

**Economic and Social Council**Distr.: General  
12 November 2020

Original: English

**Economic Commission for Europe****Inland Transport Committee****Working Party on the Transport of Dangerous Goods****Joint Meeting of Experts on the Regulations annexed to the European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN) (ADN Safety Committee)****Thirty-seventh session**

Geneva, 25–29 January 2021

Item 5 (b) of the provisional agenda

**Proposals for amendments to the Regulations annexed to ADN:  
other proposals****Electric propulsion installations and energy storage:  
Proposal for an assessment of the need for additional ADN provisions for the safe transport of dangerous goods with vessels using electric propulsion installations****Submitted by the Central Commission for the Navigation of the Rhine (CCNR) \*,\*\*****Introduction**

1. The ADN Safety Committee requested the CCNR Secretariat at its thirty-fifth session to keep it informed about the outcome of the working group on technical requirements (CESNI/PT<sup>1</sup>) on technical developments to take them into account in future proposals of amendments.
2. At the thirty-sixth session of the Safety Committee, the CCNR Secretariat reported, with informal document INF.23, on the work at CESNI level on electric propulsion

\* Distributed in German by the Central Commission for the Navigation of the Rhine under the symbol CCNR-ZKR/ADN/WP.15/AC.2/2021/6.

\*\* In accordance with the programme of work of the Inland Transport Committee for 2020 as outlined in proposed programme budget for 2020 (A/74/6 (part V sect. 20) para 20.37).

<sup>1</sup> Comité Européen pour l'Élaboration de Standards dans le Domaine de Navigation Intérieure – CESNI (www.cesni.eu)



installations for inland navigation vessels, the integration of appropriate provisions into ES-TRIN<sup>2</sup> and possible effects on vessels used for the transport of dangerous goods.

3. There is a clear trend towards vessels with innovative electric propulsion installations to fulfil future emission reduction objectives. Some of these innovative concepts for electric propulsion use exchangeable battery containers containing electric storage capacities in batteries, liquified or compressed gases like methane or hydrogen as well as liquids such as methanol.

4. The ADN Safety Committee hence emphasized that the existing provisions in ADN might need to be reviewed considering emerging innovative propulsion installations and their particularities. It was agreed that this review should in particular take into account the possible interaction between the dangerous goods and the propulsion installation on such innovative vessels.

## **Objective**

5. Overall objective of a possible task on electric propulsion installations on innovative vessels is to maintain the same level of safety for all vessels, independent from propulsion installation and energy storage system used as well as goods transported.

6. The need for complementary provisions in ADN, necessary for safe transport of dangerous goods on board of innovative vessels using of electric propulsion installations as well as innovative energy storage systems, should hence be assessed.

7. The CCNR Secretariat's objectives of this communication is to provide to the ADN Safety Committee a first assessment of the different safety concepts in ADN and ES-TRIN, clarify terms used, identify gaps between ADN and ES-TRIN and propose possible next steps.

## **Recall of discussions during the last meeting**

8. During the Safety Committee meeting last January, the CCNR secretariat concluded that the ADN does not need to be amended for the use of electrical propulsion systems.

9. The German delegation asked questions regarding the fixed fire-fighting systems for engine rooms with regard to the electric propulsion system and the battery room. Also, the structural fire protection of the different rooms containing essential parts of the propulsion system was discussed.

10. The Danube commission asked about the risk of fire as a battery room is larger than a diesel tank and not in the same room as the propulsion engine.

11. The general perception of the members of the safety committee was that the risk for safe carriage of dangerous goods on vessels with electric propulsion might require additional regulations in ADN.

12. The first assumptions submitted by CCNR in January 2020, with reference to informal document INF.23 that no additional requirements are needed in AND, might not be complete. Diesel and electric vessels have equal safety regarding ES-TRIN, but ADN covers different aspects.

## **Safety in ADN and ES-TRIN**

13. ADN is aiming for ensuring a high level of safety of international carriage of dangerous goods by inland waterways and contributing effectively to the protection of the environment by preventing any pollution resulting from accidents or incidents during such carriage.

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<sup>2</sup> European Standard laying down Technical Requirements for Inland Navigation vessels (ES-TRIN, [www.cesni.eu/en/types/technical-requirements/](http://www.cesni.eu/en/types/technical-requirements/))

14. The safety objective for ES-TRIN and the associated legal framework (Rhine Vessel inspection regulations and Directive (EU) 2016/1629) is to guarantee a high level of safety in inland navigation, thereby also protecting the environment and the people on board. ES-TRIN lays down the minimum technical requirements on the construction and equipment of inland navigation vessels.

## **Electric propulsion in ES-TRIN**

15. In November 2018, CESNI adopted the ES-TRIN<sup>3</sup>, edition 2019/1 (Resolution CESNI 2018-II-1) including Chapter 11 which addresses the electrical propulsion installations. This amendment defines the technical requirements applicable to electric propulsion installations ensuring a high level of safety in inland navigation. This edition 2019/1 entered into force on 1 January 2020 in the CCNR and EU legislative frameworks.

16. ES-TRIN also introduced five new definitions with Chapter 11. This includes the power sources and related equipment for both the vessels propulsion and also for auxiliary drives.

17. In ES-TRIN, an electric propulsion installation is a unit comprising an electrical power source including power electronics, electric propulsion motor, gearbox, shaft, propeller, etc. employed to generate movement of a craft.

18. In ES-TRIN, electric vessel propulsion is either a purely electric or diesel-electric or gas-electric propulsion installation of a craft, which is operated either by its own power supply or by the on-board network and comprising at least one electric propulsion motor. In the case of a diesel-electric or gas-electric propulsion installation, this term refers solely to the electrical components of the propulsion installation in question.

19. The provisions in Chapter 11 of ES-TRIN however do not cover at this stage possible rooms or installations for energy storage, such as battery rooms or storage of containers containing batteries in cargo holds. However, in the draft ES-TRIN 2021, special provisions (Article 10.11(17)) are foreseen for the safety of rooms or spaces in which lithium-ion batteries are stored. On-going work on the energy storage is currently done in the framework of the temporary working group on fuel cells (CESNI/PT/FC) and would be included in ES-TRIN 2023.

## **Electric propulsion in ADN**

20. ADN today does not prohibit the use of an electric propulsion installations or electricity as power source for the main engine.

21. ADN exempts in 1.1.3.7 electric energy storage and production systems for propulsion. The provisions in ADN do not apply to electric energy storage and production systems (e.g., lithium batteries, electric capacitors, asymmetric capacitors, metal hydride storage systems and fuel cells) installed in a means of transport (such as a vessel), performing a transport operation and destined for its propulsion or for the operation of any of its equipment.

22. ADN does not provide definitions for energy storage and production system.

23. ADN already requires in 9.1.0.40.2 and 9.3.x.40.2 fixed fire-extinguishing systems for engine rooms.

## **Conclusions**

24. Safety concepts of ADN and ES-TRIN do partly overlap but gaps remain, such as the interaction of dangerous goods with electric propulsion installations. Additional provisions in ADN might be necessary.

<sup>3</sup> [https://www.cesni.eu/wp-content/uploads/2018/05/ES\\_TRIN\\_2019\\_en.pdf](https://www.cesni.eu/wp-content/uploads/2018/05/ES_TRIN_2019_en.pdf)

25. The provisions in ADN and ES-TRIN cover the engine room. Hence, no additional provisions in ADN are necessary for electric engines.
26. The provisions in ES-TRIN do not yet cover rooms for the batteries needed for propulsion. However, a new article 10.11(17) ES-TRIN 2021 on such rooms will be added. Additional provisions in ADN might nevertheless be necessary.
27. The provisions in ADN and ES-TRIN do not cover or respectively exempt energy production and storage systems as well as additional required axillary installations. The CCNR Secretariat will report on CESNI/PT/FC work which might help to clarify the gaps. Additional provisions in ADN might be necessary.
28. A definition for electric propulsion system, electric energy storage system and electric energy production systems is missing in ADN. Additional provisions in ADN might be necessary.
29. Electric energy storage for vessel propulsion is today allowed in the cargo zone in application of 1.1.3.7 ADN. However, this might not apply to liquid fuels for use in fuel cells. The applicability of 1.1.3.3 ADN of exemptions related to dangerous goods used for the propulsion of vessels needs to be further elaborated regarding innovative propulsion installations. Additional provisions in ADN might be necessary.

### **Proposal for next steps**

30. The CCNR Secretariat proposes to ask the informal working group of classification societies to check the conclusions in paragraphs 24-29 above and to assess which requirements need to be applied on electric propulsion installations, electric energy production and storage systems for the use on board of ADN vessels, taking into account the activities in CESNI/PT/FC for ES-TRIN 2021.
31. The ADN Safety Committee could set up a new informal working group to develop required provisions for ADN based on the results of the informal working group of classification societies.
32. The CCNR Secretariat continues to report on CESNI activities regarding electric propulsion installations and energy storage systems.
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