



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 6 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*, *****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:	Report OTIF/RID/RC/2018 (ECE/TRANS/WP.15/AC.1/152), Section VIII on Accidents and risk management (agenda item 7) A. Accident involving molten aluminium, Informal document INF.5 (Germany) Joint Meeting of September 2018, ECE/TRANS/WP.15/AC.1/2021/1, INF.41 (Germany) Joint Meeting of March 2021, INF.27 (Germany) Joint Meeting of September 2022.

* A/77/6 (Sect. 20), table 20.6.

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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 on the construction, inspection and use of vats.
2. France, Poland, Sweden and the United Kingdom cooperated in the informal working group chaired by Germany; the European Union was also represented in the group.
3. 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.
4. The work focused on:
 - Defining requirements to be met by protective devices on the transmission of forces in the case of a vat overturning;
 - Defining requirements to be met during the production process by making references to the provisions in ADR and the standards cited more specific;
 - Specifying in more detail the requirements on the welding qualification of the manufacturer and the repair shop;
 - Specifying in more detail the responsibilities of manufacturer, operator and inspection body;
 - Assigning detailed contents 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 such carriage by rail.
5. At the 2022 autumn session of the Joint Meeting a first proposal for provisions for the carriage of molten aluminium of UN No. 3257 was presented by the working group (see INF.27). Taking into account the results from the discussion at this meeting as well as the feedback received from delegations after the session, the working group finalized the provisions given in the proposals below in a concluding session of the working group held on 8 December 2022.

Proposal 1

6. In Chapter 3.2, Table A of ADR, for the first entry UN 3257, add “AP11” in column 17).
7. In 7.3.3.2.7 of ADR, add the following new alphanumerical code AP11 (including a new footnote ⁽¹⁾):

“AP11 In accordance with VC3 in 7.3.3.1, for the purpose of carriage in bulk of molten aluminium, "standards specified by the competent authority of the country of origin" means that the following requirements shall be met.

1. General requirements

- 1.1 Vats 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 by other road users under normal conditions of carriage. 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 Vats need not be affixed with placards and markings in accordance with chapter 5.3 if these placards and markings have been affixed to the vehicle.

2. Fire and explosion protection

The risk of fire by the thermal influence of the molten aluminium on the vat, the vehicle or load security aids, and the risk of explosion resulting from 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. The forces in 6.8.2.1.2 shall be taken into account.

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

The filling and emptying openings shall be protected by the construction of the vat, 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).

The refractory lining shall be suitable to resist against the substance and it shall be suitable as insulation material.

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 approved welding companies.***

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. The inspections and test shall be carried out in accordance with the applicable requirements of EN 12972:2018. 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 type examination documents,
- (b) A check of conformity to the design,
- (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 an alternative 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 shall be carried out by magnetic particle testing, penetration testing, ultrasonic testing or radiographic testing.
- (e) An examination of the internal condition (visual inspection of the refractory lining) by an expert under the responsibility of the operator.
- (f) A check of satisfactory operation of the equipment.

These intermediate inspections may be performed within three months before the specified date, without any influence on the time frame of other inspections according to 4.3 and 4.4.

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 shall be carried out by magnetic particle testing, penetration testing, ultrasonic testing or radiographic testing.
- (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) A check of satisfactory operation of the equipment.

The hydraulic pressure test can also be carried out with an alternative seal.

4.5 Exceptional 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 inspection shall be carried out on the parts affected by the repairs or alterations. If the exceptional inspection fulfilling the requirements of 4.4 has been performed, then the exceptional inspection may be considered to be a periodic inspection. If an exceptional inspection fulfilling the requirements of 4.3 has been performed, then the exceptional inspection may be considered to be an intermediate inspection. The inspection body shall decide the detailed scope of the exceptional inspection, respecting the EN 12972:2018, Table A1.

5. Marking of vats

Vats shall be marked with a plate by analogy with ADR 6.8.2.5.1., except the approval number and external design pressure. 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

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 ⁽¹⁾.
- (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.

⁽¹⁾ Uniform provisions concerning the approval of vehicles of categories M, N and O with regard to braking.”

Proposal 2

8. In 1.6.1 add the following new transitional measure:

“1.6.1.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 continue to be used with the approval of the competent authorities in the countries of use.”

Proposal 3

9. In 1.2.1 add the following new definition:

“*Vat* means a containment intended for the carriage of molten aluminium of UN No. 3257, including its shell, refractory lining and service and structural equipment (see AP11 in 7.3.3.2.7).”
