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**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

Thirty-sixth session  
Geneva, 30 November – 9 December 2009  
Item 5 of the provisional agenda

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

Possible use of flexible bulk container (FBCs) for the transport of dangerous goods

Transmitted by the International Dangerous Goods and Containers Association (IDGCA)<sup>1</sup>

**Introduction**

1. At the thirty-first and thirty-fifth sessions of the Sub-Committee, IDGCA informed the Sub-Committee of the successful exploitation of the MK-14-10 flexible bulk container (FBC) for many years (ST/SG/AC.10/C.3/2007/31 and ST/SG/AC.10/C.3/2009/27). IDGCA proposed to revise section 1.2.1 of the Model Regulations with the purpose of increasing the maximum allowed capacity of Intermediate Bulk Containers (IBCs) to more than 3 m<sup>3</sup> (3000 litres) for dry solids of packing group III.

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<sup>1</sup> In accordance with the programme of work of the Sub-Committee for 2009-2010 approved by the Committee at its fourth session (refer to ST/SG/AC.10/C.3/68, para. 118 (d) and ST/SG/AC.10/36, para. 14)

2. Most experts considered that such big bags should not be treated as IBCs and recommended to develop a comprehensive proposal, e.g. inclusion of a new type of bulk containers (FBC), that could be named BK3, with appropriate provisions in section 1.2.1 and chapters 3.2, 4.3 and 6.8 of the Model Regulations (see also ST/SG/AC.10/C.3/62, paras 66-68 and ST/SG/AC.10/C.3/70, paras 50-52).

3. The Model Regulations contain provisions for transporting some dangerous goods in bulk containers named BK1 and BK2. These containers are strong enough to withstand impacts and loads which usually arise during transport including multimodal transport. However containers of BK1 and BK2 types are plated and have a metallic frame, that is why they are subject to corrosion. An additional point is that the bulk cargo can shift because of relatively large floor space of such containers. The constructions of containers of BK1 and BK2 types do not ensure an electrostatic safety without paint-and-lacquer coating. The exploitation disadvantage of these containers is the fact that being specialized they have empty percentages on their return route.

4. The construction of FBCs made of textile with two-sided watertight rubber cover excludes the abovementioned disadvantages which have a negative effect on the safety and effectiveness of transport. Composition of the textile cover provides dependability and longevity of the construction giving it a resistance to abrasion, punctures, ozone, acids, alkalis, low and high temperatures, eliminating the possibility of charges for the construction of static electricity. The MK-14-10 FBCs have been operated accident free in the Russian Federation and neighbouring countries for twelve years. There are often used for multimodal transport of sulphur (class 4.1, UN 1350), coal-pitch (class 9, UN 3077), ammonium nitrate (class 5.1, UN 1945) and other cargoes (see informal document INF.3 submitted separately).

5. The capacity of the loaded FBC is 13 m<sup>3</sup>. The capacity of the empty collapsed folding FBC is 0.3 m<sup>3</sup>, i.e. the capacity of the empty FBC is 40 times less than the loaded one. It permits to deliver the empty FBCs for repeated loadings with minimum costs.

## **Proposal**

6. According to the recommendations received from the Sub-Committee, IDGCA proposes to bring into force a new type of bulk containers named BK3 which can be used among other things for the transport of dangerous goods, with appropriate provisions in section 1.2.1 and chapters 3.2, 4.3 and 6.8 of the Model Regulations. The following amendments are proposed. The changes are highlighted by underlined text in bold italics.

7. In Chapter 1.2, section 1.2.1 “Definitions, amend the definition of “bulk container” to read as follows:

“Bulk container means a containment system (including any liner or coating) intended for the transport of solid substances which is in direct contact with the containment system. Packagings, intermediate bulk containers (IBCs), large packagings and portable tanks are not included.

A bulk container is:

- Of a permanent character and accordingly strong enough to be suitable for repeated use;
- Specially designed to facilitate the transport of goods by one or more means of transport without intermediate reloading;
- Fitted with devices permitting its ready handling;
- Of a capacity of not less than 1.0 m<sup>3</sup>.

Examples for bulk containers are freight containers, offshore bulk containers, skips, bulk bins, swap bodies, trough-shaped containers, roller containers, load compartments of vehicles, ***flexible bulk containers (FBC) of a capacity more than 10 m<sup>3</sup>.***

8. Add a code “BK3” for the following UN numbers in column 10 of the dangerous goods list of Chapter 3.2.

UN No.	Name and description	Class or division	UN packing group
1334	NAPHTALENE, CRUDE OR NAPHTALENE, REFINED	4.1	III
1350	SULPHUR	4.1	III
1376	IRON OXIDE, SPENT or IRON SPONGE, SPENT obtained from coal gas purification	4.2	III
1408	FERROSILICON with 30% or more but less than 90% silicon	4.3	III
1438	ALUMINIUM NITRATE	5.1	III
1454	CALCIUM NITRATE	5.1	III
1474	MAGNESIUM NITRATE	5.1	III
1486	POTASSIUM NITRATE	5.1	III
1495	SODIUM CHLORATE	5.1	II
1498	SODIUM NITRATE	5.1	III
1499	SODIUM NITRATE AND POTASSIUM NITRATE MIXTURE	5.1	III

1942	AMMONIUM NITRATE, with not more than 0.2% total combustible material, including any organic substance, calculated as carbon to the exclusion of any other added substances	5.1	III
2067	AMMONIUM NITRATE BASED FERTILIZER	5.1	III
2213	PARAFORMALDEHYDE	4.1	III
2950	MAGNESIUM GRANULES, COATED, particle size not less than 149 microns	4.3	III
2969	CASTOR BEANS or CASTOR MEAL or CASTOR POMANCE or CASTOR FLAKE	9	II
3077	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.	9	III
3170	ALUMINIUM SMELTING BY-PRODUCTS or ALUMINIUM REMELTING BY-PRODUCTS	4.3	II
3170	ALUMINIUM SMELTING BY-PRODUCTS or ALUMINIUM REMELTING BY-PRODUCTS	4.3	III
3175	SOLIDS CONTAINING FLAMMABLE LIQUID, N.O.S.	4.1	II
3377	SODIUM PERBORATE MONOHYDRATE	5.1	III
3378	SODIUM CARBONATE PEROXYHYDRATE	5.1	II
3378	SODIUM CARBONATE PEROXYHYDRATE	5.1	III

9. In Chapter 4.3 (Use of bulk containers), amend 4.3.1.1 and 4.3.1.15 to read as follows:

“4.3.1.1 This section provides general requirements applicable to the use of containers for the transport of solid substances in bulk. Substances shall be transported in bulk containers conforming to the applicable bulk container instruction identified by the letters BK in Column 10 of the Dangerous Goods List, with the following meaning:

BK1: the transport in sheeted bulk containers is permitted

BK2: the transport in closed bulk containers is permitted

**BK3: the transport in flexible bulk containers (FBCs) is permitted**

The bulk container used shall conform to the requirements of Chapter 6.8.”.

“4.3.1.15 Before a bulk container is filled it shall be visually examined to ensure it is structurally serviceable, its interior walls, ceiling and floors are free from protrusions or damage and that any inner liners or substance retaining equipment are free from rips, tears or any damage that would compromise its cargo retention capabilities. Structurally serviceable means the bulk container does not have major defects in its structural components, such as top and bottom side rails, top and bottom end rails, door sill and header, floor cross members, corner posts, and corner fittings in a freight container **and for flexible bulk containers (FBCs) – textile slings, load-bearing structure straps, a shell fabric, lock device parts including metal and textile parts**. Major defects include:

- (a) Bends, cracks or breaks in the structural or supporting members that affect the integrity of the container;
- (b) More than one splice or an improper splice (such as a lapped splice) in top or bottom end rails or door headers;
- (c) More than two splices in any one top or bottom side rail;
- (d) Any splice in a door sill or corner posts;
- (e) Door hinged and hardware that are seized, twisted, broken, missing, or otherwise inoperative;
- (f) Gaskets and seals that do not seal;
- (g) Any distortion of the overall configuration great enough to prevent proper alignment of handling equipment, mounting and securing chassis or vehicle, or insertion into ships’ cells;
- (h) Any damage to lifting attachments or handling equipment interface features; or
- (i) Any damage to service or operational equipment; or
- (j) **Ruptures of a textile strap of the sling and/or the load-bearing structure of the flexible container, seal failure of its shell, failure of operating irregularity of the lock devices.**”.

10. Amend 4.3.2.1 and 4.3.2.2 to read as follows:

**“4.3.2.1 Bulk goods of Division 4.2**

Only closed bulk containers (code BK2) **and flexible bulk containers (Code BK3)** may be used. The total mass carried in a bulk container shall be such that its spontaneous ignition temperature is greater than 55<sup>0</sup>C.

**4.3.2.2 Bulk goods of Division 4.3**

Only closed bulk containers (code BK2) and flexible bulk containers (code BK3) may be used. These goods shall be transported in bulk containers which are watertight.”.

11. In section 6.8.1, add the following definition:

“Flexible bulk container (FBC) means a hermetically sealed container for bulk cargoes with a capacity of 10 m<sup>3</sup> or more with not-rigid body, a loading sleeve being locked by folding and a discharging sleeve with two contours preventing inadvertent discharging. Flexible bulk container is provided in its top part with lifting strops (slings) being integral part of container strengthening carcass.”.

12. Amend 6.8.2.3 to read as follows:

**6.8.2.3 Code for designation of bulk container**

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

<b>Types of bulk containers</b>	<b>Code</b>
Sheeted bulk container	BK1
Closed bulk container	BK2
<u>Flexible bulk container</u>	<u>BK3</u>

”.

13. At the end of the title of section 6.8.4, add “and flexible bulk containers (FBCs)”.

14. Add a new section 6.8.5 to read as follows:

**6.8.5 Requirements for the design, construction, inspection and testing of flexible bulk containers****6.8.5.1 Design and construction requirements**

**6.8.5.1.1 Flexible bulk containers shall be sift-proof and shall prevent water from reaching the dangerous goods within the packaging.**

**6.8.5.1.2 Flexible bulk containers shall be provided with sufficient ventilation to preclude dangerous accumulation of flammable, corrosive or toxic gaseous emissions.**

**6.8.5.1.3 Flexible bulk containers shall be capable of being completely closed to prevent under normal conditions of transport, the release of contents as well as the penetration of rain and splash water.**

**6.8.5.2 Service equipment**

6.8.5.2.1 Filling and discharge devices shall be so constructed as to be protected against damage during transport and handling. The filling and discharge devices shall be capable of being secured against unintended opening.

6.8.5.3 Inspection and testing

6.8.5.3.1 Flexible bulk containers shall be manufactured and tested as provided in this chapter in accordance with procedures established by the competent authority

6.8.5.3.2 Each flexible bulk container design type shall successfully pass the tests prescribed in this Chapter before being used.

6.8.5.3.3 Tests shall be repeated on production samples at intervals established by the competent authority.

6.8.5.3.4 Tests shall also be repeated after each modification which alters the design, material or manner of construction of a flexible bulk container.

6.8.5.3.5 Tests shall be carried out on flexible bulk container prepared as for transport. Flexible bulk containers shall be filled to the maximum mass at which they may be used and the contents shall be evenly distributed. The substances to be transported in the flexible bulk container may be replaced by other substances except where this would invalidate the results of the tests. When another substance is used it shall have the same physical characteristics (mass, grain size, etc.) as the substance to be carried. It is permissible to use additives, such as bags of lead shot, to achieve the requisite total package mass, so long as they are placed so that the test results are not affected.

6.8.5.3.6 Drop test

6.8.5.3.6.1 The flexible bulk containers shall be dropped onto a rigid, non-resilient, smooth, flat and horizontal surface. Following the drop, the flexible bulk containers shall be restored to the upright position for observation.

6.8.5.3.6.2 For flexible bulk containers, drop heights are specified as follows:

Packing Group II: 1.2 m

Packing Group III: 0.8 m

6.8.5.3.7 Top lift test

6.8.5.3.7.1 Flexible bulk containers shall be filled to six times the maximum net mass, the load being evenly distributed.

6.8.5.3.7.2 A flexible bulk container shall be lifted in the manner for which it is designed until clear of the floor and maintained in that position for a period of five minutes.

6.8.5.3.7.3 Other equally effective methods of top lift testing and preparation may be used with approval of the Competent Authority.

6.8.5.3.7.4 There may be no permanent damage which renders the flexible bulk container unsafe for transport, and no loss of contents.

6.8.5.3.8 Topple test

6.8.5.3.8.1 A flexible bulk container shall be toppled onto any part of its top upon a rigid, non-resilient, smooth, flat, and horizontal surface.

6.8.5.3.8.2 For all flexible bulk containers, the topple height is specified as follows:

Packing Group II: 1.2 m

Packing Group III: 0.8 m

6.8.5.3.8.3 There may be no loss of contents. A slight discharge (e.g., from closures or stitch holes) upon impact is not considered to be a failure, provided no further leakage occurs.

6.8.5.3.9 Righting test

6.8.5.3.9.1 The righting test shall be conducted for the qualification of flexible bulk containers designed to be lifted from the top or side.

6.8.5.3.9.2 The flexible bulk container, lying on its side, shall be lifted at a speed of at least 0.1 m/s to an upright position, clear of the floor, by four lifting devices when eighteen are provided.

6.8.5.3.9.3 There may be no damage to the flexible bulk container or its lifting devices which renders the flexible bulk container unsafe for transport or handling.

6.8.5.3.10 Tear test

6.8.5.3.10.1 With the flexible bulk container placed on the ground, a 100-mm knife score, completely penetrating the wall of a wide face, is made at a 45° angle to the principal axis of the flexible bulk containers, halfway between the bottom surface and the top level of the contents. The flexible bulk containers shall then be subjected to a uniformly distributed superimposed load equivalent to twice the maximum net mass of the package. The load must be applied for at least five minutes. An flexible bulk container which is designed to be lifted from the top or the side shall, after removal of the superimposed load, be lifted clear of the floor and maintained in that position for a period of five minutes.

6.8.5.3.10.2 The flexible bulk container passes the tear test if the cut does not propagate more than 25 percent of its original length.

6.8.5.3.11 Vibration test



6.8.5.3.11.1 The flexible bulk container shall be placed on a vibrating platform that has a vertical double-amplitude (peak-to-peak displacement) of one inch. The flexible bulk container shall be constrained horizontally to prevent it from falling off the platform, but shall be left free to move vertically and bounce.

6.8.5.3.11.2 The test shall be performed for one hour at a frequency that causes the package to be raised from the vibrating platform to such a degree that a piece of material of approximately 1.6-mm thickness (such as steel strapping or paperboard) can be passed between the bottom of the package and the platform.

6.8.5.3.11.3 A flexible bulk container passes the vibration test if there is no rupture or leakage.

#### 6.8.5.4 Marking

6.8.5.4.1 Each flexible bulk container manufactured and intended for use according to these Regulations shall bear markings which are durable, legible and placed in a location so as to be readily visible. Letters, numerals and symbols shall be at least 12 mm high and shall show:

(a) The United Nations packaging symbol



This symbol shall not be used for any purpose other than certifying that a packaging, a portable tank or a MEGC complies with the relevant requirements in Chapter 6.1, 6.2, 6.3, 6.5, 6.6, 6.7 or 6.8 ;

(b) The code BK3;

(c) A capital letter designating the packing group(s) for which the design type has been approved:

(i) Y for packing groups II and III;

(ii) Z for packing group III only;

(d) The month and year (last two digits) of manufacture;

(e) The State authorizing the allocation of the mark; indicated by the distinguishing sign for motor vehicles in international traffic;

(f) The name or symbol of the manufacturer and other identification of the FBC as specified by the competent authority;

(g) The maximum permissible gross mass in kg

**Marking shall be applied in the sequence shown in (a) to (g); each element of the marking required in these subparagraphs, shall be clearly separated, e.g. by a slash or space and presented in a way that ensures that all of the parts of the mark may be easily identified.**

**6.8.5.4.2 Examples of markings**



**BK3/Z/09 09**  
**RUS/MK-14-10**  
**42000/14000**

**For flexible bulk containers for**  
**solid bulk cargo and authorized for**  
**packing group III solids.**

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