

**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

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**Global harmonization of transport of dangerous goods regulations
with the Model Regulations**

Stowage of water-reactive materials

Amendments to the IMDG Code

Transmitted by the expert from Germany

SUB-COMMITTEE ON DANGEROUS
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STOWAGE OF WATER-REACTIVE MATERIALS

Amendments to the IMDG Code

Submitted by Germany

SUMMARY

Executive summary: This document contains proposals for amending the IMDG Code which result from the FSA "The Safe Transport of Dangerous Goods which react dangerously with Water and/or Carbon Dioxide" commissioned by Germany. The proposals concern packing, stowage and segregation requirements.

Strategic direction: 5.2

High-level action: 5.2.3

Planned output: 5.2.3.6

Action to be taken: Paragraph 12

Related documents: DSC 16/6, DSC 16/INF.2; FP 54/15, FP 54/INF.2; FP 55/11; DSC 17/INF.6, DSC 17/11/1 and DSC 17/11/2

Background

1 Germany has commissioned a Formal Safety Assessment (FSA) on "The Safe Sea Transport of Dangerous Goods which react dangerously with Water and/or Carbon Dioxide". This FSA was presented to the Sub-Committee by means of documents DSC 16/6 and DSC16/INF.2. The study deals with substances to which fire schedule golf F-G (water-reactive substances) is assigned in the Dangerous Goods List. Based on the evaluation of the identified risk-reducing measures according to effectiveness and required effort, the FSA yields a number of recommendations. These concern the following aspects:

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|------------------|--|
| Recommendation 1 | Modification to the IMDG Code regarding improved packaging and stowage |
| Recommendation 2 | Adjustment to fire protection equipment |
| Recommendation 3 | Modification of the EmS and/or EmS F-G |

Recommendation 4 Supplement to the training for fire fighting as part of the IMO Model Courses.

2 Each of the recommendations comprises several possible measures; these possible measures have been examined in detail and specific proposals have been developed. In this document, proposals which are based on recommendation 1 are put forward for discussion.

3 All proposals apply to those United Nations numbers to which Fire Schedule F-G is assigned.

Improved packaging with regard to the possible impacts of moisture

4 Moisture in a container may contribute to causing a fire in connection with dangerous goods (deductive risk). Depending on the packaging properties, condensation water may soak the packaging so that the dangerous goods come into contact with water and triggers a dangerous reaction. In particular dangerous goods of class 5.1 (e.g. potassium persulfate) may react with sodden organic packaging material (paper, cardboard) and ignite. Moreover, air humidity may also be relevant: some goods in liquid form are transported in tanks or drums with pressure-relief devices. Small amounts of dangerous flammable gases may escape through these devices. If the humidity in the container is high and the concentration of dangerous gases in the air reaches a critical level, a reaction may occur and the mixture of gas and air may ignite spontaneously. Another possible risk is the formation of corrosive substances which corrode the structure of the container and the ship.

5 This is the reason why containers should only be packed in dry conditions. What is more, it has to be ensured that the container including other cargo contained therein and loading devices are dry. A requirement to that effect should be introduced into chapter 7.3 and a pertinent special provision should be assigned to the relevant substances, refer to proposal 1.

6 Water may, however, also enter into the container during transport, e.g. through the ventilation system, particularly in heavy seas, as well as in the case of leaks and collisions. If the moisture soaks the packaging, the contained goods may come into contact with moisture or water. Thus, the goods concerned should only be transported in moisture-resistant packagings. Wooden or fibreboard packagings and bags as well as flexible IBCs should be water-resistant or should be fitted with a water-resistant liner. Therefore B4 should be assigned whenever IBC 07 or IBC 08 allows the use of flexible and/or wooden and fibreboard IBCs.

7 For packagings, the situation is as follows: PP 31, requiring hermetically sealed packagings, is already assigned to some of the concerned entries and ensures an appropriate level of safety. Thus, PP 31 (and PP 40, as appropriate) could be used at least for substances having similar properties as those substances already having a "PP 31" in column 9 of the Dangerous Goods List. Additionally, a special packaging provision similar to the special IBC provision B4 should be inserted and assigned to the rest of the entries. Another option is not to extend the assignment of PP 31 but to use only the new special packaging provision. For large packagings also a new special large packaging provision similar to B4 should be inserted in LP 02. For entries to which PP 31 is assigned, a new special large packaging provision requiring hermetically sealed inner packaging should be introduced.

8 These special packaging provisions would be new provisions; therefore DSC should bring this issue to the attention of the United Nations Sub-Committee TDG. Refer to proposal 2

Enhanced stowage of goods of class 5.1

9 Inorganic peroxides are strong oxidizers and, when involved in a fire, cannot be extinguished with water. They are assigned to hazard class 5.1 and to fire schedule golf (F-G). Due to their oxidizing properties, carbon dioxide is ineffective as an extinguishing agent. Therefore, involvement of such goods in a fire under deck might result in a situation which the crew cannot control. When such goods are involved in a fire on deck, there is a better possibility for preventing the spread of fire to other cargo by copious quantities of water and letting the cargo which cannot be extinguished burn, until the fire stops by itself. Therefore, inorganic peroxides should be stowed "on deck only". Refer to proposal 3.

Enhanced stowage and segregation to prevent spread of fire

10 All goods to which the fire schedule golf (F-G) is assigned cannot be extinguished with water when they are on fire. The only possibility to control the consequences of fire originating from these goods is to let the fire burn and to prevent the spread of fire to other cargo or to equipment which is crucial for the safe operation of the ship. Therefore, these goods should be stowed sufficiently away from living quarters and from life boats. A distance of at least 12 meters is considered appropriate.

11 Furthermore, to enhance the efforts to prevent the spread of fire, these goods should be stowed at an appropriate distance from flammable liquids and flammable gases. Whenever a fire breaks out in flammable liquids or gases and is likely to spread to goods which cannot be extinguished, or also when a fire breaks out in the goods which cannot be extinguished and threatens to spread to highly flammable goods, a sufficient distance will enhance the efforts to control the fire. Presently, the IMDG Code requires segregation "2 – separated" between goods of schedule F-G and flammable liquids/flammable gases. This results in a distance of only one container space (2.5 m) in athwartship direction, which is considered rather low. The efforts to fire from spreading would be enhanced if this distance were increased to at least 5 metres. This could be achieved by changing requirements for segregation between these goods to "3 – separated by a complete compartment or hold" in case of stowage on deck. Refer to proposal 4

Action requested of the Sub-Committee

12 The Sub-Committee is invited to consider the following proposals.

Proposal 1: New provisions on packing a container

Add a new special provision 9xx in chapter 3.3.as follows:

"9xx Substances and articles shall be packed in the container under dry conditions only. The container including other contained goods, load securing or packing materials shall be dry."

Insert a new 7.2.2.19 as follows:

"7.2.2.19 If goods which may react dangerously with water, goods which may emit gases which react dangerously with water or may build up corrosive gases are packed, the container shall be packed under dry conditions only. The container

including other contained goods, load securing or packing materials shall be dry.
(See SP 9xx)."

The new SP 9xx should be assigned to all entries with "F-G" in column 15.

Proposal 2: Amendments to the packaging provisions:

IBCs

Replace special IBC provision "B3" with "B4" in column 11 of the Dangerous Goods List for the following PG III entries:

UN 1309, 1376, 1483, 1869, 1932, 2008, 2545, 2546, 2793, 2878, 2881 and 3189.

Add special IBC provision "B4" in Column 11 of the Dangerous Goods List for the following PG II entries:

UN 1390, 1393, 1394, 1396, 1400, 1401, 1402, 1405, 1417, 2624, 2813, 2830, 3078, 3170, and 3208.

Packagings:

Option 1:

Add PP31 to the following UN Nos.:

1396 (PG II), 1402 (PG II), 1409 (PG II), 1418 (PG II and III), 1436 (all PGs), 3131 (PG II and III), 3132 (PG II and III), 3134 (PG II and III), 3135 (PG II and III), 3395 (PG II and III), 3396 (PG II and III) and 3397 (PG II and III).

Special packing provision PP31 should be amended accordingly.

Add PP31 and PP40 to the following UN Nos.:

1395, 1396 (PG III), 1398 and 1403.

Special packing provisions PP31 and PP40 should be amended accordingly.

Add a new special packing provision PPxx to UN Nos. 1309, 1323, 1333, 1376, 1408, 1435, 1449, 1457, 1472, 1476, 1483, 1509, 1516, 1567, 1869, 2210, 2793, 2858, 2878, 2950, 2968, 3089, 3096, 3125 to read as follows:

"For UN Nos. 1309, 1323, 1333, 1376, 1408, 1435, 1449, 1457, 1472, 1476, 1483, 1509, 1516, 1567, 1869, 2210, 2793, 2858, 2878, 2950, 2968, 3089, 3096 and 3125, flexible, fibreboard or wooden packagings shall be sift-proof and water-resistant or shall be fitted with a sift-proof and water-resistant liner."

Option 2:

Add a new special packing provision PPxx to UN Nos. 1309, 1323, 1333, 1376, 1395, 1396, 1398, 1402 (PG II), 1403, 1408, 1409 (PG II), 1418 (PG II and III), 1435, 1436, 1449, 1457, 1472, 1476, 1483, 1509, 1516, 1567, 1869, 2210, 2793, 2858, 2878, 2950, 2968, 3089, 3096, 3125, 3131 (PG II and III), 3132 (PG II and III), 3134 (PG II and III), 3135 (PG II and III), 3395 (PG II and III), 3396 (PG II and III) and 3397 (PG II and III) to read as follows:

"For UN Nos. 1309, 1323, 1333, 1376, 1395, 1396, 1398, 1402, 1403, 1408, 1409, 1418, 1435, 1436, 1449, 1457, 1472, 1476, 1483, 1509, 1516, 1567, 1869, 2210, 2793, 2858, 2878, 2950, 2968, 3089, 3096, 3125, 3131, 3132, 3134, 3135, 3395, 3396 and 3397 flexible, fibreboard or wooden packagings shall be sift-proof and water-resistant or shall be fitted with a sift-proof and water-resistant liner."

Large Packagings:

Add a new special large-packing provision LPxx to PG III entries of UN Nos. 1309, 1376, 1483, 1869, 2793, and 2878, to read as follows:

"For UN Nos. 1309, 1376, 1483, 1869, 2793, 2858 and 2878, flexible or fibre inner packagings shall be sift-proof and water-resistant or shall be fitted with a sift-proof and water-resistant liner."

Add a new special large-packing provision LPxy to PG III entries of UN Nos. 1932, 2008, 2009, 2545, 2546, 2881 and 3189, to read as follows:

"For UN Nos. 1932, 2008, 2009, 2545, 2546, 2881 and 3189 flexible or fibre inner packagings shall be hermetically sealed."

The amendments to the dangerous goods resulting from the proposals above are indicated in a table in document DSC 17/INF.6.

If the Sub-Committee agrees with the proposed amendments to the packaging provisions, they should be brought to the attention of the UN Sub-Committee TDG for further consideration.

Proposal 3: Amendments to the stowage categories:

For UN 2466 amend stowage category "E" to "D".

For UN 1491 and 1504 amend stowage category "B" to "C".

For UN 1449, 1457, 1472, 1476, 1483, 1509 and 1516 amend stowage category "A" to "C".

Proposal 4: Amendments to the stowage and segregation provisions

For UN 1183, 1242, 1295, 1309, 1323, 1333, 1339, 1340, 1343, 1358, 1360, 1376, 1380, 1383, 1389, 1390, 1391, 1392, 1393, 1394, 1395, 1396, 1397, 1398, 1400, 1401, 1402, 1403, 1404, 1405, 1407, 1408, 1409, 1410, 1411, 1413, 1414, 1415, 1417, 1418, 1419, 1420, 1421, 1422, 1423, 1426, 1427, 1428, 1432, 1433, 1435, 1436, 1449, 1457, 1472, 1476, 1483, 1491, 1504, 1509, 1516, 1567, 1714, 1854, 1855, 1869, 1870, 1928, 1932, 2004, 2008, 2009, 2010, 2011, 2012, 2013, 2210, 2257, 2441, 2463, 2466, 2545, 2546, 2547, 2624, 2793, 2805, 2813, 2830, 2835, 2844, 2845, 2846, 2858, 2870, 2878, 2881, 2950, 2965, 2968, 2988, 3078, 3089, 3094, 3096, 3121, 3123, 3125, 3129, 3130, 3131, 3132, 3233, 3134, 3135, 3137, 3148, 3170, 3189, 3194, 3200, 3208, 3209, 3292, 3385, 3386, 3391, 3392, 3393, 3394, 3395, 3396, 3397, 3398, 3399, 3401, 3402, 3403, 3404, 3476, 3482, 3490 and 3491 the following additional stowage and segregation provisions should be included in column 16 of the dangerous goods list:

"When stowed on deck:

- .1 distance of at least 12 metres from living quarters and lifeboats required
 - .2 separated by a complete compartment or hold from goods of classes 2.1 and 3 and from goods with subsidiary risks of 2.1 and 3."
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