

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

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Item 7 of the provisional agenda

Reports of informal working groups

Inclusion of provisions for the carriage of molten aluminium of UN No. 3257

Transmitted by the Government of Germany on behalf of the informal working group “molten aluminium”

Summary

- Executive summary:** Molten aluminium of UN No. 3257 is carried in bulk in accordance with special provision VC 3. According to VC 3, the competent authority of the country of origin lays down the corresponding conditions of carriage. The aim of the proposal is to establish uniform minimum requirements for carriage.
- Action to be taken:** Include supplementary provisions for the carriage of molten aluminium of UN No. 3257 in bulk – include a new AP 11 in ADR 7.3.3.2.7.
- Related documents:** OTIF/RID/RC/2018-B (ECE/TRANS/WP.15/AC.1/152), VIII. Accidents and risk management (agenda item 7) A. Accident involving molten aluminium
Informal document INF.5 (Germany) Joint Meeting September ECE/TRANS/WP.15/AC.1/2021/1 and INF.41 (Germany) Joint Meeting Bern 2021.

Introduction

1. Based on the proposal in document OTIF/RID/RC/2021/1 (ECE/TRANS/WP.15/AC.1/2021/1) and the discussion during the 2021 spring session of the Joint Meeting, an informal working group on the carriage of molten aluminium was established. The terms of reference were defined in informal document INF.41 and included developing appropriate RID/ADR provisions, in particular concerning the construction, inspection and use of vats.
2. France, the United Kingdom, Sweden and Poland cooperated in the informal working group chaired by Germany; the European Union was also represented in the group.
3. The informal working group engaged in discussions during five online meetings. After the last meeting, the present informal document was agreed via email. The working group’s activities covered the period from November 2021 until August 2022.

4. The working group based its activities on document ECE/TRANS/WP.15/AC.1/2021/1, which reflects the current German approach. The working group has fully revised the document.

5. The work focused on:

- Defining requirements to be met by protective devices regarding the transmission of forces in the case of a vat overturning
- Defining requirements to be met by the production process by making references to the codes in ADR and the standards cited more specific
- Specifying in more detail the requirements regarding the welding qualification of the manufacturer and the repair shop
- Specifying in more detail the responsibilities of manufacturer, operator and inspection body
- Assigning contents in detail and separating the fields of manufacturing and operation
- Specifying in more detail the requirements to be met by drivers of transport units
- Deleting references to RID because, in practice, there is no carriage by rail

6. The purpose of this document is to inform the Joint Meeting about the work of the informal working group and present the proposal elaborated regarding additional provisions for the carriage of molten aluminium of UN number 3257. Taking into account the discussion at the Joint Meeting and potential other feedback of delegations following the autumn session, the informal working group intends to conclude its work by elaborating an updated official document.

Proposal 1

In Chapter 3.2, Table A of ADR, for UN 3257, in column (17), add “AP11”.

In 7.3.3.2.7 of ADR, add the following new alphanumerical code AP11:

AP11 *In accordance with 7.3.3.1, code VC3, molten aluminium shall be carried in specially equipped vehicles fulfilling the following requirements:*

1. General requirements for the means of containment and their load securing.
 - 1.1 The means of containment for the molten aluminium (vats with refractory lining) shall either be insulated so as not to exceed a surface temperature of 130°C during carriage or shall be so positioned that the means of containment cannot be touched. The surface temperature shall in no case have a detrimental effect on the functioning of the vehicle, particularly the brake pipes and electric cables.
 - 1.2 The vats shall be secured on the vehicle in accordance with the load security principles of 7.5.7.1.
 - 1.3 It is not necessary to affix marks to the vats in accordance with chapter 5.3 if such marks have already been affixed to the vehicle.
2. Fire and explosion protection

The risk of fire as a result of thermal influence of the molten aluminium on the vat, the vehicle or load security aids, and the risk of an explosion resulting from e.g. escaping vapours or chemical reaction of gases that have evolved, shall be prevented (e.g. by using inert gases).
3. Construction of vats

Vats shall be made of steel. Vats shall be designed and manufactured for a test pressure of 4 bar in accordance with EN 13445-3:2014. In the course of construction, the manufacturer shall specify the weld seams that are subject to the highest stresses. The hydrostatic pressure and surge effect of the molten aluminium shall be taken into account when deciding the dimensions of the vats and their attachment to the vehicle. In so doing, the forces in 6.8.2.1.2 shall be taken as the basis.

The vat closures shall also be designed in accordance with *EN 13445-3:2014* and shall be designed so as to remain leakproof if a full vat (lateral position and top of the vat) overturns.

The filling and emptying openings shall be protected by their construction, e.g. by collars, deflectors, cages or equivalent constructions.

The protective device on the top of the vat shall be designed so as to withstand, without permanent deformation, a static load, applied vertically on the filling lid, equal to twice the maximum permissible mass of the vat (2g).

These vertical forces shall be passed through the top part of the vat.

The refractory lining shall correspond to the state of the art.

The refractory lining shall be so designed that its leakproofness remains intact, whatever the deformation liable to occur in normal conditions of carriage (see 6.8.2.1.2)

The inspection body performing inspections in accordance with 6.8.2.4.1 or 6.8.2.4.4, shall verify and confirm the ability of the manufacturer or the maintenance or repair shop to perform welding operations and the operation of a weld quality assurance system. ***Welding work on the sheet metal jacket, in particular on load-bearing parts, may only be carried out by recognized welding companies and only by certified welders under the supervision of an approved welding coordinator. The requirements of 6.8.2.1.23 first paragraph shall apply.***

Seals on vats lids and closures shall be selected and applied so that they prevent molten aluminium from flowing out if a full vat overturns.

4. Inspection and tests of vats

The inspections and tests described in 4.1 to 4.5 shall be carried out by an inspection body approved by the competent authority in accordance with the applicable requirements of EN 12972:2018. Appropriate test reports on the results of the tests performed shall be issued.

4.1 Type examination of vats

The construction design and workmanship shall be tested as part of a design type test procedure to ensure that the vats comply with the construction requirements of EN 13445-3:2014. The weld seams subject to the highest stresses shall be identified in the design type test report.

4.2 Initial inspection

Vats shall be tested and inspected before they are placed in service.

The test shall at least include:

- (a) A check to ensure that the vat is in line with the construction documents,
- (b) A design inspection,
- (c) An examination of the external condition,
- (d) Hydraulic pressure test at a test pressure of 4 bar; at this stage, the vats shall not have a refractory lining,
- (e) An examination of the internal condition (visual inspection of the internal metal surface of the vat before the refractory *lining* is fitted and visual inspection of the refractory *lining*),
- (f) A check of satisfactory operation of the equipment.

The hydraulic pressure test can also be carried out with a replacement seal.

4.3 Intermediate inspection

Vats shall undergo an intermediate inspection no later than six years after the initial inspection and each periodic inspection.

The intermediate inspection shall at least include:

- (a) An examination of the documents,
- (b) An examination of the external condition, including the integrity of the flange and cover connections,
- (c) Measurement of the wall thickness to check the required minimum wall thickness,
- (d) Non-destructive testing of all weld seams that are subject to the highest stresses,
- (e) An examination of the internal condition (visual inspection of the refractory lining) by an expert under the responsibility of the operator.

These intermediate inspections may be performed within three months before or after the specified date.

4.4 Periodic inspection

Each time the refractory lining is renewed, or not later than twelve years after the initial or most recent periodic inspection, a periodic inspection shall be carried out.

The periodic inspection shall at least include:

- (a) An examination of the documents,
- (b) An examination of the external condition, including the integrity of the flange and cover connections,
- (c) An examination of the internal condition (visual inspection of the internal metal surface of the vat before the refractory lining is fitted and visual inspection of the refractory lining),
- (d) Non-destructive testing of all weld seams that are subject to the highest stresses,
- (e) Measurement of the wall thickness to check the required minimum wall thickness,
- (f) Hydraulic pressure test at a test pressure of 4 bar, at this stage, the vats shall not have a refractory lining,
- (g) Inspection of the service equipment.

The hydraulic pressure test can also be carried out with a replacement seal.

4.5 Exceptional test and inspection of vats

When the safety of the vat or of its equipment may have been impaired as a result of repairs, alterations or accident, an exceptional check shall be carried out. If the exceptional check fulfilling the requirements of 4.4 has been performed, then the exceptional check may be considered to be a periodic inspection. If an exceptional check fulfilling the requirements of 4.3 has been performed, then the exceptional check may be considered to be an intermediate inspection. The inspection body shall decide the detailed scope of the exceptional check, respecting the EN 12972:2018, Table A1.

5. Marking of vats

Apart from the approval number, external design pressure and calculation pressure, vats shall be marked with a vat plate by analogy with ADR 6.8.2.5.1. For the tests and inspections in accordance with 4.2 and 4.4, the marking shall be followed by "P". For the tests and inspections in accordance with 4.3, the marking shall be followed by "L".

6. Requirements for the operation

The owner or the operator shall keep a copy of the design type test report, the results of the initial tests and inspections and all subsequent tests and inspections in the vat file.

Every renewal and repair of the refractory lining shall be recorded by the operator or manufacturer.

Seals shall be checked with each filling and renewed if necessary.

7. Vehicles of vats

The following additional requirements apply to vehicles for carriage by road:

- (a) Vehicles used for carriage shall be fitted with a vehicle stability function approved in accordance with UN Regulation No. 13 (Uniform provisions concerning the approval of vehicles of categories M, N and O with regard to braking).
- (b) Vats shall be positioned on the vehicles in such a way that the discharge openings face or are opposite to the direction of travel.

8. Training of driver

In addition to the basic course in accordance with 8.2.1.2, drivers shall receive supplementary instruction from a competent person about the detailed risk of the carriage of molten aluminium in vats.

These shall include the following main points:

- The particular handling behaviour of vehicles carrying vats,
- General driving physics (driving stability/overtaking behaviour, particularly centre of gravity height, surge effects),
- Limits of electronic stability control and
- Special measures to be taken in the event of an accident.

The carrier shall document this instruction in writing or electronically, giving the date, duration and main topics covered.

Proposal 2

In 1.6.5, add the following new transitional measure:

- 1.6.5.xx Vats for the carriage of molten aluminium of UN number 3257 which have been constructed and approved before 1 July 2025 in accordance with the provisions of national law but which do not, however, conform to the construction and approval requirements of AP11 in 7.3.3.2.7 applicable as from 1 January 2025 may be used with the approval of the competent authorities in the countries of use.