

COMMITTEE OF EXPERTS ON THE TRANSPORT OF DANGEROUS GOODS AND ON THE GLOBALLY HARMONIZED SYSTEM OF CLASSIFICATION AND LABELLING OF CHEMICALS

Sub-Committee of Experts on the
Transport of Dangerous Goods

Twenty-eighth session
Geneva, 28 November – 7 December 2005
Agenda item 6 of the provisional agenda

MISCELLANEOUS PROPOSALS OF AMENDMENTS TO THE MODEL REGULATIONS ON THE TRANSPORT OF DANGEROUS GOODS

Substances forbidden from transport under any circumstances
Comments on UN/SCETDG/28/INF.11

Transmitted by the expert from the United States of America

Background

The expert from the United States supports the proposal from Italy (UN/SCETDG/28/INF.11) inviting the Sub-Committee to consider adding provisions to the Model Regulations that identify substances forbidden from transport. As a basis for discussion, the following sections of the U.S. Hazardous Materials Regulations which address this issue are provided for consideration by the Sub-Committee:

Annex 1: List of Substances Specifically Forbidden for Transport

Annex 2: Criteria for determining whether a substance should be forbidden from transport

Annex 3: Criteria for Forbidden Explosives

Proposal:

The Sub-committee is invited to review the annexes and provide appropriate comments. The Expert from the United States is willing to develop draft language suitable to be included in the UN Model Regulations based on the requirements outlined in the below annexes and based on any comments received with respect to these requirements.

Annex 1

**List of Substances specifically forbidden for transport in the U.S. Hazardous Materials Regulations
Source: 49 CFR Table 172.101**

Acetyl acetone peroxide with more than 9 percent by mass active oxygen
Acetyl benzoyl peroxide, solid, or with more than 40 percent in solution
Acetyl cyclohexanesulfonyl peroxide, with more than 82 percent wetted with less than 12 percent water
Acetyl peroxide, solid, or with more than 25 percent in solution
Acetylene (liquefied)
Acetylene silver nitrate
Cyanuric triazide
Aluminum dross, wet or hot
Methyl isobutyl ketone peroxide, in solution with more than 9 percent by mass active oxygen
Methyl nitramine (dry)
Methyl nitrate
Methyl nitrite
Methyl picric acid (heavy metal salts of)
Metal salts of methyl nitramine (dry)
Methazoic acid
Mercurous azide
Mercury acetylde
Mercury nitride
Mercury iodide aquabasic ammonobasic (Iodide of Millon's base)
Mercury oxycyanide
Magnesium dross, wet or hot
Mannitan tetranitrate
Mannitol hexanitrate (dry)
Azidoethyl nitrate
Ascaridole (organic peroxide)
Azaurolic acid (salt of) (dry)
Isopropylcumyl hydroperoxide, with more than 72 percent in solution
Isothiocyanic acid
Lead azide (dry)
Lead nitroresorcinatate (dry)
Lead picrate (dry)
Lead styphnate (dry)
Initiating explosives (dry)
Inositol hexanitrate (dry)
Inulin trinitrate (dry)
Iodine azide (dry)
Iodoxy compounds (dry)
Iridium nitratopentamine iridium nitrate
Hydrazine perchlorate
Hydrazine selenate
Hydrocyanic acid (prussic), unstabilized
Hydroxyl amine iodide
Hyponitrous acid
Hexamethylene triperoxide diamine (dry)
Hexamethylol benzene hexanitrate
Hexanitroazoxy benzene
Hexanitrodiphenyl urea
2,2',4,4',6,6'- Hexanitro-3,3'-dihydroxyazobenzene (dry)
N,N'-(hexanitrodiphenyl) ethylene dinitramine (dry)

2,2',3',4,4',6-Hexanitrodiphenylamine
2,3',4,4',6,6'-Hexanitrodiphenylether
Hexanitroethane
Hexanitrooxanilide
Hydrazine azide
Hydrazine chlorate
Hydrazine dicarbonic acid diazide
Fulminating gold
Fulminating mercury
Fulminating platinum
Fulminating silver
Fulminic acid
Galactsan trinitrate
Glycerol-1,3-dinitrate
Glycerol gluconate trinitrate
Glycerol lactate trinitrate
Guanyl nitrosaminoguanilydene hydrazine (dry)
Guanyl nitrosaminoguanilytetrazene (dry)
Forbidden materials. See §173.21
Fulminate of mercury (dry)
Ethylene glycol dinitrate
Explosive, forbidden. See §173.54
Ethanol amine dinitrate
Ethyl hydroperoxide
Ethyl perchlorate
Ethylene diamine diperchlorate
Dinitromethane
Dinitropropylene glycol
2,4-Dinitroresorcinol (heavy metal salts of) (dry)
4,6-Dinitroresorcinol (heavy metal salts of) (dry)
3,5-Dinitrosalicylic acid (lead salt) (dry)
2,2-Dinitrostilbene
Dinitrosobenzylamidine and salts of (dry)
1,9-Dinitroxy pentamethylene-2,4, 6,8-tetramine (dry)
Dipropionyl peroxide, with more than 28 percent in solution
Diethylene glycol dinitrate
Diethylgold bromide
1,8-Dihydroxy-2,4,5,7-tetranitroanthraquinone (chrysammic acid)
Diiodoacetylene
Diisopropylbenzene hydroperoxide, with more than 72 percent in solution
2,5-Dimethyl-2,5-dihydroperoxy hexane, with more than 82 percent with water
Dimethylhexane dihydroperoxide (dry)
1,3-Dinitro-5,5-dimethyl hydantoin
Dinitro-7,8-dimethylglycoluril (dry)
1,3-Dinitro-4,5-dinitrosobenzene
2,4-Dinitro-1,3,5-trimethylbenzene
1,4-Dinitro-1,1,4,4-tetramethylolbutanetetranitrate (dry)
1,2-Dinitroethane
1,1-Dinitroethane (dry)
Diazodiphenylmethane
Diazonium nitrates (dry)
Diazonium perchlorates (dry)
1,3-Diazopropane
Dibenzyl peroxydicarbonate, with more than 87 percent with water

Dibromoacetylene
N,N'-Dichlorazodicarbonamide (salts of) (dry)
Dichloroacetylene
Dichloroethyl sulfide
Dichlorovinylchloroarsine
Diethanol nitrosamine dinitrate (dry)
Diethyl peroxydicarbonate, with more than 27 percent in solution
Cyclotetramethylene tetranitramine (dry or unphlegmatized) (HMX)
Di-(1-hydroxytetrazole) (dry)
Di-(1-naphthoyl) peroxide
Di-n-butyl peroxydicarbonate, with more than 52 percent in solution
2,2-Di-(tert-butylperoxy) butane, with more than 55 percent in solution
Di-(tert-butylperoxy) phthalate, with more than 55 percent in solution
2,2-Di-(4,4-di-tert-butylperoxycyclohexyl) propane, with more than 42 percent with inert solid
Di-2,4-dichlorobenzoyl peroxide, with more than 75 percent with water
a,a'-Di-(nitroxy) methylether
Di-(beta-nitroxyethyl) ammonium nitrate
Diacetone alcohol peroxides, with more than 57 percent in solution with more than 9 percent hydrogen peroxide, less than 26 percent diacetone alcohol and less than 9 percent water; total active oxygen content more than 9 percent by mass
Diacetyl peroxide, solid, or with more than 25 percent in solution
p-Diazidobenzene
1,2-Diazidoethane
1,1'-Diazoaminonaphthalene
Diazoaminotetrazole (dry)
Diazodinitrophenol (dry)
Copper acetylide
Copper amine azide
Copper tetramine nitrate
Coal briquettes, hot
Coke, hot
Chloroacetone (unstabilized)
Chloroprene, uninhibited
Chlorine azide
Chlorine dioxide (not hydrate)
tert-Butyl hydroperoxide, with more than 90 percent with water
tert-Butyl peroxyacetate, with more than 76 percent in solution
n-Butyl peroxydicarbonate, with more than 52 percent in solution
tert-Butyl peroxyisobutyrate, with more than 77 percent in solution
Bromine azide
4-Bromo-1,2-dinitrobenzene
4-Bromo-1,2-dinitrobenzene (unstable at 59 degrees C)
1-Bromo-3-nitrobenzene (unstable at 56 degrees C)
Bromosilane
1,2,4-Butanetriol trinitrate
tert-Butoxycarbonyl azide
Benzene diazonium chloride (dry)
Benzene diazonium nitrate (dry)
Benzene triozone
Benzoxidiazoles (dry)
Benzoyl azide
Biphenyl triozone
Azido guanidine picrate (dry)
5-Azido-1-hydroxy tetrazole

Azidodithiocarbonic acid
Azido hydroxy tetrazole (mercury and silver salts)
3-Azido-1,2-Propylene glycol dinitrate
Azotetrazole (dry)
Methylene glycol dinitrate
m-Nitrophenyldinitro methane
Nitrosugars (dry)
Peroxyacetic acid, with more than 43 percent and with more than 6 percent hydrogen peroxide
Antimony sulfide and a chlorate, mixtures of
Arsenic sulfide and a chlorate, mixtures of
Ammonium azide
Ammonium bromate
Ammonium chlorate
Ammonium fulminate
Ammonium nitrite
Ammonium permanganate
Methyl trimethylol methane trinitrate
Methylamine dinitramine and dry salts thereof
Methylamine nitroform
Methylamine perchlorate (dry)
Monochloroacetone (unstabilized)
Naphthalene diozonide
Naphthylamineperchlorate
Nickel picrate
Methyl ethyl ketone peroxide, in solution with more than 9 percent by mass active oxygen
Nitro isobutane triol trinitrate
N-Nitro-N-methylglycolamide nitrate
2-Nitro-2-methylpropanol nitrate
6-Nitro-4-diazotoluene-3-sulfonic acid (dry)
N-Nitroaniline
m-Nitrobenzene diazonium perchlorate
a-Methylglucoside tetranitrate
a-Methylglycerol trinitrate
Nitroethyl nitrate
Nitroethylene polymer
1,7-Octadine-3,5-diyne-1,8-dimethoxy-9-octadecynoic acid
Organic peroxide type A, liquid or solid
Nitrated paper (unstable)
Nitrates of diazonium compounds
Nitrogen trichloride
Nitrogen triiodide
Nitrogen triiodide monoamine
Nitroglycerin, liquid, not desensitized
Nitroguanidine nitrate
1-Nitrohydantoin
Nitromannite (dry)
Perchloric acid, with more than 72 percent acid by mass
m-Phenylene diaminediperchlorate (dry)
Phosphorus (white or red) and a chlorate, mixtures of
Pentaerythrite tetranitrate (dry)
Pentanitroaniline (dry)
Potassium carbonyl
Selenium nitride
Pyridine perchlorate

Quebrachitol pentanitate
Silver acetylde (dry)
Silver azide (dry)
Silver chlorite (dry)
Silver fulminate (dry)
Silver oxalate (dry)
Silver picrate (dry)
Sodium picryl peroxide
Sucrose octanitate (dry)
Sulfur and chlorate, loose mixtures of
Tetraazido benzene quinone
Tetraethylammonium perchlorate (dry)
Tetramethylene diperoxide dicarbamide
Tetranitro diglycerin
2,3,4,6-Tetranitrophenol
2,3,4,6-Tetranitrophenyl methyl nitramine
2,3,4,6-Tetranitrophenylnitramine
Tetranitroresorcinol (dry)
2,3,5,6-Tetranitroso-1,4-dinitrobenzene
2,3,5,6-Tetranitroso nitrobenzene (dry)
Tetrazine (dry)
Tetrazolyl azide (dry)
Sodium tetranitride
Tri-(b-nitroxyethyl) ammonium nitrate
Trichloromethyl perchlorate
Triformoxime trinitrate
Trinitroamine cobalt
Trinitroethanol
Trinitroethylnitrate
Trinitromethane
1,3,5-Trinitronaphthalene
2,4,6-Trinitrophenyl guanidine (dry)
2,4,6-Trinitrophenyl nitramine
Trinitrotetramine cobalt nitrate
2,4,6-Trinitrophenyl trimethylol methyl nitramine trinitrate (dry)
2,4,6-Trinitroso-3-methyl nitraminoanisole
Tris, bis-bifluoroamino diethoxy propane (TVOPA)
Vinyl nitrate polymer
Trimethylol nitromethane trinitrate
2,4,6-Trinitro-1,3-diazobenzene
1,3,5-Trimethyl-2,4,6-trinitrobenzene
Trimethylene glycol diperchlorate
2,4,6-Trinitro-1,3,5-triazido benzene (dry)
Trinitroacetic acid
Trinitroacetonitrile
p-Xylyl diazide

Annex 2**Criteria for determining whether a substance should be forbidden from transport**
Source: U.S. Hazardous Materials Regulations (49 CFR 173.21)**49 CFR 173.21****Forbidden materials and packages.**

Unless otherwise provided in this subchapter, the offering for transportation or transportation of the following is forbidden: (a) Materials that are designated "Forbidden" in Column 3 of the § 172.101 Table. (b) Forbidden explosives as defined in § 173.54 of this part (**see Annex 3**). (c) Electrical devices which are likely to create sparks or generate a dangerous quantity of heat, unless packaged in a manner which precludes such an occurrence. (d) For carriage by aircraft, any package which has a magnetic field of more than 0.00525 gauss measured at 4.5 m (15 feet) from any surface of the package. (e) A material in the same packaging, freight container, or overpack with another material, the mixing of which is likely to cause a dangerous evolution of heat, or flammable or poisonous gases or vapors, or to produce corrosive materials. (f) A package containing a material which is likely to decompose with a self-accelerated decomposition temperature (SADT) of 50°C (122°F) or less, or polymerize at a temperature of 54°C (130°F) or less with an evolution of a dangerous quantity of heat or gas when decomposing or polymerizing, unless the material is stabilized or inhibited in a manner to preclude such evolution. The SADT may be determined by any of the test methods described in Part II of the UN Manual of Tests and Criteria (IBR, see § 171.7 of this subchapter).

- (1) A package meeting the criteria of paragraph (f) of this section may be required to be shipped under controlled temperature conditions. The control temperature and emergency temperature for a package shall be as specified in the table in this paragraph based upon the SADT of the material. The control temperature is the temperature above which a package of the material may not be offered for transportation or transported. The emergency temperature is the temperature at which, due to imminent danger, emergency measures must be initiated.

Section 173.21 Table: Method of Determining Control and Emergency Temperature

SADT ¹	Control temperatures	Emergency temperature
SADT ≤ 20 °C (68 °F)	20 °C (36 °F) below SADT	10 °C (18 °F) below SADT
20 °C (68 °F)	<15 °C (27 °F)	10 °C (18 °F)
SADT ≤ 35°C (95 °F)	below SADT	below SADT
35 °C (95 °F)	<10 °C (18 °F)	5 °C (9 °F)
SADT ≤ 50 °C (122 °F)	below SADT	below SADT
50 °C (122 °F)	(2)	(2)
< SADT		

¹ Self-accelerating decomposition temperature.

² Temperature control not required.

- (2) For self-reactive materials listed in § 173.224(b) Table control and emergency temperatures, where required are shown in Columns 5 and 6, respectively. For organic peroxides listed in The Organic Peroxides Table in § 173.225 control and emergency temperatures, where required, are shown in Columns 7a and 7b, respectively.
- (3) Refrigeration may be used as a means of stabilization only when approved by the Associate Administrator. For status of approvals previously issued by the Bureau of Explosives, see § 171.19 of this subchapter. Methods of stabilization approved by the Associate Administrator are as follows:

(i) For highway transportation:

(A) A material meeting the criteria of this paragraph (f) may be transported only in a transport vehicle, freight container, or motor vehicle equipped with a mechanical refrigeration unit, or loaded with a consumable refrigerant, capable of maintaining the inside temperature of the hazardous material at or below the control temperature required for the material during transportation.

(B) Each package containing a material meeting the criteria of this paragraph (f) must be loaded and maintained at or below the control temperature required for the material. The temperature of the material must be determined by appropriate means and entered on a written record at the time the packaging is loaded.

(C) The vehicle operator shall monitor the inside temperature of the transport vehicle, freight container, or motor vehicle and enter that temperature on a written record at the time the package is loaded and thereafter at intervals not exceeding two hours. Alternatively, a transport vehicle, freight container, or motor vehicle may be equipped with a visible or audible warning device that activates when the inside temperature of the transport vehicle, freight container, or motor vehicle exceeds the control temperature required for the material. The warning device must be readily visible or audible, as appropriate, from the vehicle operator's seat in the vehicle.

(D) The carrier shall advise the vehicle operator of the emergency temperature for the material, and provide the vehicle operator with written procedures that must be followed to assure maintenance of the control temperature inside the transport vehicle, freight container, or motor vehicle. The written procedures must include instructions for the vehicle operator on actions to take if the inside temperature exceeds the control temperature and approaches or reaches the emergency temperature for the material. In addition, the written temperature-control procedures must identify enroute points where the consumable refrigerant may be procured, or where repairs to, or replacement of, the mechanical refrigeration unit may be accomplished.

(E) The vehicle operator shall maintain the written temperature-control procedures, and the written record of temperature measurements specified in paragraph (f)(3)(i)(C) of this section, if applicable, in the same manner as specified in § 177.817 of this subchapter for shipping papers.

(F) If the control temperature is maintained by use of a consumable refrigerant (e.g., dry ice or liquid nitrogen), the quantity of consumable refrigerant must be sufficient to maintain the control temperature for twice the average transit time under normal conditions of transportation.

(G) A material that has a control temperature of 40 °C (104 °F) or higher may be transported by common carrier. A material that has a control temperature below 40 °C (104 °F) must be transported by a private or contract carrier.

(ii) For transportation by vessel, shipments are authorized in accordance with the control temperature requirements in Chapter 7.7 of the IMDG Code (IBR, see § 171.7 of this subchapter).

(g) Packages which give off a flammable gas or vapor, released from a material not otherwise subject to this subchapter, likely to create a flammable mixture with air in a transport vehicle.

(h) Packages containing materials (other than those classed as explosive) which will detonate in a fire.

(1) For purposes of this paragraph, "detonate" means an explosion in which the shock wave travels through the material at a speed greater than the speed of sound.

(2) When tests are required to evaluate the performance of a package under the provisions of this paragraph, the testing must be done or approved by one of the agencies specified in §

173.56.

(i) A package containing a cigarette lighter, or other similar device, equipped with an ignition element and containing fuel; except that a cigarette lighter or similar device subject to this paragraph may be shipped if the design of the device and its inner packaging has been examined by the Bureau of Explosives and specifically approved by the Associate Administrator. The examination of cigarette lighters and similar devices containing gaseous fuel will include scrutiny for compliance with § 173.308 of this part. For the status of approvals previously issued by the Bureau of Explosives, see § 171.19 of this subchapter.

(j) An organic peroxide of the "ketone peroxide" category which contains more than 9 percent available oxygen as calculated using the equation in § 173.128(a)(4)(ii). The category, ketone peroxide, includes, but is not limited to:

Acetyl acetone peroxide

Cyclohexanone peroxide(s)

Diacetone alcohol peroxides

Methylcyclohexanone peroxide(s)

Methyl ethyl ketone peroxide(s)

Methyl isobutyl ketone peroxide(s)

(k) Notwithstanding any other provision of this subchapter, including §§ 171.11 and 175.10(a)(2) of this subchapter, an oxygen generator (chemical) as cargo on a passenger-carrying aircraft. This prohibition does not apply to an oxygen generator for medical or personal use of a passenger that meets the requirements of § 175.10(a)(7) of this subchapter.

Annex 3

Criteria for Forbidden Explosives
Source: U.S. Hazardous Materials Regulations (49 CFR 173.54)

173.54

Forbidden explosives.

Unless otherwise provided in this subchapter, the following explosives shall not be offered for transportation or transported:

- (a) An explosive that has not been approved in accordance with § 173.56 of this subpart.
 - (b) An explosive mixture or device containing a chlorate and also containing:
 - (1) An ammonium salt, including a substituted ammonium or quaternary ammonium salt; or
 - (2) An acidic substance, including a salt of a weak base and a strong acid.
 - (c) A leaking or damaged package or article containing an explosive.
 - (d) Propellants that are unstable, condemned or deteriorated.
 - (e) Nitroglycerin, diethylene glycol dinitrate, or any other liquid explosives not specifically authorized by this subchapter.
 - (f) A loaded firearm (except as provided in 49 CFR 1544.219).
 - (g) Fireworks that combine an explosive and a detonator.
 - (h) Fireworks containing yellow or white phosphorus.
 - (i) A toy torpedo, the maximum outside dimension of which exceeds 23 mm (0.906 inch), or a toy torpedo containing a mixture of potassium chlorate, black antimony (antimony sulfide), and sulfur, if the weight of the explosive material in the device exceeds 0.26 g (0.01 ounce).
 - (j) Explosives specifically forbidden in the § 172.101 Table of this subchapter.
 - (k) Explosives not meeting the acceptance criteria specified in § 173.57 of this subchapter.
 - (l) An explosive article with its means of initiation or ignition installed, unless approved in accordance with § 173.56.
-