



Secretariat

Distr.
GENERAL

ST/SG/AC.10/C.3/2000/29

18 April 2000

ORIGINAL : ENGLISH

**COMMITTEE OF EXPERTS ON THE TRANSPORT
OF DANGEROUS GOODS**

**Sub-Committee of Experts on the
Transport of Dangerous Goods**
(Eighteenth session, 3-14 July 2000,
agenda item 3 (b))

TRANSPORT IN BULK IN PORTABLE TANKS AND FREIGHT CONTAINERS

New provisions for the transport of solid substances in bulk in freight containers

Amendments to Chapter 1.2.1, 3.2, 4.3 and 6.8

Transmitted by the expert from Germany

1. INTRODUCTION

At the twentieth meeting of the Committee of Experts on the Transport of Dangerous Goods, the expert from Germany announced that he would transmit a proposal for the transport of solids and articles in bulk containers to be included in the UN Model Regulations for the transport of dangerous goods (see ST/SG/AC.10/25, page 29, para. 141(e)). Accordingly, an item in this respect was put on the agenda for the work on the UN Recommendations for the years 1999/2000.

At the sixteenth session of the Sub-Committee of Experts on the Transport of Dangerous Goods (Geneva, 5-14 July 1999), the expert from Germany said that he would transmit this proposal for the seventeenth session of the Sub-Committee of Experts on the Transport of Dangerous Goods scheduled to take place in December 1999 (see ST/SG/AC.10/C.3/32, para. 29).

A large number of delegations at the 17th session of the Sub-Committee welcomed the work carried out by the expert from Germany (ST/SG/AC.10/C.3/1999/92) which provided a good basis for the work of preparing the new provisions for the Transport of solid substances in bulk in freight containers. In view of the numerous detailed comments, the expert from Germany offered to organize an inter-sessional working group on this question (see also ST/SG/AC.10/C.3/34, paras. 24-27).

The International Working Group on New Provisions for the Transport of Solid Substances in Bulk in Freight Containers met in Bonn from 5 - 7 April 2000. A Summary Record of the International Working Group on New Provisions for the Transport of Solid Substances in Bulk in Freight Containers will be submitted separately as an informal document (INF).

2. GENERAL

No regulations for the transport of solid dangerous goods in bulk have so far been included in the UN Model Regulations.

Owing to new production processes, but also for reasons of waste management, it has become necessary to develop a concept both with regard to the substances which are suitable for this method of carriage and, in particular, also with regard to the technical requirements for special bulk containers.

The expert from Germany, therefore, suggests developing multimodal regulations for the transport of dangerous goods in bulk containers for incorporation into the UN Model Regulations.

According to the Bonn Working Group result that as a first approach transport in bulk of solid substances and waste should be considered first and that articles and empty uncleaned packagings should be treated at a later time and noting the fact that transport in bulk of some solid substances is possible according to the provisions of RID/ADR, the IMDG Code and CFR 49 Germany stated that it would prepare a list of substances being limited to those substances common to these regulations (see Table 1 of Annex 2 of this document). Additionally this Table 1 will contain an indication in different columns as to what provisions this bulk transport applies (indication "D" identifies the substances which in the opinion of Germany could be transported in bulk). Table 2 of Annex 2 of this document identifies the substances that at present are allowed to be transported in bulk under all provisions, i.e. RID/ADR, the IMDG Code and CFR 49. Table 2 of Annex 2 of this document will be submitted by Germany as an informal document.

3. PROPOSALS

A proposal taking into account the structure of the UN Model Regulations is attached to this document as Annex 1. The proposed amendments or additions relate to the following chapters and sections:

1.2.1 Definitions

3.2 Dangerous Goods List

4.3 Use of bulk containers,

4.3.1 General provisions,

4.3.2 Provisions for bulk goods of classes 4.1, 4.3, 5.1, 6.1, 8 and 9

4.3.3 Special provisions for bulk goods

6.8 Requirements for the design, construction, inspection and testing of bulk containers,

6.8.1 Application and general requirements,

6.8.2 Requirements for the design, construction, inspection and testing of bulk containers,

6.8.3 Marking.

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Annex 1

1.2.1 Definitions

Bulk containers are containment systems (including any liner or coating) intended for the transport of solid dangerous substances which are in direct contact with the containment system, other than packagings, intermediate bulk containers (IBCs), large packagings and portable tanks.

Containment systems are:

- of a permanent character and accordingly strong enough to be suitable for repeated use;
- specially designed to facilitate the carriage of goods by one or more means of transport without intermediate reloading;
- fitted with devices permitting its ready handling, particularly when being transshipped from one means of transport to another;
- so designed as to be easy to fill and empty; and
- have a capacity of not less than [X m³].

Examples of bulk containers are freight containers, bulk bins, swap bodies, trough-shaped containers, roller containers, vehicles.

4.3 Use of bulk containers

4.3.1 General provisions

4.3.1.1 This section contains general provisions applicable to the transport of solid substances of classes 4.1 (with the exception of self-reactive substances and explosive substances in non-explosive state), 4.2, 4.3, 5.1, 6.1, 7, 8 and 9 in bulk. In addition to these general requirements bulk containers shall conform to the design, construction, inspection and testing requirements detailed in 6.8. Substances shall be transported in bulk containers conforming to the applicable bulk container instruction in the Dangerous Goods List and described in 6.8 (codes [BK]1 to [BK]3).

Note: It should be considered whether column 8 or 12 is appropriate to take into account the provisions of bulk transport. To avoid duplication a new coding system for [BK] should be found.

4.3.1.2 Bulk containers shall only be used for the transport of dangerous substances when a substance is assigned to a bulk container code in Column [8 or 12] of the Dangerous Goods List in Chapter 3.2.

4.3.1.3 When a substance is not assigned a bulk container type in Column [8 or 12] of the Dangerous Goods List in Chapter 3.2, interim approval for transport may be issued by the competent authority of the country of origin. The approval shall be included in the documentation of the consignment and contain, as a minimum, the information normally provided in the bulk container instruction and the conditions under which the substance shall be transported. Appropriate measures shall be initiated by the competent authority to include the assignment in the Dangerous Goods List.

4.3.1.4 Bulk containers, designed in accordance with 6.8.2.3.2 need, prior to filling, be equipped with the additional operational equipment in accordance with 6.8.2.3.3 to 6.8.2.3.5, as relevant.

4.3.1.5 Bulk containers shall be so closed that none of the contents can escape under normal conditions of transport including the effect of vibration, or by changes of temperature, humidity or pressure.

4.3.1.6 Bulk goods shall be so loaded into bulk containers as not to be liable to change their position in a dangerous manner in normal conditions of transport.

4.3.1.7 Openings or other devices for the venting of ventilated bulk containers shall be controlled as to ensure sufficient ventilation.

4.3.1.8 In the case of hygroscopic substances and substances which may become liquid during transport, appropriate measures shall be taken to ensure that there will be no leakage of liquefied substances from the bulk container.

4.3.1.9 Bulk goods shall not react dangerously with the material of the bulk container, gaskets, equipment including lids and tarpaulins and with protective coatings which are in contact with the contents to form hazardous products or significantly weaken them.

- 4.3.1.10 Before being filled and offered for transport, each bulk container shall be inspected to ensure that it is free from any deficiencies to ensure that it is safe for transport.
- 4.3.1.11 Transport, loading or discharge of bulk containers under pressure is not allowed.
- 4.3.1.12 During transport, no dangerous substances shall adhere to the outer surfaces of bulk containers.
- 4.3.1.13 If several closing systems are fitted in series, the system which is located nearest to the substance to be carried shall be closed first before filling.
- 4.3.1.14 During transport, empty uncleaned bulk containers shall be as tightly closed as bulk containers which have been filled.
- 4.3.1.15 If bulk containers are used for the carriage of bulk goods liable to cause a dust explosion, measures shall be taken to prevent dangerous electrostatic discharge during filling and discharging.
- 4.3.1.16 Substances which may react dangerously with one another and also substances of different classes and goods not subject to the UN Recommendations, which are liable to react dangerously with one another shall not be loaded together in the same bulk container. Dangerous reactions are:
- (a) combustion and/or evolution of considerable heat,
 - (b) emission of flammable and/or toxic gases,
 - (c) formation of corrosive liquids, or
 - (d) formation of unstable substances.

4.3.2 Provisions for bulk goods of classes 4.1, 4.3, 5.1, 6.1, 8 and 9

Open top bulk containers including sheeted containers (code [BK]1), closed bulk containers including ventilated bulk containers (code [BK]2) and closed bulk containers (hermetically closed) (code [BK]3) may be used.

4.3.3 Special provisions for bulk goods

4.3.3.1 Bulk goods of class 4.2
Closed bulk containers (code [BK]2) and closed bulk containers (hermetically closed) (code [BK]3) may be used only.

4.3.3.2 Bulk goods of class 4.3
Closed bulk containers (code [BK]2) and closed bulk containers (hermetically closed) (code [BK]3) may be used only.

These goods should be transported in bulk containers in which the openings used for loading and unloading are capable of being closed watertight.

Note: This new section takes into account sub-section 4.3.2.1 and 4.3.2.1.1 of the restructured IMDG Code.

4.3.3.3 Bulk goods of class 5.1

Bulk containers should be so constructed or adapted that the goods can not come into contact with wood or any other combustible material.

Note: This new section takes into account sub-section 4.3.2.2 and 4.3.2.2.1 of the restructured IMDG Code.

[4.3.3.4 Bulk goods of class 7

- (a) UN 2912 radioactive material, low specific activity (LSA-I), non fissile or fissile-excepted. All materials, other than ores, may be transported in closed bulk containers (code [BK]2) and closed bulk containers (hermetically closed) (code [BK]3); in addition, the special provisions “Exclusive use of the conveyance” and “No loss of shielding under routine conditions” shall be applied.
- (b) UN 2912 radioactive material, low specific activity (LSA-I), non fissile or fissile-excepted. Ores only containing naturally occurring radioactive isotopes may be transported in open top bulk containers including sheeted containers (code [BK]1), closed bulk containers including ventilated bulk containers (code [BK]2) and closed bulk containers (hermetically closed) (code [BK]3); in addition, the special provision “Exclusive use of the conveyance” shall be applied.
- (c) UN 2913 radioactive material, surface contaminated objects (SCO-I), non fissile or fissile-excepted. Only SCO-I may be carried in bulk. SCO-I may be carried in closed bulk containers (code [BK]2) and closed bulk containers (hermetically closed) (code [BK]3); in addition the special provisions “Exclusive use of the conveyance” and “No loss of shielding under routine conditions” shall be applied.
- (d) UN 2913 radioactive material, surface contaminated objects (SCO-I or SCO-II), non fissile or fissile-excepted. Only SCO-I may be carried in bulk. SCO-I contaminated on accessible and inaccessible surfaces to a level not exceeding 4 Bq/cm² for all alpha emitters may be transported in closed bulk containers (code [BK]2) and closed bulk containers (hermetically closed) (code [BK]3); in addition the special provision “No loss of shielding under routine conditions” shall be applied.
- (e) UN 2913 radioactive material, surface contaminated objects (SCO-I or SCO-II), non fissile or fissile-excepted. Only SCO-I may be carried in bulk. SCO-I on which the non-fixed contamination on inaccessible surfaces is suspected to be in excess of 4 Bq/cm² for beta and gamma emitters and low toxicity alpha emitters, or 0,4 Bq/cm² for all other alpha emitters be may be transported in closed bulk containers (code [BK]2) and closed bulk containers (hermetically closed) (code [BK]3); in addition, the special provisions “Exclusive use of the conveyance”, “No loss of shielding under routine conditions” and “No release into the conveyance” shall be applied.]
Note: The text of sub-section 4.3.3.3 should by discussed by the experts of class 7.

- 4.3.3.5 Bulk goods of class 8
Closed bulk containers (code [BK]2) and closed bulk containers (hermetically closed) (code [BK]3) may be used only.
These goods should be transported in bulk containers in which the openings used for loading and unloading are capable of being closed watertight.
Bulk containers should be so constructed or adapted that the goods can not penetrate between wooden floor coverings or come into contact with those parts of the bulk containers that may be affected by the materials or residues thereof.
Note: This new section takes into account sub-section 4.3.2.3, 4.3.2.3.1 and 4.3.2.3.2 of the restructured IMDG Code.

6.8 Requirements for the design, construction, testing and inspection of bulk containers

6.8.1 Application and general requirements

- 6.8.1.1 The requirements of this chapter apply to containers for the transport of solid dangerous substances as specified in 4.3.1.1 by all modes of transport.
- 6.8.1.2 In order to take into account progress in science and technology the use of alternative arrangements which offer at least equivalent safety as provided by the requirements of this chapter may be considered by the competent authority.

6.8.2 Requirements for the design, construction, inspection and testing of bulk containers

6.8.2.1 Definitions

For the purposes of this section:

Closed bulk container means a totally closed bulk container having a rigid roof, rigid side walls, rigid end walls and a floor. The term includes bulk containers with an opening roof where the roof can be closed during transport;

Hermetically closed bulk container means a closed bulk container which is airtight;

Maximum gross mass means the mass of the bulk container including its service, structural and the operational equipment and the maximum permissible load;

Open top bulk container means a bulk container with rigid side and end walls and a non-rigid covering;

Operational equipment means items such as bulkheads, liners and sealing members provided to facilitate the functioning of the bulk container;

Service equipment means filling, and discharge devices, ventilating devices, safety devices, and measuring instruments;

Structural equipment means reinforcing, handling, fastening, protective and stabilising members attached to the bulk container;

Ventilated bulk container means a closed bulk container equipped with openings to allow for the exchange of vapours and gases with air and which prevent under normal conditions of transport the release of solid contents as well as the penetration of rain and splash water.

6.8.2.2 *Code for designating types of bulk container*

The following table indicates the codes to be used for designating types of bulk containers:

Types of bulk containers	Code
Open top bulk container including sheeted bulk containers	[BK]1
Closed bulk container including ventilated bulk containers	[BK]2
Hermetically closed bulk container	[BK]3

6.8.2.3 *Design and construction requirements*

- 6.8.2.3.1 Closed bulk containers including their fastenings to the conveyance shall, under the maximum gross mass, comply with the design and test requirements of ISO 1496-4, as relevant with respect to their intended handling and use.
- 6.8.2.3.2 Freight containers of the Type Code Designations 00-04, 10, 11, 13, 15, 17, 50-53 according to ISO 6346:1984 or G0-G3, V0, V2, V4, U0-U5 according to ISO 6346:1995, including open top containers, designed and tested in accordance with ISO 1496-1 and approved in accordance with the CSC Convention, which do not conform fully to ISO 1496-4, may be used as bulk containers provided that an equivalent level of safety is achieved as outlined in 6.8.2.3.4. and 6.8.2.3.5.
- 6.8.2.3.3 For its qualification as bulk containers, freight containers shall be equipped with an operational equipment which is, including its connection to the freight container, designed and constructed to strengthen the end walls and to improve the longitudinal restraint, as necessary to comply with the test requirements of ISO 1496-4, as relevant.
- 6.8.2.3.4 The operational equipment of freight containers designed to be emptied by tilting shall, including its connection to the freight container, be capable of withstanding the total filling mass in the tilted orientation.
- 6.8.2.3.5 Operational equipment designed to provide for the required leaktightness shall be capable of withstanding, without loss of contents, the static, dynamic and thermal loads during normal conditions of handling and transport. For ventilated bulk containers any liner shall not impair the ventilating devices.
- 6.8.2.3.6 Bulk containers of types [BK]2 and [BK]3 shall be so closed that the penetration of splash and rain water is prevented as to be demonstrated by the weatherproofness test in accordance with ISO 1496-1.

- 6.8.2.3.7 Hermetically closed bulk containers of type [BK]3 shall be constructed to prevent changes of air in excess of air per hour based on the total volume of the bulk container as to be demonstrated by the airtightness test in accordance with ISO 1496-4.
- 6.8.2.3.8 Any removable roof or roof section shall be fitted with locking devices with securing devices designed to show the locked state to an observer at ground level.
- 6.8.2.3.9 Freight containers of the Type Code Designations indicated in the table below, designed, constructed and tested in accordance with one of the referenced standards and codices may comply with the requirements of this chapter, provided that the additional requirements as set out in this chapter are met:

Table: Assignment of Type Code Designations acc. to ISO 6346:1984/1995 and bulk containers types

Standard/ Codex	Type Code Designation	Open top bulk container Type [BK]1	Closed bulk container Type [BK]2	Hermetically closed bulk container Type [BK]3
ISO 1496-1 ^(a)	00-04/G0-G3		x	
	10, 11, 13, 15, 17/ V0, V2, V4		x	
	50-53/U0-U5	x		
ISO 1496-4 ^(b)	80-89/B0		x	
	80-89/B2			x

^(a) “General cargo containers for general purposes“ according to ISO 1496-1:1987;

^(b) “Non-pressurised containers for dry bulk“ according to ISO 1496-4: 1991;

6.8.2.4 *Service equipment*

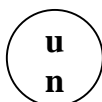
- 6.8.2.4.1 Filling and discharge devices shall be so constructed and arranged as to be protected against the risk of being wrenched off or damaged during transport and handling. The filling and discharge devices shall be capable of being secured against unintended opening. The open and closed position and direction of closure shall be clearly indicated.
- 6.8.2.4.2 Seals of openings shall be so arranged as to avoid any damage by the operation, filling and emptying of the bulk container.
- 6.8.2.4.3 Closed bulk containers shall be fitted with a manhole or other inspection openings of a suitable size to allow for internal inspection and adequate access for maintenance and repair.
- 6.8.2.4.4 Ventilated bulk containers (Type [BK]3) shall be equipped with means of air exchange, either by natural convection, e.g. by openings, or active elements, e.g. fans. The ventilating shall be designed to prevent negative pressures in the container at all times. Ventilating elements of bulk containers for the transport of flammable substances or substances emitting flammable gases or vapours shall be designed to prevent ignition.

6.8.2.5 Inspection and testing

- 6.8.2.5.1 Freight containers used and qualified as bulk containers in accordance with the requirements of this chapter shall be tested and approved in accordance with the CSC Convention.
- 6.8.2.5.2 The operational equipment shall be designed, manufactured and installed according to a quality assurance programme under the responsibility of the consignor in order to ensure that each manufactured item of equipment and its installation meets the requirements of this chapter.
- 6.8.2.5.3 The quality assurance programme including the documentation on the qualification of freight containers as bulk containers shall be available to the competent authority.
- 6.8.2.5.4 Freight containers used as bulk containers shall have been inspected initially and thereafter at intervals not exceeding 2 ½ years acc. to the CSC convention with regard to:
- (a) internal and external condition;
 - (b) proper functioning of service equipment;
- unless a continuous examination programme in accordance with 6.8.2.5.1.4 is followed.
- 6.8.2.5.5 For the purpose of periodic inspection, empty, uncleaned bulk containers may also be carried after the expiry of the date of periodic inspection.
- 6.8.2.5.6 As an alternative to the periodic inspections a Continuous Examination Programme in compliance with the CSC convention may be applied, which is aimed at detecting any defects which would endanger any person and which shall be performed in connection with major repair, refurbishment or on hire/off hire interchange and in no case less than once every 30 months.
- 6.8.2.5.7 When the structure of an bulk container is impaired as a result of impact, (e.g. accident) or any other cause, it shall be repaired and then subjected to the full testing and inspection as set out in the CSC convention.

6.8.3 Marking

- 6.8.3.1 Freight containers used as bulk containers shall be marked with a Safety Approval Plate in accordance with the CSC convention.
- 6.8.3.2 In addition, every freight container which is used as bulk container according to these Regulations shall be durably and legibly marked with the United Nations symbol



the name of the responsible person for the qualification of the bulk container and the relevant bulk container code according to 6.8.2.2. This marking shall be removed after the bulk container is no longer used as such.

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UN No. (1)	Name and description (2)	Class or division (3)	Subsidiary risk (4)	UN packing group (5)	RID/ADR	IMO	CFR	D
1334	NAPHTHALENE, CRUDE or NAPHTHALENE, REFINED	4.1		III	x	x	x	x
1350	SULPHUR	4.1		III	x	x	x	x
1376	IRON OXIDE, SPENT or IRON SPONGE, SPENT obtained from coal gas purification	4.2		III	x	x	x	x
1408	FERROSILICON with 30% or more but less than 90% silicon	4.3	6.1	III	x	x	x	x
1438	ALUMINIUM NITRATE	5.1		III	x	x	x	x
1454	CALCIUM NITRATE	5.1		III	x	x	x	x
1474	MAGNESIUM NITRATE	5.1		III	x	x	x	x
1486	POTASSIUM NITRATE	5.1		III	x	x	x	x
1495	SODIUM CHLORATE	5.1		II	x	x	x	x
1498	SODIUM NITRATE	5.1		III	x	x	x	x
1499	SODIUM NITRATE AND POTASSIUM NITRATE MIXTURE	5.1		III	x	x	x	x
1942	AMMONIUM NITRATE with not more than 0.2% combustible substances, including any organic substance calculated as carbon, to the exclusion of any other added substance	5.1		III	x	x	x	x
2067	AMMONIUM NITRATE FERTILIZERS: uniform non-segregating mixtures of ammonium nitrate with added matter which is inorganic and chemically inert towards ammonium nitrate, with not less than 90% ammonium nitrate and not more than 0.2% combustible material (including organic material calculated as carbon), or with more than 70% but less than 90% ammonium nitrate and not more than 0.4% total combustible material	5.1		III	x	x	x	x

UN No.	Name and description	Class or division	Subsidiary risk	UN packing group	RID/ADR	IMO	CFR	D
(1)	(2)	(3)	(4)	(5)				
2069	AMMONIUM NITRATE FERTILIZERS: uniform non-segregating mixtures of ammonium nitrate/ammonium sulphate, with more than 45% but not more than 70% ammonium nitrate and not more than 0.4% total combustible material	5.1		III	x	x	x	x
2213	PARAFORMALDEHYDE	4.1		III	x	x	x	x
2950	MAGNESIUM GRANULES, COATED, particle size not less than 149 microns	4.3		III	x	x	x	x
2969	CASTOR BEANS or CASTOR MEAL or CASTOR POMACE or CASTOR FLAKE	9		II	x	x	x	x
3175	SOLIDS CONTAINING FLAMMABLE LIQUID, N.O.S.	4.1		II	x	x	x	x
3243	SOLIDS CONTAINING TOXIC LIQUID, N.O.S.	6.1		II	x	x	x	x
3244	SOLIDS CONTAINING CORROSIVE LIQUID, N.O.S.	8		II	x	x	x	x