

## Economic Commission for Europe

### Inland Transport Committee

#### Working Party on the Transport of Dangerous Goods

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Item 6 of the provisional agenda:

**Interpretation of ADR**

### **Questions of interpretation: Transport of (damaged) vehicles as load, Battery electric (BEV), hydrogen powered and hybrid vehicles**

**Transmitted by the Government of Austria**

#### **Introduction**

1. This informal document welcomes the question raised in document ECE/TRANS/WP.15/2019/21 on what ADR rules apply to battery electric vehicles. Thanks to Switzerland for the work and the figure.
2. Question 1 of this informal document deals with the question raised in item 1 of the Swiss document, where the “?” is set in the figure.
3. Furthermore, there are questions on the ADR rules for the other alternative powered vehicles, like the ones fuelled with hydrogen or hybrid vehicles.

#### **Brief overview of the specific ADR rules**

4. In general, for vehicles as load, there are two specific UN-numbers with the same four Special Provisions (SP) in Table A to consider: SP 388, SP 666, SP 667 and SP 669.
5. SP 388 includes:
  - definitions (vehicles...);
  - the assignment of the different vehicles, so we know that a BEV is UN 3171 and all other vehicles are UN 3166;
  - exemptions from ADR for other dangerous goods built within the car (airbags, etc.);
  - Li-batteries must meet 2.2.9.1.7 ADR if SP 667 does not exempt;
  - damaged/defective Li-batteries have to meet the conditions of SP 667.
6. SP 666 defines an exemption from other ADR, if the following conditions are met:
  - vehicles with liquid fuel:
    - closed valves (unless essential to keep open), transport upright and secured against falling;
    - OR empty of liquid fuel.
  - vehicles with gaseous fuel:
    - closed valves, no electric contact (unless essential to remain);
    - OR empty of gaseous fuel.
  - vehicles with a metal-hybrid storage-system:
    - approved or recognized by a competent authority of a contracting party.

7. SP 667 states for Li-batteries only:
- a) Prototypes / low production volumes do not have to meet 2.2.9.1.7 a) ADR (=battery of tested type);
  - b) for damaged/defective vehicles 2.2.9.1.7 ADR does not apply, but
    - if the damage has no significant impact on the safety of the battery:
      - the conditions from SP 666 have to be met;
    - if the damage has significant impact on the safety of the battery:
      - the battery has to be safely removed and transported under SP 376;
      - OR: transport the vehicle under SP 666, if it is not possible to safely remove or to verify the status of the battery;
  - c) for damaged/defective batteries also use b).
8. SP 669 states, that the same regulations should apply to special trailers. However, trailers will be skipped for the purpose of this informal document.

## Discussion

9. Is the interpretation of the ADR rules correct for the following cases:

10. Case 1:

The raised question in item 1. of the Swiss document, where “?” is set in the figure - *a BEV as load with a damaged/defective battery where there is a significant impact on safety of the battery and where the removal of the battery is not possible:*

There are four SPs given in the table for this UN-number 3171.

SP 388 is referring to SP 667 c). That leads from case (ii) to case (i) in SP 667 b), because the battery cannot be removed. Case (i) exempts from the provisions of 2.2.9.1.7 ADR and refers to the conditions of SP 666 for the whole vehicle.

Note: in SP 667 there is also a reference to SP 363, but SP 363 a) clarifies: “...*except vehicle equipment assigned to UN No. 3166 referred to in SP 666*”. So SP 363 is for engines or machinery only and not for whole vehicles.

SP 666 declares that vehicles are not subject to any other provision of ADR, provided some conditions are met. Since these conditions are automatically met by a BEV because of its nature without any fuel, there are no further conditions to be met.

Conclusion: such a damaged BEV as load has NO conditions at all to fulfil.

11. Case 2:

- a) The main battery of a BEV which is used for propulsion, is not exempted by SP 388 last but one paragraph with the mentioned “*batteries*” and “*integral components*”, because they are subject of SP 666 which contains conditions;
- b) Goods used for propulsion (e.g. diesel) are not exempted by SP 388 last but one paragraph with the mentioned “*integral components*”, because they are no components and/or are subject of SP 666 which contains conditions.

Note: Last but one paragraph of SP 388: “*Dangerous goods, such as batteries ... and other integral components of the vehicle that are necessary for the operation of the vehicle or for the safety of its operator or passengers, shall be securely installed in the vehicle and are not otherwise subject to ADR*”.

12. Case 3:

*BEV as load where the vehicle and battery are not damaged / not defective:*

The Swiss document mentions SP 389 for not damaged vehicles. With UN 3171 as the specific UN-number for a BEV listing four SPs in Table A, there is no evidence to also take SP 389 into account, since there is no reference to it at all. Additionally,

SP 389 only applies to batteries that are designed to provide power external to the unit. So for a regular BEV the SP 389 should not be applied.

Without a listed exemption of SP 667 (prototype or damages) batteries have to fulfil all provisions of 2.2.9.1.7 ADR because of the reference in SP 388.

SP 666 does not add any further conditions and declares that vehicles are not subject to any other provisions of ADR.

Conclusion: a BEV as load only has to meet 2.2.9.1.7 ADR for the batteries.

13. Case 4:

*Damaged vehicles as load with a combustion engine (also hybrids), where the valves cannot be closed and the filled tanks cannot be emptied because of the damage:*

With a combustion engine, we have UN 3166 with four SPs in Table A, where also SP 388 helps with definitions, assignment and exception of other dangerous goods within the vehicle (e.g. airbags).

UN 3166 also includes hybrids with a battery for the electric powertrain. These hybrids additionally have to fulfil the condition of SP 667, stating to safely remove the battery if possible and transport it under SP 376 if the damage has a significant impact on the safety of the battery. The damage can be to the battery according to SP 388 and SP 667 c), or to the vehicle according to SP 667 b). For all other cases there are no additional conditions resulting from the battery. [Similar to case 1]

SP 666 declares for all UN 3166 vehicles, that “*vehicles ... are not subject to any other provisions of ADR provided the following conditions are met*”.

In the scenario of this question 4, the conditions cannot be met. In that case and with the wording of SP 666, these vehicles are indeed subject to other provisions of ADR.

Since Table A is poorly filled with data for UN 3166, we need to remember 3.2.1 ADR stating, that “*The applicable general requirements are not referred to in the corresponding cells.*”

Without data in the cells in Table A, some general requirements are:

- 5.2.1.1 ADR states for “*marking and labelling*”:
  - “*Unless provided otherwise in ADR, the UN number corresponding to the dangerous goods contained, preceded by the letters “UN” shall be clearly and durably marked on each package*”;
  - “*In the case of unpackaged articles the mark shall be displayed on the article, on its cradle or on its handling, storage or launching device.*”
- 5.2.1.8.2 ADR: “*The environmentally hazardous substance mark shall be located adjacent to the marks required by 5.2.1.1.*”;
- 5.2.1.9.1 ADR: No Lithium battery mark, because only “*packages containing lithium cells or batteries prepared in accordance with special provision 188 shall be marked*”;
- 5.2.1.10.1 ADR: No orientation arrows should be needed, because they are not strictly mentioned. The lastly modified case in this entry states machinery and apparatus, but no vehicle;
- 5.2.2 ADR: Table A does not list any labeling requirements for UN 3166, so there is no labeling in accordance with 5.2.2.1.1. ADR;
- 5.4 ADR: Table A does not list any placarding requirements for UN 3166, so there is no placarding in accordance with 5.3.1.1.1. ADR;
- 5.3.2 ADR: *orange-coloured plate marking*:
  - Transport units carrying UN 3166 shall display two rectangular orange-coloured plates conforming to 5.3.2.2.1 ADR, one at the front and the other at the rear of the transport unit;

- No hazard identification number, because Table A does not list any.
- 5.3.6.1 ADR: Since there are no other placards to be displayed, no environmentally hazardous substance mark has to be displayed on the transport unit;
- 5.4 ADR: The transport document shall contain:
  - “UN 3166”, proper shipping name as assigned in SP 388, 9, the number and a description of the packages (e.g. one package? or is “one article” correct?), the total quantity, the name and address of the consignor, the name and address of the consignee(s).
- 5.4 ADR: Instructions in writing;
- General requirements of part 7 ADR: like the prohibition of smoking;
- General requirements of part 8 and part 9 ADR.

Further discussion: Changes because of other goods (e.g. diesel in the tank)?

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