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Explosion protection measures on wagons with electrical equipment (e.g. DAC)

Proposal from the International Union of Wagon Keepers (UIP)

I. DESCRIPTION OF THE PROBLEM

1. In the course of the work on carrying over the technical wagon requirements from RID and incorporating them into the TSI WAG, the topic of introducing digital automatic coupling (DAC) was also addressed, and this type of coupling was included in the drafts with a view to energy absorption and the risk of buffers overriding, etc.

2. As both a 400 V AC power line running through the entire train and a 48 V DC battery in each carriage (to power the electric DAC and any carriage-specific sensors) are planned, a text has already been adopted for the TSI WAG that refers to Directive 2014/34/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres. At the time, there was no detailed discussion on this.

3. The text adopted for the TSI WAG reads as follows:

   *"**C) Requirements to comply with point 7.1.2.1.3 of RID***
   Any wagon intended to be used in potentially explosive atmospheres shall comply with a suitable level of protection which depends on the zones where such wagon is intended to be used.
   The zones referred to in the first paragraph of this point are defined in Directive 1999/92/EC of the European Parliament and of the Council.*
   *The level of protection corresponding to the selected equipment group and equipment category is set out in Directive 2014/34/EU of the European Parliament and of the Council**. The level of protection for which the wagon is assessed shall be reported in the wagon's technical file."*

4. In the technical implementation, which is currently being pursued intensively in the area of standardisation at CENELEC TC9X WG44, ERA was of the view that, as it is European law, Directive 2014/34/EU must be fully implemented.

5. In connection with this, it should be noted that, according to the scope of Directive 2014/34/EU, vehicles approved in accordance with dangerous goods law (RID and ADR) are exempt. This is then explained in detail in the guidelines for Directive 2014/34/EU concerning road tank-vehicles.

6. In order to achieve sufficient safety in loading areas where there are explosion-protected areas in accordance with Directive 2014/34/EU, basic rules for explosion protection on road vehicles were nevertheless defined in ADR 9.2.2 many years ago. These include the following:

   - The cables shall be in conformity with certain standards;
   - Circuits shall be protected by fuses or circuit breakers;
   - Battery terminals shall be insulated and covered (in a vented box for batteries which may develop gas);
   - It must be possible to de-energise the vehicle by means of a disconnector switch;

   The requirement for separate ATEX approval of road vehicles or their components is not found in ADR and is also not standard practice.

II. PROPOSED SOLUTION

7. For UIP, it is indisputable that when installing a digital automatic coupling, requirements for driving in explosion-protected zones must be defined. UIP considers it to be technically feasible, sensible and expedient to implement these provisions in RID in line with the ADR rules, which have been tried and tested in operational situations.

8. The solution UIP sees is therefore to provide clarification in RID or the TSI that the following provisions on explosion protection must be taken into account:

   a) Electrical equipment that is permanently powered by electricity, even in explosion-protected areas, such as GPS modules with their own power supply, must have separate ATEX approval.

   However

   b) The DAC standard is assumed to be:

      - Before entering an explosion-protected area, the wagon must be disconnected from the 400 V network of the train/locomotive.
      - A disconnect switch must be installed near the 48 V battery. This disconnect switch can be used to disconnect the power supply to the vehicle, including the components powered by this battery, within 30 seconds.
      - The position of the disconnect switch must be clearly and obviously identifiable on the wagon.
      - The 48 V battery is installed in a closed box (ventilated if necessary).
      - The battery terminals are insulated.
      - The cabling systems on the vehicle must comply with standards EN 50746 and EN 50747.
      - The operator’s responsibilities are to be determined by the explosion protection staff at the loading areas.
      - The facility operator is responsible for ensuring that the vehicle is disconnected from the power supply before entering the explosion-protected area, and this must be regulated in the operator's operating instructions. A reference in Chapter 1.4 of RID would be one way of making this mandatory.

   Compliance with the technical implementation on the wagon can be checked and certified by the notified body as part of the TSI assessment during the wagon approval process.

III. ASSESSMENT AND OUTSTANDING ISSUES

9. UIP believes that, from the perspective of the wagon, implementation of this proposal would fully comply with the text already adopted in the TSI. Separate ATEX approval of the wagons or their components is not therefore required, provided that they are disconnected from the power supply in explosion-protected areas.

10. Questions remain open in relation to:

- application in relation to powdery goods. These are not addressed in ADR, and there are also non-hazardous goods that can pose a risk of explosion;
- application of these rules in relation to wagons in intermodal transport;
- where these requirements should be laid down;
- the complete wording (comparable to ADR) still to be developed.