

SCHEDULE

Article 2(8)

ML8.

In this entry, references in square brackets to Chemical Abstract Service [CAS] numbers are included for convenience only. Goods of which the description in this entry includes a CAS reference are specified in this entry whether or not they fall within that reference.

“Energetic materials”, and related substances, as follows:

a. “Explosives”, as follows, and mixtures thereof.

1. ADNBF (aminodinitrobenzofuroxan or 7-amino-4, 6 dinitrobenzofurazane- 1 -oxide) (CAS 97096-78-1);
2. BNCP (cis-bis (5-nitrotetrazolato) tetra amine-cobalt (III) perchlorate) (CAS 117412-28-9);
3. CL-14 (diamino dinitrobenzofuroxan or 5,7-diamino-4, 6 dinitrobenzofurazane-1 -oxide) (CAS 117907-74-1);
4. CL-20 (HNIW or Hexanitrohexaazaisowurtzitane) (CAS 135285-90-4); chlathrates of CL-20;
5. CP (2-(5-cyanotetrazolato) penta amine-cobalt (III) perchlorate) (CAS 70247-32-4);
6. DADE (1,1-diamino-2,2-dinitroethylene, FOX7);
7. DATB (diaminotrinitrobenzene) (CAS 1630-08-6);
8. DDFP (1,4-dinitrodifurazanopiperazine);
9. DDPO (2,6-diamino-3,5-dinitropyrazine-1-oxide, PZO) (CAS 194486—77-6);
10. DIPAM (3,3'-diamino-2,2',4,4',6,6'-hexanitrobiphenyl or dipicramide) (CAS 17215-44-0);
11. DNGU (DINGU or dinitroglycoluril) (CAS 55510-04-8);
12. Furazans, as follows:
 - (a) DAAOF (diaminoazoxyfurazan);
 - (b) DAAzF (diaminoazofurazan) (CAS 78644-90-3);
13. HMX and derivatives, as follows:
 - (a) HMX (Cyclotetramethylenetetranitramine, octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazine, 1,3,5,7-tetranitro-1,3,5,7-tetraza-cyclooctane, octogen or octogene) (CAS 2691-41-0);
 - (b) difluoroaminated analogs of HMX;
 - (c) K-55 (2,4,6,8-tetranitro-2,4,6,8-tetraazabicyclo [3,3,0]-octanone-3, tetranitrosemiglycouril or keto-bicyclic HMX) (CAS 130256-72-3);
14. HNAD (hexanitroadamantane) (CAS 143850-71-9);
15. HNS (hexanitrostilbene) (CAS 20062-22-0);
16. Imidazoles, as follows:
 - (a) BNNII (Octahydro-2,5-bis(nitroimino)imidazo [4,5-d]imidazole);
 - (b) DNI (2,4-dinitroimidazole) (CAS 5213-49-0);
 - (c) FDIA (1-fluoro-2,4-dinitroimidazole);
 - (d) NTDNIA (N-(2-nitrotriazolo)-2,4-dinitroimidazole);
 - (e) PTIA (1-picryl-2,4,5-trinitroimidazole);
17. NTNMH (1-(2-nitrotriazolo)-2-dinitromethylene hydrazine);

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18. NTO (ONTA or 3-nitro-1,2,4-triazol-5-one) (CAS 932-64-9);
19. Polynitrocubanes with more than four nitro groups;
20. PYX (2,6-Bis(picrylamino)-3,5-dinitropyridine) (CAS 38082-89-2);
21. RDX and derivatives, as follows:
 - (a) RDX (cyclotrimethylenetrinitramine, cyclonite, T4, hexahydro-1,3,5-trinitro-1,3,5-triazine, 1,3,5-trinitro-1,3,5-triaza-cyclohexane, hexogen or hexogene) (CAS 121-82-4);
 - (b) Keto-RDX (K-6 or 2,4,6-trinitro-2,4,6-triazacyclohexanone) (CAS 115029-35-1);
22. TAGN (triaminoguanidinenitrate) (CAS 4000-16-2);
23. TATB (triaminotrinitrobenzene) (CAS 3058-38-6);
24. TEDDZ (3,3,7,7-tetrakis(difluoroamine) octahydro-1,5-dinitro-1,5diazocine);
25. Tetrazoles, as follows:
 - (a) NTAT (nitrotriazol aminotetrazole);
 - (b) NTNT (1-N-(2-nitrotriazolo)-4-nitrotetrazole);
26. Tetryl (trinitrophenylmethylnitramine) (CAS 479-45-8);
27. TNAD (1,4,5,8-tetranitro-1,4,5,8-tetraazadecalin) (CAS 135877-16-6);
28. TNAZ (1,3,3-trinitroazetidine) (CAS 97645-24-4);
29. TNGU (SORGUYL or tetranitroglycoluril) (CAS 55510-03-7);
30. TNP (1,4,5,8-tetranitro-pyridazino[4,5-d]pyridazine) (CAS 229176-04-9);
31. Triazines, as follows:
 - (a) DNAM (2-oxy-4,6-dinitroamino-s-triazine) (CAS 19899-80-0);
 - (b) NNHT (2-nitroimino-5-nitro-hexahydro-1,3,5-triazine) (CAS 130400-13-4);
32. Triazoles, as follows:
 - (a) 5-azido-2-nitrotriazole;
 - (b) ADHTDN (4-amino-3,5-dihydrazino-1,2,4-triazole dinitramide) (CAS 1614-08-0);
 - (c) ADNT (1-amino-3,5-dinitro-1,2,4-triazole);
 - (d) BDNTA ([bis-dinitrotriazole]amine);
 - (e) DBT (3,3'-dinitro-5,5-bi-1,2,4-triazole) (CAS 30003-46-4);
 - (f) DNBT (dinitrobistriazole) (CAS 70890-46-9);
 - (g) NTDNA (2-nitrotriazole 5-dinitramide) (CAS 75393-84-9);
 - (h) NTDNT (1-N-(2-nitrotriazolo) 3,5-dinitrotriazole);
 - (i) PDNT (1-picryl-3,5-dinitrotriazole);
 - (j) TACOT (tetranitrobenzotriazolobenzotriazole) (CAS 25243-36-1);
33. Any explosive not listed elsewhere in ML8.a. with a detonation velocity exceeding 8,700 m/s at maximum density or a detonation pressure exceeding 34 GPa (340 kbar);
34. Other organic explosives not listed elsewhere in ML8.a. 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.
 - b. "Propellants", as follows:

1. Any United Nations (UN) Class 1.1 solid “propellant” with a theoretical specific impulse (under standard conditions) of more than 250 seconds for non-metallized, or more than 270 seconds for aluminized 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, 250 seconds for non-metallized compositions and 266 seconds for metallized compositions;

3. “Propellants” having a force constant of more than 1,200 kJ/kg;

4. “Propellants” that can sustain a steady-state linear burning rate of more than 38 mm/s under standard conditions (as measured in the form of an inhibited single strand) of 6.89 Mpa (68.9 bar) pressure and 294K (21°C);

5. Elastomer modified cast double base (EMCDB) “propellants” with extensibility at maximum stress of more than 5% at 233K (-40°C);

6. Any “propellant” containing substances listed in ML8.a.

c. “Pyrotechnics”, fuels and related substances, as follows, and mixtures thereof:

1. Aircraft fuels specially formulated for military purposes;

2. Alane (aluminum hydride) (CAS 7784-21-6);

3. Carboranes; decaborane (CAS 17702-41-9); pentaboranes (CAS 19624-22-7 and 18433-84-6) and their derivatives;

4. Hydrazine and derivatives, as follows (see also ML8.d.8. and d.9. for oxidising hydrazine derivatives):

(a) Hydrazine (CAS 302-01-2) in concentrations of 70% or more;

(b) Monomethyl hydrazine (CAS 60-34-4);

(c) Symmetrical dimethyl hydrazine (CAS 540-73-8);

(d) Unsymmetrical dimethyl hydrazine (CAS 57-14-7);

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

a. Metals and mixtures thereof, as follows:

1. Beryllium (CAS 7440-41-7) in particle sizes of less than 60µm;

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

b. Mixtures, which contain any of the following:

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

2. Boron (CAS 7440-42-8) or boron carbide (CAS 12069-32-8) fuels of 85% purity or higher and particle sizes of less than 60µm;

except: boron and boron carbide enriched with boron-10 (20% or more of total boron-10 content);

6. Military materials containing thickeners for hydrocarbon fuels specially formulated for use in flame throwers or incendiary munitions, such as metal stearates or palmates (eg octal (CAS 637-12-7)) and M1, M2 and M3 thickeners;

7. Perchlorates, chlorates and chromates composited with powdered metal or other high energy fuel components;

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8. Spherical aluminum powder (CAS 7429-90-5) with a particle size of 60µm or less, manufactured from material with an aluminum content of 99% or more;
9. Titanium subhydride (TiH_n) of stoichiometry equivalent to n=0.65-1.68.
- d. Oxidizers, as follows, and mixtures thereof:
 1. ADN (ammonium dinitramide or SR12) (CAS 140456-78-6);
 2. AP (ammonium perchlorate) (CAS 7790-98-9);
 3. Compounds composed of fluorine and any of the following:
 - (a) Other halogens;
 - (b) Oxygen; *or*
 - (c) Nitrogen;

except: chlorine trifluoride;

 4. DNAD (1,3-dinitro-1,3-diazetidene) (CAS 78246-06-7);
 5. HAN (hydroxylammonium nitrate) (CAS 13465-08-2);
 6. HAP (hydroxylammonium perchlorate) (CAS 15588-62-2);
 7. HNF (hydrazinium nitroformate) (CAS 20773-28-8);
 8. Hydrazine nitrate (CAS 37836-27-4);
 9. Hydrazine perchlorate (CAS 27978-54-7);
 10. Liquid oxidisers comprised of or containing inhibited red fuming nitric acid (IRFNA) (CAS 8007-58-7);
 - e. Binders, plasticizers, monomers, polymers, as follows:
 1. AMMO (azidomethylmethyloxetane and its polymers) (CAS 90683-29-7);
 2. BAMO (bisazidomethyloxetane and its polymers) (CAS 17607-20-4);
 3. BDNPA (bis (2,2-dinitropropyl) acetal) (CAS 5108-69-0);
 4. BDNPF (bis (2,2-dinitropropyl) formal) (CAS 5917-61-3);
 5. BTTN (butanetrioltrinitrate) (CAS 6659-60-5);
 6. Energetic monomers, plasticizers and polymers containing nitro, azido, nitrate, nitraza or difluoroamino groups specially formulated for military use;
 7. FAMAO (3-difluoroaminomethyl-3-azidomethyl oxetane) and its polymers;
 8. FEFO (bis-(2-fluoro-2,2-dinitroethyl) formal) (CAS 17003-79-1);
 9. FPF-1 (poly-2,2,3,3,4,4-hexafluoropentane-1,5-diol formal) (CAS 376-90-9);
 10. FPF-3 (poly-2,4,4,5,5,6,6-heptafluoro-2-tri-fluoromethyl-3-oxaheptane-1,7-diol formal);
 11. GAP (glycidylazide polymer) (CAS 143178-24-9) and its derivatives;
 12. HTPB (hydroxyl terminated polybutadiene) with a hydroxyl functionality equal to or greater than 2.2 and less than or equal to 2.4, a hydroxyl value of less than 0.77 meq/g and a viscosity at 30°C of less than 47 poise (CAS 69102-90-5);
 13. Low (less than 10,000) molecular weight, alcohol functionalised, poly(epichlorohydrin); poly(epichlorohydrindiol) and triol;

14. NENAs (nitrateethylnitramine compounds) (CAS 17096-47-8, 85068-73-1, 82486-83-7, 82484-82-6 and 85954-06-9);
 15. PGN (poly-GLYN, polyglycidynitrate or poly(nitratomethyl oxirane) (CAS 27814-48-8);
 16. Poly-NIMMO (poly nitratomethylmethyloxetane) or poly-NMMO (poly[3-Nitratomethyl-3-methyloxetane]) (CAS 84051-81-0);
 17. Polynitroorthocarbonates;
 18. TVOPA (1,2,3-tris[1,2-bis(difluoroamino)ethoxy] propane or tris vinoxyl propane adduct) (CAS 53159-39-0).
- f. "Additives", as follows:
1. Basic copper salicylate (CAS 62320-94-9);
 2. BHEGA (*bis*-(2-hydroxyethyl) glycolamide) (CAS 17409-41-5);
 3. BNO (butadienenitrileoxide) (CAS 9003-18-3);
 4. Ferrocene derivatives, as follows:
 - (a) Butacene (CAS 125856-62-4);
 - (b) Catocene (2,2-bis-ethylferrocenyl propane) (CAS 37206-42-1);
 - (c) Ferrocene carboxylic acids;
 - (d) n-butyl-ferrocene (CAS 319904-29-7);
 - (e) Other adducted polymer ferrocene derivatives;
 5. Lead beta-resorcylate (CAS 20936-32-7);
 6. Lead citrate (CAS 14450-60-3);
 7. Lead-copper chelates of beta-resorcylate or salicylates (CAS 68411-07-4);
 8. Lead maleate (CAS 19136-34-6);
 9. Lead salicylate (CAS 15748-73-9);
 10. Lead stannate (CAS 12036-31-6);
 11. MAPO (tris-1-(2-methyl)aziridinyl phosphine oxide) (CAS 57-39-6), and BOBBA 8 (bis(2-methyl aziridinyl) 2-(2-hydroxypropanoxy) propylamino phosphine oxide); and other MAPO derivatives;
 12. Methyl BAPO (bis(2-methyl aziridinyl) methylamino phosphine oxide) (CAS 85068-72-0);
 13. N-methyl-p-nitroaniline (CAS 100-15-2);
 14. 3-Nitroazirane-1,5-pentane diisocyanate (CAS 7406-61-9);
 15. Organo-metallic coupling agents, as follows:
 - (a) Neopentyl[di-allyl]oxy, tri[diocetyl]phosphato-titanate (CAS 103850-22-2); also known as titanium IV, 2,2[bis(2-propenolato-methyl, butanolato, tris (diocetyl) phosphato) (CAS 110438-25-0); or LICA 12 (CAS 103850-22-2);
 - (b) Titanium IV, [(2-propenolato-1) methyl, n-propanolatomethyl] butanolato-1, tris[diocetyl] pyrophosphate or KR3538;
 - (c) Titanium IV, [(2-propenolato-1) methyl, n-propanolatomethyl] butanolato-1, tris(diocetyl)phosphate;
 16. Polycyanodifluoroaminoethyleneoxide;

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17. Polyfunctional aziridine amides with isophthalmic, trimesic (BITA or butylene imine trimesamide), isocyanuric or trimethyladipic backbone structures and 2-methyl or 2-ethyl substitutions on the aziridine ring;

18. Propyleneimine (2-methylaziridine) (CAS 75-55-8);

19. Superfine iron oxide (Fe_2O_3) with a specific surface area more than $250 \text{ m}^2/\text{g}$ and an average particle size of 3.0 nm or less;

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

21. TEPANOL (tetraethylenepentaamineacrylonitrileglycidol) (CAS 68412-46-4); cyanoethylated polyamines adducted with glycidol and their salts;

22. TPB (triphenyl bismuth) (CAS 603-33-8).

g. "Precursors", as follows:

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

2. Dinitroazetidide-t-butyl salt (CAS 125735-38-8);

3. HBIW (hexabenzylhexaazaisowurtzitane) (CAS 124782-15-6);

4. TAIW (tetraacetyldibenzylhexaazaisowurtzitane);

5. TAT (1,3,5,7 tetraacetyl-1,3,5,7,-tetraaza cyclo-octane) (CAS 41378-98-7);

6. 1,4,5,8-tetraazadecalin (CAS 5409-42-7);

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

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