

**Economic and Social Council**Distr.: General
30 December 2013

Original: English

Economic Commission for Europe**Inland Transport Committee****Working Party on the Transport of Dangerous Goods****Joint Meeting of the RID Committee of Experts and the
Working Party on the Transport of Dangerous Goods**

Bern, 17-21 March 2014

Item 5 (a) of the provisional agenda

**Proposals for amendments to RID/ADR/ADN:
pending issues****UN 3170 Aluminium smelting by-products or aluminium
remelting by-products****Transmitted by the Governments of Spain and Norway^{1, 2}***Summary*

Executive summary:	The aim of this proposal is to clarify the conditions of transport for UN 3170 ALUMINIUM SMELTING BY-PRODUCTS or ALUMINIUM REMELTING BY-PRODUCTS
Related documents:	ECE/TRANS/WP.15/AC.1/2012/28 (United Kingdom) Informal documents INF.4 and INF.5 presented at the September 2012 session (United Kingdom) ECE/TRANS/WP.15/AC.1/2012/128, para. 34-40 Informal document INF.22 presented at the March 2013 session (Norway) ECE/TRANS/WP.15/AC.1/2012/130, para. 34-35 Report ST/SG/AC.10/C.3/88, para. 16-19, and informal document INF.45 (Norway and Spain) from the forty-fourth session of the Sub-Committee of Experts on the Transport of Dangerous Goods.

¹ In accordance with the programme of work of the Inland Transport Committee for 2012–2016 (ECE/TRANS/224, para. 94, ECE/TRANS/2012/12, programme activity 02.7 (A1c)).

² Circulated by the Intergovernmental Organisation for International Carriage by Rail (OTIF) under the symbol OTIF/RID/RC/2014/21.

Introduction

1. In the September 2012 session, the United Kingdom, on behalf of the informal working group on carriage in bulk, proposed general modifications for the conditions of transport for carriage in bulk (see ECE/TRANS/WP.15/AC.1/2012/28, and informal documents INF.4 and INF.5. For goods of Class 4.3, it was proposed to include the following additional provisions:

“AP3 [[For UN 1405 and UN 2844] sheeted vehicles and sheeted containers shall be used only when the substance is in pieces (not in powder, granular, dust or ashes form).]

(**Comment from the working group** - We are not certain it is necessary to introduce this as a general requirement for all substances in Class 4.3.)

AP4 Closed vehicles and closed containers shall be equipped with hermetically closed openings used for loading and unloading to prevent the exit of gas and exclude the ingress of moisture.

AP5 The cargo doors of the closed vehicles or closed containers shall be marked with the following in letters not less than 25 mm high:

EN	FR
<p style="text-align: center;">“WARNING <u>CLOSED MEANS OF CONTAINMENT</u> NO VENTILATION OPEN WITH CAUTION”</p>	<p style="text-align: center;">"ATTENTION <u>MOYEN DE RETENTION FERMÉ</u> <u>NON VENTILÉ</u> OUVRIR AVEC PRECAUTION"</p>

This shall be in a language considered appropriate by the consignor.”

2. The general draft for carriage in bulk was accepted by the Joint Meeting, but for Class 4.3 the following comment was included into the report (ECE/TRANS/WP.15/AC.1/2012/128, para. 40):

“The Joint Meeting adopted the proposal in informal documents INF.5, INF.5/Add.1 and INF.15 to assign codes VV/VW and AP, except for class 4.3 substances. For the 16 UN numbers of class 4.3 (UN Nos. 1394, 1396, 1398, 1402, 1405, 1408, 1418, 1435, 1436, 2803, 2844, 2950, 2968, 3170, 3208 and 3209), several delegations noted that the current requirements called for containers or vehicles specially equipped with hermetic closures (provision VV5/VW5), except for UN Nos. 1408 and 3170, where sheeted containers or vehicles were authorized, and UN Nos. 1405 and 2844, where they were authorized if the substance was transported in pieces. It was suggested that the industry should be consulted to find out how those various substances were transported. The representative of CEFIC pointed out that his organization had no members involved in the transport of such substances, and that it would be appropriate to consult the industry at the national level, or relevant international organizations (e.g. metal industry).”

3. In the Spring 2013 session, for carriage of UN No. 3170, ALUMINIUM SMELTING BY-PRODUCTS, Norway provided a brief presentation of the current transport practice in Norway and requested the Joint Meeting not to introduce AP3 for these by-products (see informal document INF.22).

“34. Several delegations considered that those products’ contact with water could produce flammable or toxic gases such as hydrogen, ammonia and phosphine, and, therefore, they were not in favour of the idea of authorizing carriage in bulk of those by-products in sheeted vehicles, wagons or containers, particularly by-products in

smaller particle-size powder or granular form, even if some forms in pieces were probably less reactive.

35. A contradiction was found in the United Nations Model Regulations, i.e. the dangerous goods list authorized BK1 and BK2 bulk containers for UN No. 3170, while subsection 4.3.2.2 authorized only BK2 closed bulk containers and BK3 bulk containers, provided that they were waterproof, for Division 4.3 substances. That contradiction should be brought to the attention of the United Nations Sub-Committee of Experts, and the representative of Norway could then return to the issue.”.

4. Norway raised the topic at the forty-fourth session of the Sub-Committee of Experts on the Transport of Dangerous Goods in informal document INF.11, followed by an alternative proposal from Spain in informal document INF.26, and a final joint proposal by Norway and Spain in informal document INF.45.

5. The Subcommittee in the report retained the following points on this subject:

“16. The Sub-Committee noted that the assignment of code BK1 (bulk transport in sheeted bulk containers permitted) to UN No. 3170 is inconsistent with subsection 4.3.2.2, which does not permit bulk transport of Class 4.3 goods in sheeted containers.

17. Several experts pointed out that only code BK2 is assigned in the IMDG Code and considered that it would not be appropriate to authorize maritime transport of dangerous goods in BK1 containers that react with water, notably owing to the risk of pockets of hydrogen forming in ships’ holds.

18. Some experts pointed out, however, that for inland transport, such goods had been transported in sheeted bulk containers for many years without mishap and in light of that experience requested an exception to be made, at least for inland transport.”.

Aluminium smelting and remelting by-products

6. Under aluminium smelting and remelting by-products, several products with a different composition and obtained by different processes are handled. According to special provision 244, this entry includes aluminium dross, aluminium skimmings, spent cathodes, spent potliner (SPL) and aluminium salt slags.

7. All products have in common:

- A heterogenous composition, both in terms of chemical properties and particle size. The particle size may range from big pieces to powder for aluminium smelting by-products, and from sheets to powder for aluminium remelting by-products. In all of the cases, presence of powder is unavoidable due to the production process of the loads.

- All of them contain water to a certain degree. SPL that has not been cooled with water will have the least, but the adherence of humidity to the surface cannot be avoided. The presence of water can lead to the formation of hydrogen, which is a flammable gas, and under certain conditions also explosive. Also methane and ammonia can be emitted.

8. The composition of the different products carried under UN 3170 is quite variable, even the material taken out from one spot is chemically very heterogeneous. Similarly, the gases emitted will also vary a lot; but hydrogen will always be the predominant gas emitted (99%).

9. The gas emission limits are below 10 l/min and 20 l/hour for packing group II or III respectively (Manual of Tests and Criteria, 33.4.1.4.4).

Present transport conditions for aluminium smelting and remelting by-products

10. In ADR 2013, under UN 3170 in table A there are included two packing groups (PG) with the following bulk transport conditions:

- UN 3170 PG II: T3, BK1, BK2 (portable tank and bulk container provision, column 10)-VV3 (special provision for carriage in bulk, column 17)
- UN 3170 PG III: T1, BK1, BK2 (portable tank and bulk container provision, column 10)-VV1/VV5 (special provision for carriage in bulk, column 17)

Where:

BK1 are sheeted bulk container.

BK2 closed bulk container.

VV3 Carriage in bulk is permitted in sheeted vehicle and sheeted large container with adequate ventilation.

VV1 Carriage in bulk in closed or sheeted vehicle, in closed container or in large sheeted container.

VV5 Carriage in bulk is permitted in specially equipped vehicle and container. The opening used for loading and unloading shall be capable of being closed hermetically.

11. Besides, in 7.3.2.4 it is said that, for class 4.3 goods, “these goods shall be carried in bulk containers (code BK2) which are waterproof.”

12. It seems that the industry generally applies the VV provisions for land transport of UN 3170, and this way the contradiction relating to BK1 has not been regarded as an obstacle. Also, generally the provisions for PG II are used for all by-products, as ventilation is understood to be important; since 1990, when the explosion on a ship in Canada during loading of SPL caused fatalities among the handling crew, the industry practice is to transport SPL in rain-protected vented vehicles or containers.

Transport conditions for aluminium smelting and remelting by-products in ADR/RID 2015

13. For ADR 2015, the VV conditions are reorganized according to 7.3.3.1. For UN 3170, VC1 and VC2 are assigned for both packaging groups II and III:

“VC1: Carriage in bulk in sheeted vehicles, sheeted containers or sheeted bulk containers is permitted

VC2: Carriage in bulk in closed vehicles, closed containers and closed bulk containers is permitted.”

14. Also, generally for class 4.3, it has been approved to assign the additional provisions AP3, AP4 and AP5 (see paragraph 1).

Assigning AP3, AP4 and AP5 to the transport of UN 3170 would mean that:

- AP3: the conditions considered in AP3 can never be fulfilled, as there is always a certain degree of powder or dust. This would mean that UN 3170 could never be transported in sheeted vehicles or containers.

- AP4 (and AP5): closing hermetically the openings of the container or vehicle would effectively prevent the exit of gas and the entry of moisture, but would not prevent

the formation of hydrogen within the container/vehicle, as a certain amount of water is already present. This would create a potentially flammable or explosive atmosphere in the container/vehicle, and would not be acceptable as such for the safe transport of UN 3170. Not permitting adequate ventilation could, in some cases, lead to pressure build-up inside the container or vehicle, and even to the deformation of these (see Figure 1).



Figure 1: Closed container damaged due to pressure build-up with dross residue.

15. The consequences of assigning AP3, AP4 and AP5 to UN 3170 can be summarized as follows:

- Less safe transport compared with current practice
- Significant costs increase and reduced transport efficiency
- Closed vehicles and containers fulfilling AP4 may not be available due to the practical problems with maintenance
- Increase in energy use and CO2 emissions

16. Safe transport of aluminium smelting or remelting by-products could be done:

- In sheeted containers/vehicles, which provide enough ventilation and prevent the entrance of water
- In closed containers/vehicles, provided there is enough ventilation

17. This way of transporting aluminium smelting and remelting by-products by the overland modes has proven safe.

18. To allow the industry to carry on with the current safe practice the following amendments are proposed:

- Deletion of AP3, AP4 and AP5 for both packing groups of UN 3170 (Proposal A)
- Addition of a requirement for ventilation for both packing groups. This could be done by modifying AP2, which now only applies to closed containers/vehicles and adapting it to all kinds of containers/vehicles (Proposal B)

19. This would reproduce the conditions previously established by the current VV codes for PG II, and which have been proven to be safe for the transport of UN 3170 through the years. This would also be in consonance with the recommendation made by the UN Sub-Committee of Expert on Dangerous Goods at its forty-fourth session.

20. Additionally, to assure proper cooling of the material, a special provision should be introduced.

21. The initial temperature of aluminium smelting by-products is almost 1000 °C; when the product is prepared for transport, it is necessarily much cooler, as operators have to walk and work on the product. According to the industry, proper cooling before shipment is considered the most important preventive measure against incidents during transport, because the main part of the gas production is done while the product is at a high temperature. As the products cools down, gas creating reactions also slow down (Proposal C).

22. Finally, as consequential amendments, in 7.3.2.4, where the general rules for use of BK containers are established, the parenthesis “code BK2” should be deleted; BK1 containers can also be waterproof, and the deletion of this parenthesis would permit the inclusion of BK1 into table A for UN 3170 without any further modification (Proposal D). Also, in 7.3.3.2.3 the additional provisions for class 4.3 are established; here the necessary text should be included to permit differences to the general rule for specific UN numbers (Proposal E).

Proposal

23. The following proposals are made:

A. Change in table A, for UN 3170:

- column (17)

PGIII: VC1VC2 ~~[AP3]~~ AP4 AP5 AP2

PG II: VC1VC2 ~~[AP3]~~ AP4 AP5 AP2

B. Modify AP2 in 7.3.3.2.1 and 7.3.3.2.7:

“~~Closed~~ vehicles/wagons and ~~closed~~ containers shall have adequate ventilation”

C. Including a special provision XXX, assigned to UN 3170 ALUMINIUM SMELTING BY-PRODUCTS or ALUMINIM REMELTING BY-PRODUCTS (column 18):

CV XX: Before transport, aluminium smelting by-products or aluminium remelting by-products have to be cooled till ambient temperature”

D. For 7.3.2.4, delete “code BK2”:

“These goods shall be carried in bulk containers ~~(code BK2)~~ which are waterproof.”

E. For the new point 7.3.3.2.3 Goods of class 4.3, introduce the following sentence at the beginning:

“Unless stated otherwise in these regulations, the following provisions shall apply:”.