protect against the effect of articles covered by this subchapter as follows:

(1) Ballistic shock or impact;

(2) Nuclear, biological, or chemical contamination.

(c) Tooling and equipment specifically designed or modified for the production of articles controlled by this category.

(d) Components, parts, accessories, attachments, and associated equipment specifically designed, modified, configured, or adapted for use with the articles in paragraphs (a) through (c) of this category.

(e) Technical data (as defined in §120.10 of this subchapter) and defense services (as defined in §120.9 of this subchapter) directly related to the defense articles enumerated in paragraphs (a) through (d) of this category.

(f) The following interpretations explain and amplify the terms used in this category and throughout this subchapter: (1) The body armor covered by this category does not include Type 1, Type 2, Type 2a, or Type 3a as defined by the National Institute of Justice Classification;

(2) The articles in this category include any end item, components, accessory, attachment, part, firmware, software or system that has been designed or manufactured using technical data and defense services controlled by this category;

(3) Pressure suits in paragraph (a) (4) of this category include full and partial suits used to simulate normal atmospheric pressure conditions at high altitude.

### CATEGORY XI—MILITARY ELECTRONICS

(a) Electronic equipment not included in Category XII of the U.S. Munitions List which is specifically designed, modified or configured for military application. This equipment includes but is not limited to:

\* (1) Underwater sound equipment to include active and passive detection, identification, tracking, and weapons control equipment.

\* (2) Underwater acoustic active and passive countermeasures and counter-countermeasures.

(3) Radar systems, with capabilities such as:

\* (i) Search,

\* (ii) Acquisition,

\* (iii) Tracking,

\* (iv) Moving target indication,

\* (v) Imaging radar systems,

(vi) Any ground air traffic control radar which is specifically designed or modified for military application.

\* (4) Electronic combat equipment, such as:

(i) Active and passive countermeasures,

(ii) Active and passive counter-countermeasures, and

(iii) Radios (including transceivers) specifically designed or modified to interfere with other communication devices or transmissions.

\* (5) Command, control and communications systems to include radios

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(transceivers), navigation, and identification equipment.

(6) Computers specifically designed or developed for military application and any computer specifically modified for use with any defense article in any category of the U.S. Munitions List.

(7) Any experimental or developmental electronic equipment specifically designed or modified for military application or specifically designed or modified for use with a military system.

\* (b) Electronic systems or equipment specifically designed, modified, or configured for intelligence, security, or military purposes for use in search, reconnaissance, collection, monitoring, direction-finding, display, analysis and production of information from the electromagnetic spectrum and electronic systems or equipment designed or modified to counteract electronic surveillance or monitoring. A system meeting this definition is controlled under this subchapter even in instances where any individual pieces of equipment constituting the system may be subject to the controls of another U.S. Government agency. Such systems or equipment described above include, but are not limited to, those:

(1) Designed or modified to use cryptographic techniques to generate the spreading code for spread spectrum or hopping code for frequency agility. This does not include fixed code techniques for spread spectrum.

(2) Designed or modified using burst techniques (e.g., time compression techniques) for intelligence, security or military purposes.

(3) Designed or modified for the purpose of information security to suppress the compromising emanations of information-bearing signals. This covers TEMPEST suppression technology and equipment meeting or designed to meet government TEMPEST standards. This definition is not intended to include equipment designed to meet Federal Communications Commission (FCC) commercial electro-magnetic interference standards or equipment designed for health and safety.

(c) Components, parts, accessories, attachments, and associated equipment specifically designed or modified for use with the equipment in paragraphs (a) and (b) of this category, except for such items as are in normal commercial use.

(d) Technical data (as defined in § 120.10) and defense services (as defined in § 120.9) directly related to the defense articles enumerated in paragraphs (a) through (c) of this category. (See § 125.4 for exemptions.) Technical data directly related to the manufacture or production of any defense articles enumerated elsewhere in this category that are designated as Significant Military Equipment (SME) shall itself be designated as SME.

### 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 of this section.

\* (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. Military second and third generation image intensification tubes and military infrared focal plane arrays identified in this subparagraph are licensed by the Department of Commerce (ECCN 6A002A and 6A003A) when part of a commercial system (*i.e.*, those systems originally designed for commercial use). This does not include any military system comprised of non-military specification components. Replacement tubes or focal plane arrays identified in this paragraph being exported for commercial systems are subject to the controls of the ITAR.

NOTE: *Special definition.* For purposes of this subparagraph, *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 stabilization 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

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designed or modified for the articles in paragraphs (a) through (d) of this category, except for such items as are in normal commercial use.

(f) Technical data (as defined in §120.10) and defense services (as defined in §120.9) directly related to the defense articles enumerated in paragraphs (a) through (e) of this category. (See §125.4 for exemptions.) Technical data directly related to manufacture and production of any defense articles enumerated elsewhere in this category that are designated as Significant Military Equipment (SME) shall itself be designated as SME.

### CATEGORY XIII— MATERIALS AND MISCELLANEOUS ARTICLES

(a) Cameras and specialized 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 or intelligence systems, equipment, assemblies, modules, integrated circuits, components, or software (including all previous or derived versions) authorized to control access to or transfer data between different security domains as listed on the Unified Cross Domain Management Office (UCDMO) Control List (UCL); or

(5) Ancillary equipment specially designed for the articles in paragraphs (b)(1)–(b)(4) of this category.

(c) [Reserved]

(d) Materials, as follows:

\* (1) Ablative materials fabricated or semi-fabricated from advanced composites (e.g., silica, graphite, carbon, carbon/carbon, and boron filaments) specially designed for the articles in USML Category IV (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); or

(2) Carbon/carbon billets and preforms that are reinforced with continuous unidirectional fibers, tows, tapes, or woven cloths in three or more dimensional planes (MT if designed 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 TO PARAGRAPH (D): “Range” is the maximum distance that the specified rocket system is capable of traveling 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 maximizes range, assuming International Civil Aviation Organization (ICAO) standard atmosphere with zero wind.

NOTE TO PARAGRAPH (D)(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) Armor (e.g., organic, ceramic, metallic) and armor materials, as follows:

(1) Spaced armor with  $E_m$  greater than 1.4 and meeting NIJ Level III or better;

(2) Transparent armor having  $E_m$  greater than or equal to 1.3 or having  $E_m$  less than 1.3 and meeting and exceeding NIJ Level III standards with areal density less than or equal to 40 pounds per square foot;

(3) Transparent ceramic plate greater than ¼ inch-thick and larger than 8 inches x 8 inches, excluding glass, for transparent armor;

(4) Non-transparent ceramic plate or blanks, greater than ¼ inches thick and larger than 8 inches x 8 inches for transparent armor. This includes spinel and aluminum oxynitride (ALON);

(5) Composite armor with  $E_m$  greater than 1.4 and meeting or exceeding NIJ Level III;

(6) Metal laminate armor with  $E_m$  greater than 1.4 and meeting or exceeding NIJ Level III; or

(7) Developmental armor funded by the Department of Defense via contract or other funding authorization.

NOTE 1 TO PARAGRAPH (E)(7): This paragraph does not control armor (a) in production, (b) determined to be subject to the EAR via a commodity jurisdiction determination

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(see §120.4 of this subchapter), or (c) identified in the relevant Department of Defense contract or other funding authorization as being developed for both civil and military applications.

NOTE 2 TO PARAGRAPH (E)(7): Note 1 does not apply to defense articles enumerated on the USML, whether in production or development.

NOTE 3 TO PARAGRAPH (E)(7): This provision is applicable to those contracts and funding authorizations that are dated July 8, 2014, or later.

\*(f) Any article enumerated in this category that (MT for those articles designated as such):

- (i) Is classified;
- (ii) Contains classified software directly related to defense articles in this subchapter or 600 series items subject to the EAR; or
- (iii) Is being developed using classified information.

“Classified” means classified pursuant to Executive Order 13526, or predecessor order, and a security classification guide developed pursuant thereto or equivalent, or to the corresponding classification rules of another government or international organization.

\*(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 to paragraph (d) of this category):

(1) Polymers loaded with carbonyl iron powder, ferrites, iron whiskers, fibers, 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 defense articles or military items subject to the EAR; or

(4) Broadband (greater than 30% bandwidth) lightweight (less than 2 lbs/sq ft) magnetic radar absorbing material (RAM) specially designed for use on defense articles or military items subject to the EAR.

(h) Energy conversion devices not otherwise enumerated in this subchapter, as follows:

(1) Fuel cells specially designed for platforms or soldier systems specified in this subchapter;

(2) Thermal engines specially designed for platforms or soldier systems specified in this subchapter;

(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 to paragraph (d) of this category); or

NOTE TO PARAGRAPH (H)(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.

(4) Thermionic generators specially designed for platforms or soldier systems enumerated in this subchapter.

\*(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 to paragraph (d) of this category) 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 defense articles to reduce detectability or observability;

(2) Software for design of low-observable platforms;

(3) Software for design, analysis, prediction, or optimization of signature management solutions for defense articles;

(4) Infrared signature measurement or prediction software for defense articles or radar cross section measurement or prediction software;

(5) Signature management technical data, including codes and algorithms for defense articles to reduce detectability or observability;

(6) Signature control design methodology (*see* §125.4(c)(4) of this subchapter) for defense 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 (e.g., low probability of intercept (LPI) techniques, methods or applications) of defense platforms or equipment through shaping, active, or passive techniques; or

(11) Technical data for modifying acoustic signatures of defense platforms or equipment



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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 nanometers (see USML Category X(a)(2)); or

\* (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 defense articles or 600 series items subject to the EAR 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 to paragraph (d) of this category).

\* (k) Tooling and equipment, as follows:

(1) Tooling and equipment specially designed for production of low observable (LO) components; or

(2) Portable platform signature field repair validation equipment (e.g., portable optical interrogator that validates integrity of a repair to a signature reduction structure).

(l) Technical data (see §120.10 of this subchapter) directly related to the defense articles enumerated in paragraphs (a) through (h), (j), and (k) of this category and defense services (see §120.9 of this subchapter) directly related to the defense articles enumerated in this category. (See also §123.20 of this subchapter.) (MT for technical data and defense services related to articles designated as such.)

(m) The following interpretations explain and amplify terms used in this category and elsewhere in this subchapter:

(1) Composite armor is defined as having more than one layer of different materials or a matrix.

(2) Spaced armors are metallic or non-metallic armors that incorporate an air space or obliquity or discontinuous material path effects as part of the defeat mechanism.

(3) Reactive armor 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 armor (EMA) employs electricity to defeat threats such as shaped charges.

(5) Materials used in composite armor could include layers of metals, plastics, elastomers, fibers, 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 armors are two or more layers of metallic materials which are mechanically or adhesively bonded together to form an armor system.

(9)  $E_m$  is the line-of-sight target mass effectiveness ratio and provides a measure of the tested armor's performance to that of rolled homogenous armor, where  $E_m$  is defined as follows:

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

Where:

$\rho_{RHA}$  = density of RHA, (7.85 g/cm<sup>3</sup>)

$P_o$  = Baseline Penetration of RHA, (mm)

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

$AD_{TARGET}$  = Line-of-Sight Areal Density of Target (kg/m<sup>2</sup>)

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.

(10) NIJ is the National Institute of Justice and Level III refers to the requirements specified in NIJ standard 0108.01 Ballistic Resistant Protective Materials.

(n)–(w) [Reserved]

(x) Commodities, software, and technical data subject to the EAR (see §120.42 of this subchapter) used in or with defense articles controlled in this category.

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NOTE TO PARAGRAPH (X): Use of this paragraph is limited to license applications for defense articles controlled in this category where the purchase documentation includes commodities, software, or technical data subject to the EAR (see §123.1(b) of this sub-chapter).

### 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 C<sub>10</sub>, 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);

(ii) O-Alkyl (equal to or less than C<sub>10</sub>, 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);

(iii) O-Alkyl (H or equal to or less than C<sub>10</sub>, 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);

(2) Amiton: O,O-Diethyl S-[2(diethylamino)ethyl] phosphorothiolate and corresponding alkylated or protonated salts (CAS 78-53-5) (CWC Schedule 2A);

(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);

(ii) Lewisites, such as: 2-chlorovinyl dichloroarsine (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);

(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);

(iv) Ethyldichloroarsine (ED);

(v) Methyl dichloroarsine (MD);

(4) Incapacitating agents, such as:

(i) 3-Quinuclidinyl benzilate (BZ) (CAS 6581-06-2) (CWC Schedule 2A);

(ii) Diphenylchloroarsine (DA) (CAS 712-48-1);

(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 C<sub>10</sub>, 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-Pinacolyl 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);

(2) CA (Bromobenzyl cyanide) (CAS 5798-79-8);

(3) CN (Phenylacetyl chloride or w-Chloroacetophenone) (CAS 532-27-4);

(4) CR (Dibenz-(b,f)-1,4-oxazepine) (CAS 257-07-8);

(5) CS (o-Chlorobenzylidenemalononitrile or o-Chlorobenzalmalononitrile) (CAS 2698-41-1);

(6) Dibromodimethyl ether (CAS 4497-29-4);

(7) Dichlorodimethyl ether (ClCi) (CAS 542-88-1);

(8) Ethyldibromoarsine (CAS 683-43-2);

(9) Bromo acetone;

(10) Bromo methylethylketone;

(11) Iodo acetone;

(12) Phenylcarbylamine chloride;

(13) Ethyl iodoacetate;

(e) Defoliants, as follows:

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(1) Agent Orange (2,4,5-Trichlorophenoxyacetic acid mixed with 2,4-dichlorophenoxyacetic acid);

(2) LNF (Butyl 2-chloro-4-fluorophenoxyacetate)

\* (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, of this category;

(2) The detection, identification, warning or monitoring of the chemical agents and biological agents listed in paragraph (a) and (b) of this category;

(3) Sample collection and processing of the chemical agents and biological agents listed in paragraph (a) and (b) of this category;

(4) Individual protection against the chemical and biological agents listed in paragraphs (a) and (b) of this category.

(5) Collective protection against the chemical agents and biological agents listed in paragraph (a) and (b) of this category.

(6) Decontamination or remediation of the chemical agents and biological agents listed in paragraph (a) and (b) of this category.

(g) Antibodies, polynucleoides, biopolymers or biocatalysts specifically designed or modified for use with articles controlled in paragraph (f) of this category.

(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) of this category and vaccines with the sole purpose of protecting against biological agents identified in paragraph (b) of this category. Examples include: barrier creams specifically designed to be applied to skin and personal equipment to protect against vesicant agents controlled in paragraph (a) of this category; atropine auto injectors specifically designed to counter nerve agent poisoning.

(i) Modeling or simulation tools specifically designed or modified for chemical or biological weapons design, development or employment. The concept of modeling and simulation includes software covered by paragraph (m) of this category specifically designed to reveal susceptibility or vulnerability to biological agents or materials listed in paragraph (b) of this category.

(j) Test facilities specifically designed or modified for the certification and qualification of articles controlled in paragraph (f) of this category.

(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) of this category. This destruction equipment includes facilities specifically designed or modified for destruction operations.

(1) Tooling and equipment specifically designed or modified for the production of articles controlled by paragraph (f) of this category.

(m) Technical data (as defined in § 120.10 of this subchapter) and defense services (as defined in § 120.9 of this subchapter) related to the defense articles enumerated in paragraphs (a) through (l) of this category. (See § 125.4 of this subchapter for exemptions.) Technical data directly related to the manufacture or production of any defense articles enumerated elsewhere in this Category that are designated as Significant Military Equipment (SME) shall itself be designated as SME.

(n) The following interpretations explain and amplify the terms used in this category and elsewhere in this subchapter.

(1) A chemical agent in category XIV(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) of this category 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 (e.g., 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) of this category.

(4)(i) The individual protection against the chemical and biological agents controlled by this category includes military protective clothing and masks, but not those items designed for domestic preparedness (e.g., civil defense). Domestic preparedness devices for individual protection that integrate components and parts identified in this subparagraph are licensed by the Department of Commerce when such components are:

(A) Integral to the device;

(B) Inseparable from the device; and,

(C) Incapable of replacement without compromising the effectiveness of the device.

(ii) Components and parts identified in this subparagraph exported for integration into domestic preparedness devices for individual protection are subject to the controls of the ITAR;

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(5) Technical data and defense services in paragraph (1) include libraries, databases and algorithms specifically designed or modified for use with articles controlled in paragraph (f) of this category.

(6) The tooling and equipment covered by paragraph (1) of this category includes molds used to produce protective masks, overboots, and gloves controlled by paragraph (f) and leak detection equipment specifically designed to test filters controlled by paragraph (f) of this category.

(7) The resulting product of the combination of any controlled or non-controlled substance compounded or mixed with any item controlled by this subchapter 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-defense purposes.

NOTE 2: Categories XIV(a) and (d) do not include the following:

- (1) Cyanogen chloride;
- (2) Hydrocyanic acid;
- (3) Chlorine;
- (4) Carbonyl chloride (Phosgene);
- (5) Ethyl bromoacetate;
- (6) Xylol bromide;
- (7) Benzyl bromide;
- (8) Benzyl iodide;
- (9) Chloro acetone;
- (10) Chloropicrin (trichloronitromethane);
- (11) Fluorine;
- (12) 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: With respect to U.S. obligations under the Chemical Weapons Convention (CWC), refer to Chemical Weapons Convention Regulations (CWCR) (15 CFR parts 710 through 722). As appropriate, the CWC schedule is provided to assist the exporter.

NOTE 5: Pharmacological formulations containing nitrogen mustards and certain reference standards for these drugs are not considered to be chemical agents and are licensed by the Department of Commerce when:

- (1) The drug is in the form of a final medical product; or
- (2) 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.

### CATEGORY XV—SPACECRAFT SYSTEMS AND ASSOCIATED EQUIPMENT

\* (a) Spacecraft, including communications satellites, remote sensing satellites, scientific satellites, research satellites, navigation satellites, experimental and multi-mission satellites.

\* NOTE TO PARAGRAPH (a): Commercial communications satellites, scientific satellites, research satellites and experimental satellites are designated as SME only when the equipment is intended for use by the armed forces of any foreign country.

(b) Ground control stations for telemetry, tracking and control of spacecraft or satellites, or employing any of the cryptographic items controlled under category XIII of this subchapter.

(c) Global Positioning System (GPS) receiving equipment specifically designed, modified or configured for military use; or GPS receiving equipment with any of the following characteristics:

- (1) Designed for encryption or decryption (e.g., Y-Code) of GPS precise positioning service (PPS) signals;
- (2) Designed for producing navigation results above 60,000 feet altitude and at 1,000 knots velocity or greater;
- (3) Specifically designed or modified for use with a null steering antenna or including a null steering antenna designed to reduce or avoid jamming signals;
- (4) Designed or modified for use with unmanned air vehicle systems capable of delivering at least a 500 kg payload to a range of at least 300 km.

NOTE: GPS receivers designed or modified for use with military unmanned air vehicle systems with less capability are considered to be specifically designed, modified or configured for military use and therefore covered under this paragraph (d)(4).

Any GPS equipment not meeting this definition is subject to the jurisdiction of the Department of Commerce (DOC). Manufacturers or exporters of equipment under DOC jurisdiction are advised that the U.S. Government does not assure the availability of the GPS P-Code for civil navigation. It is the policy of the Department of Defense (DOD) that GPS receivers using P-Code without clarification as to whether or not those receivers were designed or modified to use Y-Code will be presumed to be Y-Code capable and covered under this paragraph. The DOD policy further requires that a notice be attached to all P-Code receivers presented for export. The notice must state the following: "ADVISORY NOTICE: This receiver uses the GPS P-Code signal, which by U.S. policy, may be switched off without notice."

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(d) Radiation-hardened microelectronic circuits that meet or exceed all five of the following characteristics:

- (1) A total dose of  $5 \times 10^5$  Rads (Si);
- (2) A dose rate upset threshold of  $5 \times 10^8$  Rads (Si)/sec;
- (3) A neutron dose of  $1 \times 10^{14}$  n/cm<sup>2</sup> (1 MeV equivalent);
- (4) A single event upset rate of  $1 \times 10^{-10}$  errors/bit-day or less, for the CREME96 geosynchronous orbit, Solar Minimum Environment;
- (5) Single event latch-up free and having a dose rate latch-up threshold of  $5 \times 10^8$  Rads (Si).

(e) All specifically designed or modified systems or subsystems, components, parts, accessories, attachments, and associated equipment for the articles in this category, including the articles identified in section 1516 of Public Law 105-261: satellite fuel, ground support equipment, test equipment, payload adapter or interface hardware, replacement parts, and non-embedded solid propellant orbit transfer engines (see also Categories IV and V in this section).

NOTE: This coverage by the U.S. Munitions List does not include the following unless specifically designed or modified for military application (see §120.3 of this subchapter): (For controls on these items see the Export Administration Regulations, Commerce Control List (15 CFR Parts 730 through 799).)

(1) Space qualified travelling wave tubes (also known as helix tubes or TWTs), microwave solid state amplifiers, microwave assemblies, and travelling wave tube amplifiers operating at frequencies equal to or less than 31GHz.

(2) Space qualified photovoltaic arrays having silicon cells or having single, dual, triple junction solar cells that have gallium arsenide as one of the junctions.

(3) Space qualified tape recorders.

(4) Atomic frequency standards that are not space qualified.

(5) Space qualified data recorders.

(6) Space qualified telecommunications systems, equipment and components not designed or modified for satellite uses.

(7) Technology required for the development or production of telecommunications equipment specifically designed for non-satellite uses.

(8) Space qualified focal plane arrays having more than 2048 elements per array and having a peak response in the wavelength range exceeding 300nm but not exceeding 900nm.

(9) Space qualified laser radar or Light Detection and Ranging (LIDAR) equipment.

(f) Technical data (as defined in §120.10 of this subchapter) and defense services (as defined in §120.9 of this subchapter) directly related to the articles enumerated in paragraphs (a) through (e) of this category, as

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well as detailed design, development, manufacturing or production data for all spacecraft and specifically designed or modified components for all spacecraft systems. This paragraph includes all technical data, without exception, for all launch support activities (e.g., technical data provided to the launch provider on form, fit, function, mass, electrical, mechanical, dynamic, environmental, telemetry, safety, facility, launch pad access, and launch parameters, as well as interfaces for mating and parameters for launch.) (See §124.1 for the requirements for technical assistance agreements before defense services may be furnished even when all the information relied upon by the U.S. person in performing the defense service is in the public domain or is otherwise exempt from the licensing requirements of this subchapter.) Technical data directly related to the manufacture or production of any article enumerated elsewhere in this category that is designated as Significant Military Equipment (SME) shall itself be designated SME. Further, technical data directly related to the manufacture or production of all spacecraft, notwithstanding the nature of the intended end use (e.g., even where the hardware is not SME), is designated SME.

NOTE TO PARAGRAPH (f): The special export controls contained in §124.15 of this subchapter are always required before a U.S. person may participate in a launch failure investigation or analysis and before the export of any article or defense service in this category for launch in, or by nationals of, a country that is not a member of the North Atlantic Treaty Organization or a major non-NATO ally of the United States. Such special export controls also may be imposed with respect to any destination as deemed appropriate in furtherance of the security and foreign policy of the United States.

### CATEGORY XVI—NUCLEAR WEAPONS, DESIGN AND TESTING RELATED ITEMS

\*(a) Any article, material, equipment, or device which is specifically designed or modified for use in the design, development, or fabrication of nuclear weapons or nuclear explosive devices. (See §123.20 of this subchapter and Department of Commerce Export Administration Regulations, 15 CFR 742.3 and 744.2).

\*(b) Any article, material, equipment, or device which is specifically designed or modified for use in the devising, carrying out, or evaluating of nuclear weapons tests or any other nuclear explosions (including for modeling or simulating the employment of nuclear weapons or the integrated operational use of nuclear weapons), except such items as are in normal commercial use for other purposes.

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\* (c) Nuclear radiation detection and measurement devices specifically designed or modified for military applications.

(d) All specifically designed or modified components and parts, accessories, attachments, and associated equipment for the articles in this category.

(e) Technical data (as defined in § 120.10 of this subchapter), and defense services (as defined in § 120.9 of this subchapter) directly related to the defense articles enumerated in paragraphs (a) through (d) of this category. (See also, § 123.20 of this subchapter.) Technical data directly related to the manufacture or production of any defense articles enumerated elsewhere in this category that are designated as Significant Military Equipment (SME) shall itself be designated SME.

### CATEGORY XVII—CLASSIFIED ARTICLES, TECHNICAL DATA, AND DEFENSE SERVICES NOT OTHERWISE ENUMERATED

\* (a) All articles, and technical data (see § 120.10 of this subchapter) and defense services (see § 120.9 of this subchapter) relating thereto, that are classified in the interests of national security and that are not otherwise enumerated on the U.S. Munitions List.

### CATEGORY XVIII—DIRECTED ENERGY WEAPONS

\* (a) Directed energy weapon systems specifically designed or modified for military applications (e.g., 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 or assessing target damage, destruction or mission-abort;

(10) Beam-handling, propagation or pointing equipment;

(11) Equipment with rapid beam slew capability for rapid multiple target operations;

(12) Negative ion beam funneling equipment; and,

(13) Equipment for controlling and slewing a high-energy ion beam.

\* (b) Equipment specifically designed or modified for the detection or identification of, or defense against, articles controlled in paragraph (a) of this category.

(c) Tooling and equipment specifically designed or modified for the production of defense articles controlled by this category.

(d) Test and evaluation equipment and test models specifically designed or modified for the defense 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) through (d) of this category.

(f) Technical data (as defined in § 120.10 of this subchapter) and defense services (as defined in § 120.9 of this subchapter) directly related to the defense articles enumerated in paragraphs (a) through (e) of this category. Technical data directly related to the manufacture or production of any defense articles enumerated in this category that are designated as Significant Military Equipment (SME) shall itself be designated SME.

(g) The following interpretations explain and amplify terms used in this category and elsewhere in this subchapter:

(1) 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 neutralizing negative hydrogen isotope beams.

(2) The particle beam systems in paragraph (a)(3) of this category include devices embodying particle beam and electromagnetic pulse technology and associated components and subassemblies (e.g., 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.

(3) 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 defense services controlled by this category.

(4) The articles specifically designed or modified for military application controlled in this category include any articles specifically developed, configured, or adapted for military application.

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### 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) of this category;

(4) specially designed for sustained 30 second inverted flight or negative g maneuver; or

(5) specially designed for high power extraction (greater than 50 percent of engine thrust at altitude) at altitudes greater than 50,000 feet.

\* (b) Turbohaft 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 (e.g., 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 TO PARAGRAPH (e): 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 to paragraph (a) of USML 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 U.S.-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 (*i.e.*, 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 (*i.e.*, 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;

(ii) contains classified software directly related to defense articles in this subchapter or 600 series items subject to the EAR; or

(iii) is being developed using classified information (*see* § 120.10(a)(2) of this subchapter).

“Classified” means classified pursuant to Executive Order 13526, or predecessor order, and a security classification guide developed pursuant thereto or equivalent, or to the corresponding classification rules of another government or international organization; or

(7) Printed circuit boards or patterned multichip modules for which the layout is specially designed for defense articles in this category.

(g) Technical data (*see* § 120.10 of this subchapter) and defense services (*see* § 120.9 of this subchapter) directly related to the defense articles enumerated in paragraphs (a) through (f) of this category and classified technical data directly related to items controlled in ECCNs 9A619, 9B619, 9C619, and 9D619 and defense services using the classified technical data. (*See* § 125.4 of this subchapter for exemptions.) (MT for technical data and defense services related to articles designated as such.)

(h)–(w) [Reserved]

(x) Commodities, software, and technical data subject to the EAR (*see* § 120.42 of this subchapter) used in or with defense articles controlled in this category.

NOTE TO PARAGRAPH (x): Use of this paragraph is limited to license applications for defense articles controlled in this category where the purchase documentation includes commodities, software, or technical data subject to the EAR (*see* § 123.1(b) of this subchapter).

### CATEGORY XX—SUBMERSIBLE VESSELS AND RELATED ARTICLES

(a) Submersible and semi-submersible vessels (*see* § 121.14 of this subchapter) that are:

\* (1) Submarines;

(2) Mine countermeasure vehicles;

(3) Anti-submarine warfare vehicles;

(4) Armed;

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(5) Swimmer delivery vehicles specially designed for the deployment, recovery, or support of swimmers or divers from submarines;

(6) Vessels equipped with any mission systems controlled under this subchapter; or

(7) Developmental vessels funded by the Department of Defense via contract or other funding authorization.

NOTE 1 TO PARAGRAPH (A)(7): This paragraph does not control vessels, and specially designed parts, components, accessories, attachments, and associated equipment therefor, (a) in production, (b) determined to be subject to the EAR via a commodity jurisdiction determination (see §120.4 of this subchapter) or (c) identified in the relevant Department of Defense contract or other funding authorization as being developed for both civil and military applications.

NOTE 2 TO PARAGRAPH (A)(7): Note 1 does not apply to defense articles enumerated on the U.S. Munitions List, whether in production or development.

NOTE 3 TO PARAGRAPH (A)(7): This provision is applicable to those contracts and funding authorizations that are dated July 8, 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 (see §123.20 of this subchapter);

(2) Electric motors specially designed for submarines that have the following:

(i) Power output of more than 0.75 MW (1,000 hp);

- (ii) Quick reversing;
(iii) Liquid cooled; and
(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 TO PARAGRAPH (C): "Range" is the maximum distance that the specified rocket system is capable of traveling 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 maximizes range, assuming International Civil Aviation Organization (ICAO) standard atmosphere with zero wind.

(d) Technical data (see §120.10 of this subchapter) and defense services (see §120.9 of this subchapter) directly related to the defense articles enumerated in paragraphs (a) through (c) of this category. (MT for technical data and defense services related to articles designated as such.) (See §125.4 of this subchapter for exemptions.)

(e)-(w) [Reserved]

(x) Commodities, software, and technical data subject to the EAR (see §120.42 of this subchapter) used in or with defense articles controlled in this category.

NOTE TO PARAGRAPH (X): Use of this paragraph is limited to license applications for defense articles controlled in this category where the purchase documentation includes commodities, software, or technical data subject to the EAR (see §123.1(b) of this subchapter).

CATEGORY XXI—ARTICLES, TECHNICAL DATA, AND DEFENSE SERVICES NOT OTHERWISE ENUMERATED

\*(a) Any article not enumerated on the U.S. Munitions List may be included in this category until such time as the appropriate U.S. Munitions List category is amended. The decision on whether any article may be included in this category, and the designation of the defense article as not Significant Military Equipment (see §120.7 of this subchapter), shall be made by the Director, Office of Defense Trade Controls Policy.

(b) Technical data (see §120.10 of this subchapter) and defense services (see §120.9 of this subchapter) directly related to the defense articles covered in paragraph (a) of this category.

[58 FR 39287, July 22, 1993]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting §121.1, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at www.fdsys.gov.

EFFECTIVE DATE NOTE: At 79 FR 39, Jan. 2, 2014, §121.1 was amended by revising U.S. Munitions List Categories IV, V, IX, X, and XVI, effective July 1, 2014. For the convenience of the user, the revised text is set forth as follows:

§121.1 General. The United States Munitions List.

\* \* \* \* \*

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:



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- (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 defense systems (MANPADS);
- (4) Anti-tank missiles and rockets;
- (5) Rockets, SLVs, and missiles not meeting the criteria of paragraphs (a)(1) through (a)(4) of this category;
- (6) Bombs;
- (7) Torpedoes;
- (8) Depth charges;
- (9) Anti-personnel, anti-vehicle, or anti-armor land mines (e.g., area denial devices);
- (10) Anti-helicopter mines;
- (11) Naval mines; or
- (12) Fragmentation and high explosive hand grenades.

NOTE 1 TO PARAGRAPH (A): “Range” is the maximum distance that the specified rocket system is capable of traveling 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 maximizes range, assuming International Civil Aviation Organization (ICAO) standard atmosphere with zero wind.

NOTE 2 TO PARAGRAPH (A): “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 TO PARAGRAPH (A): This paragraph does not control model and high power rockets (as defined in National Fire Protection Association Code 1122) and kits thereof made of paper, wood, fiberglass, or plastic containing no substantial metal parts and designed to be flown with hobby rocket motors that are certified for consumer use. Such rockets must not contain active controls (e.g., RF, GPS).

NOTE 4 TO PARAGRAPH (A): “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 (a)(2) of this category (e.g., launch tables, TOW missile, MANPADS) (MT); or
- (2) Fixed launch sites and mobile launcher mechanisms for any system enumerated in

paragraphs (a)(3) through (a)(5) of this category (e.g., launch tables, TOW missile, MANPADS).

NOTE 1 TO PARAGRAPH (B): For controls on non-SLV launcher mechanisms for use on aircraft, see USML Category VIII(h).

NOTE 2 TO PARAGRAPH (B): For controls on launcher mechanisms that are integrated onto a vessel or ground vehicle, see USML Categories VI and VII, respectively.

NOTE 3 TO PARAGRAPH (B): This paragraph does not control parts and accessories (e.g., igniters, launch stands) specially designed for consumer use with model and high power rockets (as defined in National Fire Protection Association Code 1122) and kits thereof made of paper, wood, fiberglass, 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, protection, discharge, or detonation of the articles enumerated in paragraphs (a) and (b) of this category (MT for those systems enumerated in paragraphs (a)(1), (a)(2), and (b)(1) of this category).

NOTE 1 TO PARAGRAPH (C): This paragraph includes specialized handling equipment (transporters, cranes, and lifts) specially designed to handle articles enumerated in paragraphs (a) and (b) of this category 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 USML Category V, CCL ECCNs 1C011, 1C111, and 1C608, or other liquid propellants used in the systems enumerated in paragraphs (a)(1), (a)(2), or (a)(5) of this category.

NOTE 2 TO PARAGRAPH (C): Aircraft Missile Protection Systems (AMPS) are controlled in USML Category XI.

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

(1) Except as enumerated in paragraph (d)(2) or (d)(3) of this category, individual rocket stages for the articles enumerated in paragraph (a)(1), (a)(2), or (a)(5) of this category (MT for those stages usable in systems enumerated in paragraphs (a)(1) and (a)(2) of this category);

(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  $1.1 \times 10^6$  N·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  $8.41 \times 10^5$  N·s, but less than  $1.1 \times 10^6$  N·s (MT);

(4) Combined cycle, pulsejet, ramjet, or scramjet engines (MT);

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(5) Air-breathing engines that operate above Mach 4 not enumerated in paragraph (d)(4) of this category;

(6) Pressure gain combustion-based propulsion systems not enumerated in paragraphs (d)(4) and (d)(5) of this category; or

(7) Rocket, SLV, and missile engines and motors, not otherwise enumerated in paragraphs (d)(1) through (d)(6) of this category or USML Category XIX.

NOTE TO PARAGRAPH (D): This paragraph does not control model and high power rocket motors, containing no more than 5 pounds of propellant, that are certified for U.S. consumer use as described in National Fire Protection Association Code 1125.

(e)–(f) [Reserved]

\* (g) Non-nuclear warheads for rockets, bombs, and missiles (e.g., 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) of this category (MT for those articles enumerated in paragraphs (a)(1) and (a)(2) of this category);

NOTE TO PARAGRAPH (H)(1): A guidance set integrates the process of measuring and computing a vehicle's position and velocity (*i.e.*, navigation) with that of computing and sending commands to the vehicle's flight control systems to correct the trajectory.

(2) Seeker systems specially designed for articles enumerated in paragraph (a) of this category (e.g., radiofrequency, infrared) (MT for articles enumerated in paragraphs (a)(1) and (a)(2) of this category);

(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) of this category);

(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 (a)(2) of this category);

(7) Rocket or missile nose tips, nose fairings, or aerospikes, and specially designed parts and components therefor (MT for those articles enumerated in paragraphs (a)(1) and (a)(2) of this category);

(8) Re-entry vehicle or warhead heat shields (MT for those re-entry vehicles and heat shields usable in systems enumerated in paragraph (a)(1) of this category);

(9) Missile and rocket safing, arming, fuzing, 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) of this category);

(10) Self-destruct systems specially designed for articles enumerated in paragraph (a) of this category (MT for those articles enumerated in paragraphs (a)(1) and (a)(2) of this category);

(11) Separation mechanisms, staging mechanisms, and interstages useable for articles enumerated in paragraph (a) of this category, and specially designed parts and components therefor (MT for those separation mechanisms, staging mechanisms, and interstages usable in systems enumerated in paragraph (a)(1) of this category);

(12) Post-boost vehicles (PBV) (MT);

(13) Engine or motor mounts specially designed for articles enumerated in paragraphs (a) and (b) of this category (MT for those articles enumerated in paragraphs (a)(1), (a)(2), and (b)(1) of this category);

(14) Combustion chambers specially designed for articles enumerated in paragraphs (a) and (d) of this category and specially designed parts and components therefor (MT for those articles enumerated in paragraphs (a)(1), (a)(2), (b)(1), and (d)(1) through (d)(5) of this category);

(15) Injectors specially designed for articles controlled in this category (MT for those injectors specially designed which are usable in systems enumerated in paragraph (a)(1) of this category);

(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);

NOTE TO PARAGRAPH (H)(17): This paragraph does not control spacecraft. For controls on spacecraft, *see* USML Category XV and, if not described therein, then CCL ECCN 9A515.

(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 (e.g., physical or electronic countermeasure suites, re-entry vehicle replicas or decoys, or submunitions);

(20) Rocket motor cases and specially designed parts and components therefor (e.g., flanges, flange seals, end domes) (MT for those rocket motor cases usable in systems enumerated in paragraphs (a)(1) and (a)(2) of this category and for specially designed parts and components for hybrid rocket motors enumerated in paragraphs (d)(2) and (d)(3) of this category);

(21) Solid rocket motor liners and rocket motor insulation (MT for those solid rocket motor liners usable in systems enumerated in paragraph (a)(1) of this category or specially designed for systems enumerated in paragraph (a)(2) of this category; and rocket

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motor insulation usable in systems enumerated in paragraphs (a)(1) and (a)(2) of this category);

(22) Radomes, sensor windows, and antenna windows specially designed for articles enumerated in paragraph (a) of this category (MT for those radomes usable in systems enumerated in paragraph (a)(1) of this category 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 paragraph (a)(1), (a)(2), (d)(1), (h)(8), (h)(9), (h)(17), or (h)(25) of this category);

(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 paragraphs (a)(1) and (a)(2) of this category);

(25) Fuzes specially designed for articles enumerated in paragraph (a) of this category (e.g., proximity, contact, electronic, dispenser proximity, airburst, variable time delay, or multi-option) (MT for those fuzes usable in systems enumerated in paragraph (a)(1) of this category);

(26) Rocket or missile liquid propellant tanks (MT for those rocket or missile liquid propellant tanks usable in systems enumerated in paragraph (a)(1) of this category);

(27) Rocket or missile altimeters specially designed for use in articles enumerated in paragraph (a)(1) of this category (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 paragraph (a)(1) of this category (MT for these systems which have been designed or modified for those enumerated in paragraph (a)(1) of this category);

(29) Umbilical and interstage electrical connectors specially designed for use in the rockets or missiles enumerated in paragraph (a)(1) or (a)(2) of this category (MT); or

NOTE TO PARAGRAPH (H)(29): This paragraph also includes electrical connectors installed between the systems specified in paragraph (a)(1) or (a)(2) of this category and their payload.

\*(30) Any part, component, accessory, attachment, equipment, or system that (MT for those articles designated as such):

- (i) Is classified;
- (ii) Contains classified software directly related to defense articles in this subchapter or 600 series items subject to the EAR; or
- (iii) Is being developed using classified information.

NOTE TO PARAGRAPH (H)(30): "Classified" means classified pursuant to Executive Order 13526, or predecessor order, and a security classification guide developed pursuant thereto or equivalent, or to the cor-

responding classification rules of another government or international organization.

(i) Technical data (see §120.10 of this subchapter) and defense services (see §120.9 of this subchapter) directly related to the defense articles enumerated in paragraphs (a) through (h) of this category and classified technical data directly related to items controlled in ECCNs 0A604, 0B604, 0D604, 9A604, 9B604, or 9D604 and defense services using the classified technical data. (See §125.4 of this subchapter for exemptions.) (MT for technical data and defense services related to articles designated as such.)

(j)–(w) [Reserved]

(x) Commodities, software, and technical data subject to the EAR (see §120.42 of this subchapter) used in or with defense articles controlled in this category.

NOTE TO PARAGRAPH (X): Use of this paragraph is limited to license applications for defense articles controlled in this category where the purchase documentation includes commodities, software, or technical data subject to the EAR (see §123.1(b) of this subchapter).

NOTE TO CATEGORY IV: If a Missile Technology Control Regime Category I item is included in a system, that system will also be considered as a Category I item, except when the incorporated item cannot be separated, removed, or duplicated.

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 (diaminodinitrobenzofuroxan or 5,7-diamino-4,6-dinitrobenzofurazane-1-oxide) (CAS 117907-74-1);

(4) CL-20 (HNIW or Hexanitrohexaazaisowurtzitane) (CAS 135285-90-4); clathrates of CL-20 (MT for CL-20);

(5) CP (2-(5-cyanotetrazolato) penta aminecobalt (III) perchlorate) (CAS 70247-32-4);

(6) DADE (1,1-diamino-2,2-dinitroethylene, FOX-7);

(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);

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- (13) Furazans, as follows:  
 (i) DAAOF (DAAF, DAAFox, or diaminoazoxyfuran);  
 (ii) DAAzF (diaminoazofuran) (CAS 78644-90-3);  
 (iii) ANF (Furazanamine, 4-nitro- or 3-Amino-4-nitrofuran; or 4-Nitro-1,2,5-oxadiazol-3-amine; or 4-Nitro-3-furazanamine; CAS 66328-69-6); or  
 (iv) ANAzF (Aminonitroazofuran 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; or  
 (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 (Octohydro-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); or  
 (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:  
 (i) RDX (cyclotrimethylenetrinitramine), cyclonite, T4, hexahydro-1,3,5-trinitro-1,3,5-triazine, 1,3,5-trinitro-1,3,5-triazacyclohexane, 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); or  
 (iii) Difluoroaminated derivative of RDX; 1,3-Dinitro-5,5-bis(difluoramino)1,3-diazahexane (CAS No. 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); or  
 (ii) LAX-112 (3,6-diamino-1,2,4,5-tetrazine-1,4-dioxide);  
 (28) Tetrazoles, as follows:  
 (i) NTAT (nitrotriazolaminotetrazole); or  
 (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-diazaisowurtzitane);  
 (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); or  
 (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); or  
 (ix) TACOT (tetranitrobenzotriazolobenzotriazole) (CAS 25243-36-1);  
 (37) Energetic ionic materials melting between 70 and °degrees C and with detonation velocity exceeding 6800 m/s or detonation pressure exceeding 18 GPa (180 kbar); or  
 (38) Explosives, not otherwise enumerated in this paragraph or on the CCL in ECCN 1C608, with a detonation velocity exceeding 8700 m/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) of this category) greater than:  
 (i) 240 seconds for non-metallized, non-halogenated propellant;  
 (ii) 250 seconds for non-metallized, halo-genated propellant; or  
 (iii) 260 seconds for metallized propellant;

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(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 38 mm/s under standard conditions (as measured in the form of an inhibited single strand) of 6.89 Mpa (68.9 bar) pressure and 294K (21 °C);

(4) Elastomer-modified cast double-based propellants with extensibility at maximum stress greater than 5% at 233 K (–40 °C); or

(5) Other composite and composite modified double-base propellants.

(c) Pyrotechnics, fuels and related substances, and mixtures thereof, as follows:

(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; or

(ii) Other high energy density fuels and fuel additives (e.g., cubane, ionic solutions, JP–7, JP–10) having a volume-based energy density of 37.5 GJ per cubic meter or greater, measured at 20 °C and one atmosphere (101.325 kPa) pressure;

NOTE TO PARAGRAPH (C)(3)(II): JP–4, JP–8, fossil refined fuels or biofuels, or fuels for engines certified for use in civil aviation are not included.

(4) Metal fuels, and fuel or pyrotechnic mixtures in particle form whether spherical, atomized, 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 micrometers (MT); or

(B) Iron powder (CAS 7439–89–6) with particle size of 3 micrometers or less produced by reduction of iron oxide with hydrogen;

(ii) Fuel mixtures or 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 micrometers; or

(B) Zirconium (CAS 7440–67–7), magnesium (CAS 7439–95–4), or alloys of these in particle sizes of less than 60 micrometers;

(iii) Explosives and fuels containing the metals or alloys listed in paragraphs (c)(4)(i) and (c)(4)(ii) of this category whether or not the metals or alloys are encapsulated in aluminum, magnesium, zirconium, or beryllium;

(5) Fuel, pyrotechnic, or energetic mixtures having any nanosized aluminum, beryllium, boron, zirconium, magnesium, or titanium, as follows:

(i) Having particle size less than 200 nm in any direction; and

(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; or

(ii) Mixtures of magnesium, polytetrafluoroethylene and the copolymer vinylidene difluoride and hexafluoropropylene (MT);

(7) Titanium subhydride (TiH<sub>n</sub>) of stoichiometry equivalent to  $n = 0.65$ – $1.68$ ; or

(8) Hydrocarbon fuels specially formulated for use in flame throwers or incendiary munitions containing metal stearates (e.g., octal) or palmitates, and M1, M2, and M3 thickeners.

(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-diazetidene) (CAS 78246–06–7);

(5) HAN (Hydroxylammonium nitrate) (CAS 13465–08–2);

(6) HAP (hydroxylammonium perchlorate) (CAS 15588–62–2);

(7) HNF (Hydrazinium nitroformate) (CAS 20773–28–8) (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 oxidizers comprised of or containing IRFNA or oxygen difluoride (MT for liquid oxidizers comprised of IRFNA); or

(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 (bis(azidomethyl)oxetane and its polymers) (CAS 17607–20–4);

(3) BTTN (butanetriol trinitrate) (CAS 6659–60–5) (MT);

(4) FAMAO (3-difluoroaminomethyl-3-azidomethylloxetane) 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 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);

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(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); or
- (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 vinoxopropane 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(nitratomethylloxirane); poly-GLYN); (CAS 27814-48-8);

(17) N-methyl-p-nitroaniline (MT);

(18) Low (less than 10,000) molecular weight, alcohol-functionalized, poly(epichlorohydrin); poly(epichlorohydrindiol); and triol; or

(19) Dinitropropyl based plasticizers, as follows (MT):

- (i) BDNPA (bis (2,2-dinitropropyl) acetal) (CAS 5108-69-0); or
- (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-ethylferrocenylpropane) (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); or
- (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)aziridinylphosphine 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)methylaminophosphine oxide) (CAS 85068-72-0);

(13) 3-Nitrazo-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; or

(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); or

(ii) Polyfunctional aziridine amides with isophthalic, trimesic, isocyanuric, or trimethyladipic backbone also having a 2-methyl or 2-ethyl aziridine group;

NOTE TO PARAGRAPH (F)(16)(II): Included are (1) 1,1H-Isophthaloyl-bis(2-methylaziridine) (HX-752) (CAS 7652-64-4); (2) 2,4,6-tris(2-ethyl-1-aziridinyl)-1,3,5-triazine (HX-874) (CAS 18924-91-9); and (3) 1,1'-trimethyladipoylbis(2-ethylaziridine) (HX-877) (CAS 71463-62-2).

(17) Superfine iron oxide (Fe<sub>2</sub>O<sub>3</sub>, hematite) with a specific surface area more than 250 m<sup>2</sup>/g and an average particle size of 0.003 micrometers 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) (tetraethylenepentaamineacrylonitrileglycidol) (CAS 110445-33-5); cyanoethylated polyamines adducted with glycidol and their salts (MT for TEPANOL (HX-878));

(20) TPB (triphenyl bismuth) (CAS 603-33-8) (MT); or

(21) Tris (ethoxyphenyl) bismuth (TEPB) (CAS 90591-48-3).

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(g) Precursors, as follows:

(1) BCMO (bischloromethyloxetane) (CAS 142173-26-0);

(2) DADN (1,5-diacetyl-3,7-dinitro-1, 3, 5, 7-tetraazacyclooctane);

(3) Dinitroazetidino-t-butyl salt (CAS 125735-38-8);

(4) CL-20 precursors (any molecule containing hexaazaisowurtzitane) (e.g., HBIW (hexabenzylhexaazaisowurtzitane), TAIW (tetraacetyldibenzylhexa-azaisowurtzitane));

(5) TAT (1, 3, 5, 7-tetraacetyl-1, 3, 5, 7-tetraazacyclooctane) (CAS 41378-98-7);

(6) Tetraazadecalin (CAS 5409-42-7);

(7) 1,3,5-trichlorobenzene (CAS 108-70-3); or

(8) 1,2,4-trihydroxybutane (1,2,4-butanetriol) (CAS 3068-00-6).

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

(1) Is classified; or

(2) Is being developed using classified information (see §120.10(a)(2) of this subchapter).

NOTE TO PARAGRAPH (H): “Classified” means classified pursuant to Executive Order 13526, or predecessor order, and a security classification guide developed pursuant thereto or equivalent, or to the corresponding classification rules of another government or international organization.

(i) Developmental explosives, propellants, pyrotechnics, fuels, oxidizers, binders, additives, or precursors therefor funded by the Department of Defense via contract or other funding authorization.

NOTE 1 TO PARAGRAPH (I): This paragraph does not control explosives, propellants, pyrotechnics, fuels, oxidizers, binders, additives, or precursors therefor (a) in production, (b) determined to be subject to the EAR via a commodity jurisdiction determination (see §120.4 of this subchapter), or (c) identified in the relevant Department of Defense contract or other funding authorization as being developed for both civil and military applications.

NOTE 2 TO PARAGRAPH (I): Note 1 does not apply to defense articles enumerated on the U.S. Munitions List, whether in production or development.

NOTE 3 TO PARAGRAPH (I): This paragraph is applicable only to those contracts and funding authorizations that are dated January 5, 2015, or later.

(j) Technical data (as defined in §120.10 of this subchapter) and defense services (as defined in §120.9 of this subchapter) directly related to the defense articles enumerated in paragraphs (a) through (i) of this category (see also §123.20 of this subchapter) (MT for articles designated as such).

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

(1) USML Category V contains explosives, energetic materials, propellants, and pyro-

technics 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) Paragraph (c)(4)(ii)(A) of this category 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.

(1)-(w) [Reserved]

(x) Commodities, software, and technical data subject to the EAR (see §120.42 of this subchapter) used in or with defense articles controlled in this category.

NOTE TO PARAGRAPH (X): Use of this paragraph is limited to license applications for defense articles controlled in this category where the purchase documentation includes commodities, software, or technical data subject to the EAR (see §123.1(b) of this subchapter).

NOTE 1 TO USML CATEGORY V: To assist the exporter, an item has been categorized by the most common use. Also, where appropriate, references have been provided to the related controlled precursors.

NOTE 2 TO USML CATEGORY V: 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 government agencies in the license review process and

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exporters when completing their license application and export documentation.

\* \* \* \* \*

CATEGORY IX—MILITARY TRAINING EQUIPMENT

(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 defense article, specific other item, or specific person; or

(ii) Are instrumented to provide hit/miss performance information for defense articles controlled in this subchapter;

NOTE TO PARAGRAPH (A)(1): Target drones are controlled in USML Category VIII(a).

(2) Devices that are mockups of articles enumerated in this subchapter used for maintenance training or disposal training for ordnance enumerated in this subchapter;

NOTE TO PARAGRAPH (A)(2): This paragraph does not control mockups that do not reveal technical data (see ITAR §120.10 of this subchapter) and do not contain parts, components, accessories, or attachments controlled in this subchapter.

(3) Air combat maneuvering 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 USML Category XI;

(6) Training devices specially designed to be attached to a crew station, mission system, or weapon of an article controlled in this subchapter;

NOTE TO PARAGRAPH (A)(6): This paragraph includes simulators that are built-in or add-on devices that cause the actual equipment to act as a trainer.

(7) Anti-submarine warfare trainers;

(8) Missile launch trainers;

(9) Radar target generators;

(10) Infrared scene generators; or

\*(11) Any training device that:

(i) Is classified;

(ii) Contains classified software directly related to defense articles in this subchapter or 600 series items subject to the EAR; or

(iii) Is being developed using classified information. "Classified" means classified pursuant to Executive Order 13526, or predecessor order, and a security classification guide developed pursuant thereto or equivalent, or to the corresponding classification rules of another government or international organization.

NOTE TO PARAGRAPH (A): Training equipment does not include combat games without item signatures or tactics, techniques, and procedures covered by this subchapter.

(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 subchapter;

(2)-(3) [Reserved]

(4) Software and associated databases not elsewhere enumerated in this subchapter that can be used to model or simulate the following:

(i) Trainers enumerated in paragraph (a) of this category;

(ii) Battle management;

(iii) Military test scenarios/models; or

(iv) Effects of weapons enumerated in this subchapter; or

\*(5) Simulators that:

(i) Are classified;

(ii) Contain classified software directly related to defense articles in this subchapter or 600 series items subject to the EAR; or

(iii) Are being developed using classified information.

NOTE TO PARAGRAPH (B)(5): "Classified" means classified pursuant to Executive Order 13526, or predecessor order, and a security classification guide developed pursuant thereto or equivalent, or to the corresponding classification rules of another government or international organization.

(c)-(d) [Reserved]

(e) Technical data (see §120.10 of this subchapter) and defense services (see §120.9 of this subchapter) directly related to the defense articles enumerated in paragraphs (a) and (b) of this category.

NOTE TO PARAGRAPH (E): This paragraph includes defense services (see §120.9 of this subchapter) directly related to the software and associated databases enumerated in paragraph (b)(4) of this category even if no defense articles are used or transferred.

(f)-(w) [Reserved]

(x) Commodities, software, and technical data subject to the EAR (see §120.42 of this subchapter) used in or with defense articles controlled in this category.

NOTE TO PARAGRAPH (X): Use of this paragraph is limited to license applications for defense articles controlled in this category where the purchase documentation includes commodities, software, or technical data subject to the EAR (see §123.1(b) of this subchapter).

NOTE TO USML CATEGORY IX: 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 USML category or CCL ECCN as the parts, components, accessories, and attachments of the simulated system or simulated end-item.

CATEGORY X—PERSONAL PROTECTIVE EQUIPMENT

(a) Personal protective equipment, as follows:



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(1) Body armor providing a protection level equal to or greater than NIJ Type IV;

NOTE 1 TO PARAGRAPH (A)(1): For body armor providing a level of protection of Type I, Type II, Type IIA, Type IIIA, or Type III, see ECCNs 1A005 and 1A613.

NOTE 2 TO PARAGRAPH (A)(1): See USML Category XIII(e) for controls on related materials.

(2) Personal protective clothing, equipment, or face paints specially designed to protect against or reduce detection by radar, IR, or other sensors at wavelengths greater than 900 nanometers;

NOTE TO PARAGRAPH (A)(2): See USML Category XIII(j) for controls on related materials.

(3)–(4) [Reserved]

(5) Integrated helmets, not specified in USML Category VIII(h)(15) or USML Category XII, incorporating optical sights or slewing devices, which include the ability to aim, launch, track, or manage munitions;

(6) Helmets and helmet shells providing a protection level equal to or greater than NIJ Type IV;

(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 (e.g., narrow band filters/dyes or broadband limiters/coatings with high visible transparency), having an optical density greater than 3, and that protect against:

(i) Multiple visible (in-band) laser wavelengths;

(ii) Thermal flashes associated with nuclear detonations; or

(iii) Near infrared or ultraviolet (out-of-band) laser wavelengths; or

NOTE 1 TO PARAGRAPH (A)(7): See paragraphs (d)(2) and (3) of this category for controls on related parts, components, and materials.

NOTE 2 TO PARAGRAPH (A)(7): See USML Category XII for sensor protection equipment.

(8) Developmental personal protective equipment and specially designed parts, components, accessories, and attachments therefor, developed for the U.S. Department of Defense via contract or other funding authorization.

NOTE 1 TO PARAGRAPH (A)(8): This paragraph does not control personal protective equipment and specially designed parts, components, accessories, and attachments (a) in production, (b) determined to be subject to the EAR via a commodity jurisdiction determination (see §120.4 of this subchapter), or (c) identified in the relevant Department of Defense contract or other funding authorization as being developed for both civil and military applications.

NOTE 2 TO PARAGRAPH (A)(8): Note 1 does not apply to defense articles enumerated on the USML, whether in production or development.

NOTE 3 TO PARAGRAPH (A)(8): This paragraph is applicable only to those contracts and funding authorizations that are dated January 5, 2015, or later.

(b)–(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 that provide protection equal to or greater than NIJ Type IV;

(2) Lenses, substrates, or filters “specially designed” for the articles covered in paragraph (a)(7) of this category;

(3) Materials and coatings specially designed for the articles covered in paragraph (a)(7) of this category with optical density greater than 3, as follows:

(i) Narrowband absorbing dyes;

(ii) Broadband optical switches or limiters (*i.e.*, nonlinear material, tunable or switchable agile filters, optical power limiters, near infrared interference based filters); or

(iii) Narrowband interference based notch filters (*i.e.*, multi-layer dielectric coatings, rugate, holograms or hybrid (*i.e.*, interference with dye)) protecting against multiple laser wavelength and having high visible band transparency; or

\* (4) Any component, part, accessory, attachment, equipment, or system that:

(i) Is classified;

(ii) Contains classified software directly related to defense articles in this subchapter or 600 series items subject to the EAR; or

(iii) Is being developed using classified information.

NOTE TO PARAGRAPH (D)(4): “Classified” means classified pursuant to Executive Order 13526, or predecessor order, and a security classification guide developed pursuant thereto or equivalent, or to the corresponding classification rules of another government or international government.

NOTE TO PARAGRAPHS (A) AND (D): See National Institute of Justice Classification, NIJ Standard-0101.06, or national equivalents, for a description of level of protection for armor.

(e) Technical data (see §120.10 of this subchapter) and defense services (see §120.9 of this subchapter) directly related to the defense articles enumerated in paragraphs (a) through (d) of this category.

(f)–(w) [Reserved]

(x) Commodities, software, and technical data subject to the EAR (see §120.42 of this subchapter) used in or with defense articles controlled in this category.

NOTE TO PARAGRAPH (X): Use of this paragraph is limited to license applications for defense articles controlled in this category where the purchase documentation includes commodities, software, or technical data

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subject to the EAR (see § 123.1(b) of this subchapter).

\* \* \* \* \*

CATEGORY XVI—NUCLEAR WEAPONS RELATED ARTICLES

(a) [Reserved]

(b) Modeling 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) of this category.

(e) Technical data (see § 120.10 of this subchapter) and defense services (see § 120.9 of this subchapter) directly related to the defense articles enumerated in paragraph (b) of this category. (See § 123.20 of this subchapter for nuclear related controls.)

(f)-(w) [Reserved]

(x) Commodities, software, and technical data subject to the EAR (see § 120.42 of this subchapter) used in or with defense articles controlled in this category.

NOTE TO PARAGRAPH (X): Use of this paragraph is limited to license applications for defense articles controlled in this category where the purchase documentation includes commodities, software, or technical data subject to the EAR (see § 123.1(b) of this subchapter).

\* \* \* \* \*

§ 121.2 Interpretations of the U.S. Munitions List.

The following interpretations explain and amplify the terms used in § 121.1 of this subchapter. These interpretations have the same force as if they were a part of the U.S. Munitions List category to which they refer.

[78 FR 22758, Apr. 16, 2013; 78 FR 61755, Oct. 3, 2013]

§ 121.3 Aircraft.

(a) In USML Category VIII, except as described in paragraph (b) below, "aircraft" means aircraft that:

(1) Are U.S.-origin aircraft that bear an original military designation of A, B, E, F, K, M, P, R, or S;

(2) Are foreign-origin aircraft specially designed to provide functions equivalent to those of the aircraft listed in paragraph (a)(1) of this section;

(3) Are armed or are specially designed to be used as a platform to deliver munitions or otherwise destroy targets (e.g., firing lasers, launching rockets, firing missiles, dropping bombs, or strafing);

(4) Are strategic airlift aircraft with a roll-on/roll-off ramp and capable of airlifting payloads over 35,000 lbs to ranges over 2,000 nm without being refueled in-flight into short or unimproved airfields;

(5) Are capable of being refueled in-flight;

(6) Incorporate any mission system controlled under this subchapter. "Mission system" is defined as a system (see § 121.8(g) of this subchapter) that is a defense article that performs specific military functions beyond airworthiness, such as by providing military communication, radar, active missile counter measures, target designation, surveillance, or sensor capabilities; or

(7) Are Optionally Piloted Vehicles (OPV) (i.e., aircraft specially designed to operate with and without a pilot physically located in the aircraft).

(b) Aircraft specially designed for military applications that are not identified in paragraph (a) of this section are subject to the EAR and classified as ECCN 9A610, including any unarmed military aircraft, regardless of origin or designation, manufactured prior to 1956 and unmodified since manufacture. Modifications made to incorporate safety of flight features or other FAA or NTSB modifications such as transponders and air data recorders are considered "unmodified" for the purposes of this paragraph.

[78 FR 22758, Apr. 16, 2013; 78 FR 61755, Oct. 3, 2013]

§ 121.4 Ground vehicles.

(a) In USML Category VII, "ground vehicles" are those, whether manned or unmanned, that:

(1) Are armed or are specially designed to be used as a platform to deliver munitions or otherwise destroy or incapacitate targets (e.g., firing lasers, launching rockets, firing missiles, firing mortars, firing artillery rounds, or firing other ammunition greater than .50 caliber);

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(2) Are armored 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 (e.g., personnel carriers, resupply vehicles, combat engineer vehicles, recovery vehicles, reconnaissance vehicles, bridge launching vehicles, ambulances, and command and control vehicles); or

(3) Incorporate any “mission systems” controlled under this subchapter. “Mission systems” are defined as “systems” (see §121.8(g) of this subchapter) that are defense articles that perform specific military functions, such as by providing military communication, target designation, surveillance, target detection, or sensor capabilities.

NOTE 1 TO PARAGRAPH (A): Armored ground vehicles are (i) ground vehicles that have integrated, fully armored hulls or cabs, or (ii) ground vehicles on which add-on armor has been installed to provide ballistic protection to level III (National Institute of Justice Standard 0108.01, September 1985) or better. Armored vehicles do not include those that are merely capable of being equipped with add-on armor.

NOTE 2 TO PARAGRAPH (A): Ground vehicles include any vehicle meeting the definitions or control parameters regardless of the surface (e.g., highway, off-road, rail) upon which the vehicle is designed to operate.

(b) Ground vehicles specially designed for military applications that are not identified in paragraph (a) of this section are subject to the EAR under ECCN 0A606, including any unarmed ground vehicles, regardless of origin or designation, manufactured prior to 1956 and unmodified since 1955. Modifications made to incorporate safety features required by law, are cosmetic (e.g., different paint, repositioning of bolt holes), or that add parts or components otherwise available prior to 1956 are considered “unmodified” for the purposes of this paragraph. ECCN 0A606 also includes unarmed vehicles derived from otherwise EAR99 civilian vehicles that have been modified or otherwise fitted with materials to provide ballistic protection, including protection to level III (National Institute of Justice Standard 0108.01, September 1985) or better and

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that do not have reactive or electromagnetic armor.

[78 FR 40932, July 8, 2013]

### § 121.5 Apparatus and devices under Category IV(c).

Category IV includes but is not limited to the following: Fuzes and components specifically designed, modified or configured for items listed in that category, bomb racks and shackles, bomb shackle release units, bomb ejectors, torpedo tubes, torpedo and guided missile boosters, guidance systems equipment and parts, launching racks and projectors, pistols (exploders), ignitors, fuze arming devices, intervalometers, thermal batteries, hardened missile launching facilities, guided missile launchers and specialized handling equipment, including transporters, cranes and lifts designed to handle articles in paragraphs (a) and (b) of this category for preparation and launch from fixed and mobile sites. The equipment in this category includes robots, robot controllers and robot end-effectors specially designed or modified for military applications.

EFFECTIVE DATE NOTE: At 79 FR 46, Jan. 2, 2014, §121.5 was removed and reserved, effective July 1, 2014.

### §§ 121.6–121.7 [Reserved]

### § 121.8 End-items, components, accessories, attachments, parts, firmware, software, and systems.

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

(b) A *component* is 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.

(c) *Accessories* and *attachments* are associated equipment for any component, end-item or system, and which are not necessary for their operation, but

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which enhance their usefulness or effectiveness. (EXAMPLES: Military riflescopes, special paints, etc.)

(d) A *part* is 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.)

(e) 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 of the U.S. Munitions 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.

(f) *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. A person who intends to export software only should, unless it is specifically enumerated in §121.1 (e.g., XIII(b)), apply for a technical data license pursuant to part 125 of this subchapter.

(g) A *system* is a combination of end-items, parts, components, accessories, attachments, firmware, or software that operate together to perform a specialized military function.

[58 FR 39287, July 22, 1993, as amended at 78 FR 22758, Apr. 16, 2013]

EFFECTIVE DATE NOTE: At 79 FR 46, Jan. 2, 2014, §121.8 was revised, effective July 1, 2014. For the convenience of the user, the revised text is set forth as follows:

### **§ 121.8 End-items, components, accessories, attachments, parts, firmware, software, systems, and equipment.**

(a) An *end-item* is a system, equipment, or an assembled article ready for its intended use. Only ammunition or fuel or other energy source is required to place it in an operating state.

(b) A *component* is 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. A minor component includes any assembled element of a major component.

(c) *Accessories* and *attachments* are associated articles for any component, equipment, system, or end-item, and which are not necessary for its operation, but which enhance its usefulness or effectiveness.

(d) A *part* is 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 designed use.

(e) *Firmware* and any related unique support tools (such as computers, linkers, editors, test case generators, diagnostic checkers, library of functions, and system test diagnostics) directly related to equipment or systems covered under any category of the U.S. Munitions 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.

(f) *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. A person who intends to export software only should, unless it is specifically enumerated in §121.1 of this subchapter (e.g., USML Category XIII(b)), apply for a technical data license pursuant to part 125 of this subchapter.

(g) A *system* is a combination of parts, components, accessories, attachments, firmware, software, equipment, or end-items that operate together to perform a function.

NOTE TO PARAGRAPH (G): The industrial standards established by INCOSE and NASA provide examples for when commodities and software operate together to perform a function as a system. References to these standards are included in this note to provide examples for when commodities or software operate together to perform a function as a system. See the INCOSE standards for what constitutes a system at: <http://g2sebok.incose.org/app/mss/asset.cfm?ID=INCOSE%20G2SEBOK%202.00&ST=F>, and in INCOSE SE Handbook v3.1 2007; ISO/IEC 15288:2008. See the NASA standards for examples of what constitutes a system in NASA SE Handbook SP-2007-6105 Rev 1.

(h) *Equipment* is a combination of parts, components, accessories, attachments, firmware, or software that operate together to perform a function of, as, or for an end-item or system. Equipment may be a subset of an end-item based on the characteristics of the equipment. Equipment that meets the definition of an end-item is an end-item. Equipment that does not meet the definition of an end-item is a component, accessory, attachment, firmware, or software.

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### § 121.10 Forgings, castings, and machined bodies.

The U.S. Munitions List controls as defense articles those forgings, castings, and other unfinished products, such as extrusions and machined bodies, that have reached a stage in manufacturing where they are clearly identifiable by mechanical properties, material composition, geometry, or function as defense articles.

[78 FR 22758, Apr. 16, 2013]

### § 121.11 Military demolition blocks and blasting caps.

Military demolition blocks and blasting caps referred to in Category IV(a) do not include the following articles:

- (a) Electric squibs.
- (b) No. 6 and No. 8 blasting caps, including electric ones.
- (c) Delay electric blasting caps (including No. 6 and No. 8 millisecond ones).
- (d) Seismograph electric blasting caps (including SSS, Static-Master, Vibrocap SR, and SEISMO SR).
- (e) Oil well perforating devices.

EFFECTIVE DATE NOTE: At 79 FR 46, Jan. 2, 2014, § 121.11 was removed and reserved, effective July 1, 2014.

### §§ 121.12–121.13 [Reserved]

### § 121.14 Submersible vessels.

(a) In USML Category XX, submersible and semi-submersible vessels are those, manned or unmanned, tethered or untethered, that:

- (1) Are submarines specially designed for military use;
- (2) Are armed or are specially designed to be used as a platform to deliver munitions or otherwise destroy or incapacitate targets (e.g., firing torpedoes, launching rockets, firing missiles, deploying mines, deploying countermeasures) or deploy military payloads;
- (3) Are specially designed for the deployment, recovery, or support of swimmers or divers from submarines;
- (4) Are integrated with nuclear propulsion systems;
- (5) Incorporate any “mission systems” controlled under this subchapter. “Mission systems” are defined

as “systems” (see § 121.8(g) of this subchapter) that are defense articles that perform specific military functions such as by providing military communication, electronic warfare, target designation, surveillance, target detection, or sensor capabilities; or

(6) Are developmental vessels funded or contracted by the Department of Defense.

(b) Submersible and semi-submersible vessels that are not identified in paragraph (a) of this section are subject to the EAR under Category 8.

[78 FR 40932, July 8, 2013]

### § 121.15 Surface vessels of war.

(a) In USML Category VI, “surface vessels of war” are those, manned or unmanned, that:

(1) Are warships or other combatant vessels (battleships, aircraft carriers, destroyers, frigates, cruisers, corvettes, littoral combat ships, mine sweepers, mine hunters, mine countermeasure ships, dock landing ships, amphibious assault ships), or Coast Guard Cutters (with or equivalent to those with U.S. designations WHEC, WMEC, WMSL, or WPB for the purpose of this subchapter);

(2) Are foreign-origin vessels specially designed to provide functions equivalent to those of the vessels listed in paragraph (a)(1) of this section;

(3) Are high-speed air cushion vessels for transporting cargo and personnel, ship-to-shore and across a beach, with a payload over 25 tons;

(4) Are surface vessels integrated with nuclear propulsion plants or specially designed to support naval nuclear propulsion plants;

(5) Are armed or are specially designed to be used as a platform to deliver munitions or otherwise destroy or incapacitate targets (e.g., firing lasers, launching torpedoes, rockets, or missiles, or firing munitions greater than .50 caliber); or

(6) Incorporate any mission systems controlled under this subchapter. “Mission systems” are defined as “systems” (see § 121.8(g) of this subchapter) that are defense articles that perform specific military functions such as by providing military communication, electronic warfare, target designation,

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surveillance, target detection, or sensor capabilities.

(b) Vessels specially designed for military use that are not identified in paragraph (a) of this section are subject to the EAR under ECCN 8A609, including any demilitarized vessels, regardless of origin or designation, manufactured prior to 1950 and unmodified since 1949. Modifications made to incorporate safety features required by law, are cosmetic (e.g., different paint), or that add parts or components otherwise available prior to 1950 are considered “unmodified” for the purposes of this paragraph.

[78 FR 40932, July 8, 2013]

### § 121.16 Missile Technology Control Regime Annex.

Some of the items on the Missile Technology Control Regime Annex are controlled by both the Department of Commerce on the Commodity Control List and by the Department of State on the United States Munitions List. To the extent an article is on the United States Munitions List, a reference appears in parentheses listing the U.S. Munitions List category in which it appears. The following items constitute all items on the Missile Technology Control Regime Annex which are covered by the U.S. Munitions List:

#### ITEM 1—CATEGORY I

Complete rocket systems (including ballistic missile systems, space launch vehicles, and sounding rockets (see §121.1, Cat. IV(a) and (b))) and unmanned air vehicle systems (including cruise missile systems, see §121.1, Cat. VIII (a), target drones and reconnaissance drones (see §121.1, Cat. 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 §121.1, Cat. IV(h));

(b) Reentry vehicles (see §121.1, Cat. 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 §121.1, Cat. 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 §121.1, Cat. 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 §121.1, Cat. IV, (h)).

(d) “Guidance sets” capable of achieving system accuracy of 3.33 percent or less of the range (e.g., a CEP of 1 j., 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 §121.1, Cat. 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 §121.1, Cat. 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 §121.1, Cat. IV(h)).

#### NOTES TO ITEM 2

(1) The exceptions in (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.

(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.

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

(4) Examples of methods of achieving thrust vector control which are covered by (e) include:

(i) Flexible nozzle;

(ii) Fluid or secondary gas injection;

(iii) Movable engine or nozzle; Deflection of exhaust gas stream (jet vanes or probes); or

(v) 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 §121.1, both Cat. IV(h) and VIII(b));

(b) Ramjet/Scramjet/pulse jet/combined cycle engines, including devices to regulate combustion, and specially designed components therefor (see §121.1, both Cat. IV(h) and Cat. VIII(b));

(c) Rocket motor cases, “interior lining”, “insulation” and nozzles therefor (see §121.1, Cat. IV(h) and Cat. V(c));

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(d) Staging mechanisms, separation mechanisms, and interstages therefor (see §121.1, Cat. 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 1,000 Hz (see §121.1, Cat. IV(c) and (h));

(f) Hybrid rocket motors and specially designed components therefor (see §121.1, Cat. IV(h)).

### NOTES TO ITEM 3

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

(2) In Item 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, e.g., carbon filled HTPB or other polymer with added curing agents to be sprayed or screeded over a case interior (see §121.1, Cat. V(c)).

(3) In Item 3(c), "insulation" intended to be applied to the components of a rocket motor, *i.e.*, 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.

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

(i) 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;

(ii) 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).

(5) Item 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  $500 \times 10^{-6}$  M (500 microns) and an aluminum content of 97 percent or greater;

(5) Metal fuels in particle sizes less than  $500 \times 10^{-6}$  M (500 microns), whether spherical, atomized, spheroidal, flaked or ground, consisting of 97 percent or more of any of the

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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:

(i) Nitrogen dioxide/dinitrogen tetroxide;

(ii) Inhibited Red Fuming Nitric Acid (IRFNA);

(iii) 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  $40 \times 10$  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(2ethyl)aziridine (HX868, BITA);

(iii) "Tepanol" (HX878), reaction product of tetraethylenepentamine, acrylonitrile and glycidol;

(iv) "Tepan" (HX879), reaction product of tetraethylenepentamine and acrylonitrile;

(v) Polyfunctional aziridine 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);

(ii) Burning rate modifiers as follows:

(iii) Catocene;

(iv) Nbutylferrocene;

(v) Other ferrocene derivatives.

(3) Nitrate esters and nitrate plasticizers as follows:

(i) 1,2,4butanetriol trinitrate (BTTN).

(4) Stabilizers as follows:

(i) Nmethylpntroaniline.

### 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 prepregs 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  $7.62 \times 10^4$  m ( $3 \times 10^6$  inches) and a specific modulus greater than  $3.18 \times 10^6$  m ( $1.25 \times 10^8$  inches), (see §121.1, Category IV (f), and Category XIII (d));

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(b) Resaturated pyrolyzed (*i.e.*, carbon-carbon) materials designed for rocket systems, (see §121.1 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 §121.1, 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 §121.1, 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 §121.1, 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 §121.1, 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 §121.1, 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 1 q environment (see §121.1, 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 §121.1, 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 §121.1, Category VIII (e) and Category XII(d));

### NOTES TO ITEM 9

(1) Items (a) through (f) may be exported as part of a manned aircraft or satellite or in quantities appropriate for replacement parts for manned aircraft.

(2) In subitem (d):

(i) 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 angu-

lar displacement per unit time with respect to inertial space.

(ii) 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 §121.1, Category IV (h));

(b) Attitude control equipment, (see §121.1, 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 §121.1, 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 §121.1, Category IV (i)).

### NOTE TO ITEM 10

Items (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 §121.1, Category XI(a)(3));

(b) Passive sensors for determining bearings to specific electromagnetic sources (direction finding equipment) or terrain characteristics (see §121.1, 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 §121.1, Category XV(d)(2); or

(2) Designed or modified for use with unmanned air vehicles covered by Item 1 (see §121.1, 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 §121.1, Category XI(a)(7)).



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(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 §121.1, 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.

### NOTES TO ITEM 11

(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.

(2) Examples of equipment included in this Item:

- (i) Terrain contour mapping equipment;
- (ii) Scene mapping and correlation (both digital and analog) equipment;
- (iii) Doppler navigation radar equipment;
- (iv) Passive interferometer equipment;
- (v) Imaging sensor equipment (both active and passive);

(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 §121.1, Category IV(c));

(b) Vehicles designed or modified for the transport, handling, control, activation and launching of the systems in Item 1, (see §121.1, Category VII(d));

(c) Telemetry and telecontrol equipment usable for unmanned air vehicles or rocket systems, (see §121.1, 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 §121.1, 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 §121.1, Category XI(a)(3)):

(i) angular resolution better than 3 milliradians (0.5 mils);

(ii) range of 30 km or greater with a range resolution better than 10 meters RMS;

(iii) velocity resolution better than 3 meters per second.

(3) Software which processes post-flight, recorded data, enabling determination of vehicle position throughout its flight path (see §121.1, 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 §121.1, 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 TO ITEM 13

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 §121.1, Category XI(d)); or,

(b) Designed or modified for military use (see §121.1, 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 16—CATEGORY II

Specially designed software, or specially designed software with related specially designed hybrid (combined analog/digital) computers, for modeling, simulation, or design integration of the systems in Item 1 and Item 2 (see §121.1, Category IV(i) and Category XI(a)(6)).

NOTE TO ITEM 16

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 (*i.e.*, stealth technology), for applications usable for the systems in Item 1 or Item 2 (see §121.1, 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 (see §121.1, Category XI(a)(3)).

ITEM 18—CATEGORY II

Devices for use in protecting rocket systems and unmanned air vehicles against nuclear effects (e.g. Electromagnetic Pulse (EMP), X-rays, combined blast and thermal effects), and usable for the systems in Item 1, as follows (see §121.1, Category IV (c) and (h)):

- (a) “Radiation Hardened” “microcircuits” and detectors (see §121.1, 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 §121.1, Category IV(h)).

NOTE TO ITEM 18(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. The following pages were removed from the final ITAR for replacement by DDTC’s updated version §6(1) of the Export Administration Act of 1979 (50 U.S.C. App. 2405(1)), as amended. In accordance with this provision, the list of MTCR Annex items shall constitute all items on the U.S. Munitions List in §121.16.

[58 FR 39287, July 22, 1993, as amended at 71 FR 20539, Apr. 21, 2006]

**PART 122—REGISTRATION OF MANUFACTURERS AND EXPORTERS**

Sec.

- 122.1 Registration requirements.
- 122.2 Submission of registration statement.
- 122.3 Registration fees.
- 122.4 Notification of changes in information furnished by registrants.
- 122.5 Maintenance of records by registrants.

AUTHORITY: Sections 2 and 38, Pub. L. 90-629, 90 Stat. 744 (22 U.S.C. 2752, 2778); 22 U.S.C. 2651a; E.O. 13637, 78 FR 16129.

SOURCE: 58 FR 39298, July 22, 1993, unless otherwise noted.

**§ 122.1 Registration requirements.**

(a) Any person who engages in the United States in the business of manufacturing or exporting or temporarily importing defense articles, or furnishing defense services, is required to register with the Directorate of Defense Trade Controls under §122.2. For the purpose of this subchapter, engaging in such a business requires only one occasion of manufacturing or exporting or temporarily importing a defense article or furnishing a defense service. A manufacturer who does not engage in exporting must nevertheless register. (See part 129 of this subchapter for requirements for registration of persons who engage in brokering activities.)

(b) *Exemptions.* The registration requirements of paragraph (a) of this section do not apply to:

- (1) Officers and employees of the U.S. Government acting in an official capacity;
- (2) Persons whose pertinent business activity is confined to the production of unclassified technical data only;
- (3) Persons all of whose manufacturing and export activities are licensed under the Atomic Energy Act of 1954, as amended; or
- (4) Persons who engage in the fabrication of articles solely for experimental or scientific purposes, including research and development.

NOTE TO PARAGRAPH (b): Persons who qualify for the exemptions in paragraphs (b)(2) or (b)(4) of this section remain subject to the requirements for licenses or other approvals for exports of defense articles and defense services and may not receive an export license or approval unless registered under §122.2.