



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, 14–18 March 2022

Item 5 (a) of the provisional agenda

**Proposals for amendments to RID/ADR/ADN:
pending issues****Transport of electric energy systems containing lithium ion
batteries****Transmitted by the Government of Sweden^{*}, ^{**}, ^{***}***Summary***Executive summary:**

Clarify and develop appropriate transport provisions and conditions for the carriage of electric energy systems containing lithium ion batteries by road and rail.

Action to be taken:

Insert suitable transport provisions for electric energy systems containing lithium ion batteries.

Introduction

1. At the last session of the Joint Meeting in September 2021, Sweden raised the question concerning suitable transport provisions for electric energy systems containing lithium ion batteries (document [ECE/TRANS/WP.15/AC.1/2021/32](#)). Sweden's proposal received several comments on the need and urgency to amend RID/ADR on the carriage of mobile electric energy systems. Taking into account the comments received during the meeting, a revised proposal has been drafted and submitted to this meeting.

2. Over the past few years, the use of mobile electric energy systems has increased significantly. This trend will likely continue and evolve even more, especially considering global activities and the aim to phase out fossil fuels and shifting towards low-carbon power

* A/76/6 (Sect.20), para. 20.76.

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sources. The ambition and legislation put forward by the European Commission, described on https://ec.europa.eu/environment/topics/waste-and-recycling/batteries-and-accumulators_en, is one example of on-going actions to facilitate and accelerate this transition.

3. Mobile electric energy systems might consist of lithium batteries attached to the interior structure of containers. Furthermore, it could also be systems, fastened and secured on trailers, containing lithium ion batteries and other equipment necessary for its functioning. In some cases, there might be only one large lithium ion battery bolted on the trailer.

4. The systems are used for example to provide power to electrified machines and construction site sheds. In the example in figure 1 below, the energy system consists of six batteries with an individual capacity of 20 kWh, in total 120 kWh. The weight of the energy system without the trailer is approximately 3000 kg.



Figure 1

Figure 2

5. Sweden believes these systems should be classified as UN 3536, lithium batteries installed in cargo transport unit, and then the transport of these systems are more or less fully regulated. The definition of a cargo transport unit in chapter 1.2 is the following:

"Cargo transport unit" means a vehicle, a wagon, a container, a tank-container, a portable tank or an MEGC;

6. Special provision 389 is assigned to UN 3536 and states that UN 3536 "only applies to cargo transport units in which lithium ion batteries or lithium metal batteries are installed and which are designed only to provide power external to the unit". However, special provision 389 only permits exemptions from marking and labelling requirements to the individually installed batteries in the cargo transport units. All other requirements are applicable, e.g. dangerous goods documentation, equipment on board and driver training.

7. In ADR/RID 2023, UN 3536 will be assigned to transport category 2 (see Annex II of the report [ECE/TRANS/WP.15/AC.1/158](https://www.ece.org/trans/wp15/2022/20)), which means that transport in accordance with 1.1.3.6 will be applicable for energy systems with a total mass up to 333 kilograms.

8. Sweden believes that some further exemptions for land transport should be included for UN 3536, similar to special provision 363 assigned to engines and machinery (UN 3528, 3529, 3530). Sweden proposes that a new special provision is introduced for UN 3536 in ADR/RID where all applicable provisions for road and rail transport are stated. During the last meeting, there was some support to use the energy content value of the systems as a cut off limit rather than the mass of the battery. Sweden therefore suggests that when the total energy content is more than 100 kWh, cargo transport units assigned to UN 3536 shall be marked with orange-coloured plates and placards and be accompanied by a transport document.

9. The energy content limit is based on the energy content in batteries used in Tesla cars, https://en.wikipedia.org/wiki/Tesla_Model_S#Battery, and other values can certainly be discussed. For information, there are heavy-duty electric trucks with five or six battery packs on the market. Each battery pack has a total energy of 90 kWh, which means either 450 kWh or 540 kWh of total energy, <https://www.volvotrucks.com/en-en/trucks/alternative->

[fuels/electric-trucks/faq.html](#). The energy content (volumetric energy density) for lithium ion batteries varies depending on type of battery and also on future technical improvements. An average value of 800 Wh/L for the batteries means an energy content of 2.88 MJ/L (800 Wh/L*3600, (1 Wh = 3600 Joule [J])). This value may be found in (page 58 ff): https://ec.europa.eu/energy/topics/technology-and-innovation/batteries-europe/news-articles-and-publications/sra_en

10. In comparison with other types of fuels this energy content is low and therefore Sweden believes this exemption could be justified. A list of the energy content for other fuels is found in paragraph 1.1.3.2 of ADR.

11. The specific requirements currently in special provision 389, concerning compliance with the battery provisions in 2.2.9.1.7 and load securing, should still be applicable and are thus transferred from special provision 389 to the new special provision. As a consequence, special provision 389 could be deleted in ADR/RID. No other provisions should be applicable.

12. As stated at the last session of the Joint Meeting in September 2021, Sweden believes this type of transport is more common on land and that there is an urgent need to develop relevant provisions. These do not be as stringent as for sea transport, why this should be discussed by the Joint Meeting rather than by the UN Sub-Committee on the Transport of Dangerous Goods. Since a solution need to be found to an urgent situation for land transport, Sweden believes it is not appropriate to await the outcome of the specific discussion about the proper shipping name for UN 3536, which is discussed in the UN Sub-Committee. For multimodal transport Sweden believes the current special provision 389 in the “UN Recommendations on the Transport of Dangerous Goods – Model Regulations” (Revision 21) is sufficiently drafted.

Proposals

Proposal 1

13. In Chapter 3.3 insert a new special provision to read as follows:

“6XX This entry only applies to cargo transport units in which lithium ion batteries or lithium metal batteries are installed and which are designed only to provide power external to the unit. No other requirements of ADR/RID apply except the following provisions:

[(a)] The lithium batteries shall meet the provisions of 2.2.9.1.7 (a) to (g) and contain the necessary systems to prevent overcharge and over discharge between the batteries. The batteries shall be securely attached to the interior structure of the cargo transport unit (e.g., by means of placement in racks, cabinets, etc.) in such a manner as to prevent short circuits, accidental operation, and significant movement relative to the cargo transport unit under the shocks, loadings and vibrations normally incident to carriage.

[(b)] Dangerous goods necessary for the safe and proper operation of the cargo transport unit (e.g., fire extinguishing systems and air conditioning systems), shall be properly secured to or installed in the cargo transport unit and are not otherwise subject to ADR/RID. Dangerous goods not necessary for the safe and proper operation of the cargo transport unit shall not be carried within the cargo transport unit. The batteries inside the cargo transport unit are not subject to marking or labelling requirements.

[(c)] Where the maximum total energy content is above 100 kWh, the cargo transport unit shall bear orange-coloured plates in accordance with 5.3.2.2 and placards in accordance with 5.3.1.1 on two opposing sides and a transport document in accordance with 5.4.1 is required. This transport document shall contain the following additional statement:

“Transport in accordance with special provision 6XX.”

Proposal 2

14. In Chapter 3.2 insert new special provision 6XX in column (6) in Table A against the entry UN 3536.

Consequential amendments

15. Amend the first Note in 2.2.9.1.7 to read as follows (new text is underlined, deleted text is strikethrough):

“NOTE: *For UN 3536 LITHIUM BATTERIES INSTALLED IN CARGO TRANSPORT UNIT, see special provision 6XX ~~389~~ in Chapter 3.3.”*

Delete special provision 389 in column (6) in Table A against the entry UN 3536.

In 3.3.1 amend special provision 389 to read as follows:

“389 (Deleted)”

Annex

Websites with further information on energy systems

<https://www.tillquist.com/en/energy/energy-storage/ees-energy-storage-systems>

<https://www.atlascopco.com/sv-se/construction-equipment/products/energy-storage-systems/large>

Comparison between new special provision and existing special provision 389 (new text in bold)

“6XX This entry only applies to cargo transport units in which lithium ion batteries or lithium metal batteries are installed and which are designed only to provide power external to the unit. **No other requirements of ADR/RID apply except the following provisions:**

The lithium batteries shall meet the provisions of 2.2.9.1.7 (a) to (g) and contain the necessary systems to prevent overcharge and over discharge between the batteries. The batteries shall be securely attached to the interior structure of the cargo transport unit (e.g., by means of placement in racks, cabinets, etc.) in such a manner as to prevent short circuits, accidental operation, and significant movement relative to the cargo transport unit under the shocks, loadings and vibrations normally incident to carriage. Dangerous goods necessary for the safe and proper operation of the cargo transport unit (e.g., fire extinguishing systems and air conditioning systems), shall be properly secured to or installed in the cargo transport unit and are not otherwise subject to ADR/RID. Dangerous goods not necessary for the safe and proper operation of the cargo transport unit shall not be carried within the cargo transport unit. The batteries inside the cargo transport unit are not subject to marking or labelling requirements.

Where the maximum total energy content is above 100 kWh, the cargo transport unit shall bear orange-coloured plates in accordance with 5.3.2.2 and placards in accordance with 5.3.1.1 on two opposing sides and a transport document in accordance with 5.4.1 is required. This transport document shall contain the following additional statement: "Transport in accordance with special provision XXX".