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Working Party on Inland Water Transport

Working Party on the Standardization of Technical and Safety Requirements in Inland Navigation

Fifty-second session
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Item 6 (c) of the provisional agenda
Standardization of technical and safety requirements in inland navigation: Recommendations on Harmonized Europe-Wide Technical Requirements for Inland Navigation Vessels (Resolution No. 61, revised)

Aligning of the Annex to Resolution No. 61, revised, with the European Standard laying down Technical Requirements for Inland Navigation vessels (ES-TRIN) Edition 2017

Note by the secretariat

Mandate

1. This document is submitted in line with cluster 5: Inland Waterway Transport, paragraph 5.1 of the programme of work 2018-2019 (ECE/TRANS/SC.3/2017/24) to be adopted by the Inland Transport Committee at its eightieth session (20-23 February 2018).

2. It is recalled that the Working Party on Inland Water Transport (SC.3) at its sixtieth session had decided to align the Annex to Resolution No. 61 with the European Standard laying down Technical Requirements for Inland Navigation vessels (ES-TRIN) (ECE/TRANS/SC.3/203, para. 67) adopted by the European committee for drawing up common standards in the field of inland navigation (CESNI). On 6 July 2017, the European Committee for drawing up Standards in the field of Inland Navigation (CESNI) had adopted ES-TRIN Edition 2017, which replaced 2015 Edition (available at www.cesni.eu/documents/es-trin-2017/).

3. The present document reproduces the text of new and/or revised provisions from Parts I and II of ES-TRIN 2017. SC.3/WP.3 may wish to use this for further work on updating the Annex to Resolution No. 61.

Annex

Proposal for updating Sections 1-2, 7-7 and Chapters 8A, 9 and 10 of the Annex to Resolution No. 61, revised*

I. Proposal for updating Section 1-2 "Definitions"

The present part reproduces the text of new definitions from Article 1.01 of ES-TRIN 2017.

"1.29 'Traditional craft': a craft which, based on its age, its technical nature or construction, its rarity, its meaning for the preservation of traditional principles of seamanship or techniques of inland navigation or its significance for a period from a historic viewpoint, is worthy of being preserved, and is operated for demonstration purposes in particular, or a replica thereof;

1.30 'Replica of a traditional craft': a craft which was largely built from original materials, using an appropriate construction method according to plans or templates as a traditional craft;

3.4 'electrical service room' a room in which components of an electric propulsion system such as control cabinets or electric engines are located, and which is not a main engine room or engine room;

3.21 'explosive atmosphere' a mixture with air, under atmospheric conditions, of flammable substances in the form of gas, vapour, dust, fibres, or flyings, which, after ignition, permits self- sustaining flame propagation;

3.22 'hazardous area' an area in which an explosive gas atmosphere is or may be expected to be present, in quantities such as to require special precautions for the construction, installation and use of equipment;

3.23 'zones' hazardous area classification based upon the frequency of the occurrence and duration of an explosive atmosphere;

'Zone 0': areas in which an explosive atmosphere is present continuously or for long periods or frequently.

'Zone 1': areas in which an explosive atmosphere is likely to occur in normal operation occasionally.

'Zone 2': areas in which an explosive atmosphere is not likely to occur in normal operation but, if it does occur, will persist for a short period only. These areas also include areas directly adjoining Zone 1 that are not separated from one another in a gas tight manner.

3.24 'certified safe type electrical equipment' an electrical equipment which has been tested and approved by the competent authority regarding its safety of operation in an explosive atmosphere;

6.6 'self-extinguishing' the characteristic of a burning substance whereby it extinguishes itself of its own accord within a short period once the ignition source has been removed, i.e. does not continue to burn;

* Only new and/or revised paragraphs and Articles of ES-TRIN are reproduced here.

7.9 'VTT standard' the CCNR Standard 'Vessel Tracking and Tracing Standard for Inland Navigation' edition 1.2[1] or the technical specifications defined by Implementing Regulation (EU) no. 689/2012[2];

7.10 'Inland ECDIS standard': the CCNR Standard 'Electronic Chart Display and Information System for Inland Navigation' edition 2.3[3] or the technical specifications defined by Implementing Regulation (EU) no. 909/2013[4];

7.11 'Test Standard for Inland AIS': the CESNI Inland AIS Test Standard edition 2.0[5];

11. Electrical equipment, installations and propulsion systems

11.1 'power source' an energy carrier or energy converter used for producing useful energy. For rudder machinery propulsion systems the power supply to the steering drive unit and the steering apparatus produced by an on-board network, a battery, an accumulator or an internal combustion engine;

11.2 'electrical power source' an energy source from which electric power is obtained;

11.3 'accumulator' a rechargeable storage device for electrical energy on an electro-chemical basis;

11.4 'battery' a non-rechargeable storage device for electrical energy on an electro-chemical basis;

11.5 'power electronics' an installation, appliance, assembly or device for converting electrical energy with switching electronic devices or a system comprised thereof."

II. Proposal for revising Section 7-7 "Movable wheelhouses"

The present part reproduces the text of Article 7.12 of ES-TRIN 2017.

"**Article 7.12**
Elevating wheelhouses

1. A mechanically powered elevating wheelhouse and its appliances shall be designed in such a way that the safety of persons on board is not endangered.

2. An elevating wheelhouse shall not endanger the stability of the vessel.

3. Operations carried out from the wheelhouse shall not be hindered during lifting and lowering. It shall be possible to enter and leave the wheelhouse safely, whatever its position.

[1] Vessel Tracking and Tracing Standard for Inland Navigation standard, Edition 1.2; Resolution CCNR 2013-I-23 dated 29 May 2013

[2] Commission Implementing Regulation (EU) no. 689/2012 dated 27 July 2012 amending Regulation (EC) no. 415/2007 on the technical specifications applicable to the vessel tracking and location systems referred to in Article 5 of directive 2005/44/EC of the European Parliament and Council on harmonised river information services (RIS) on community navigable waterways (OJ L 202 dated 28.7.2012).

[3] Electronic Chart Display and Information System for Inland Navigation (Inland ECDIS) Edition 2.3; CCNR Resolution 2012•II-20 dated 29 November 2012.

[4] Commission Implementing Regulation (EU) no. 909/2013 of 10 September 2013 on the technical specifications pertaining to the Electronic Chart Display and Information System for Inland Navigation (Inland ECDIS) referred to in Directive 2005/44/EC of the European Parliament and Council (OJ L 258 dated 28.9.2013).

[5] Inland AIS Test Standard Edition 2.0; CESNI Resolution 2017-II-2 dated 6 July, 2017.

4. It shall be possible to operate the lifting mechanism from inside the wheelhouse. The following indications shall be arranged at the steering position:

a) voltage present,

b) wheelhouse in lowest position,

c) wheelhouse in highest position,

d) wheelhouse locked in fixed position (if applicable).

5. The lifting mechanism shall enable the wheelhouse to stop in all positions. If the possibility exists to lock the wheelhouse in a certain position, the lifting mechanism shall be automatically disabled when locking takes place. Releasing the locks shall be possible under all operating conditions.

6. The lifting mechanism shall be designed in such a way that exceeding the terminal positions is not possible.

7. Arrangements shall be provided to avoid uncontrolled lowering of the wheelhouse. Appropriate protection features shall be installed to prevent the risk of injury which may result from lowering. All lowering operations shall automatically trigger an optical and a clearly audible acoustic warning signal.

8. Elevating wheelhouses shall be fitted with an emergency lowering system, which is independent from the normal lifting mechanism and can be used even in the event of a power failure. This emergency system shall be operated from inside the wheelhouse. When using the emergency system the lowering speed shall not be less than the lowering speed under normal conditions.

9. (left void)

10. Hydraulic hoses are:

a) only permissible, if vibration absorption or freedom of movement of components makes their use inevitable,

b) to be designed for at least the maximum service pressure,

c) to be renewed at the latest every eight years.

11. Elevating wheelhouses and their appliances shall be inspected regularly, but at least once every twelve months, by a competent person. The safety of the installation is to be established by a visual check and a check on satisfactory operation.

12. Elevating wheelhouses and their appliances shall be inspected by an expert:

a) before being put into service for the first time,

b) before being put back into service after any major modification or repair, and

c) regularly, at least every five years.

In these inspections proof of adequate strength and stability shall be provided by calculations.

An inspection attestation shall be issued, signed by the expert and showing the date of the inspection.”

III. Proposal for revising Chapter 8A "Exhaust and pollutant particulate emissions from diesel engines"

The present part reproduces the text of Chapter 9 of ES-TRIN 2017.

"**CHAPTER 9**
EMISSION OF GASEOUS AND PARTICULATE POLLUTANTS FROM INTERNAL COMBUSTION ENGINES

Article 9.00
Definitions

For the purposes of this Chapter, the following definitions shall apply

1. 'internal combustion engine': an energy converter other than a gas turbine designed to transform chemical energy (input) into mechanical energy (output) with an internal combustion process; it includes, where they have been installed, the emission control system and the communication interface (hardware and messages) between the engine's electronic control unit(s) and any other control unit;

2. 'type-approval': the procedure whereby the competent authority certifies that an engine type or an engine family satisfies the relevant administrative provisions and technical requirements with regard to the levels of gaseous and particulate pollutants emitted by the engine(s);

3. 'engine family': an engine manufacturer's grouping of engines which, through their design, have similar exhaust emission characteristics, and respect the applicable emission limit values;

4. 'reference power': the net power that is used to determine the applicable emission limit values for the engine;

5. 'engine manufacturer': any natural or legal person who is responsible to the approval authority for all aspects of the engine type-approval or authorisation process and for ensuring conformity of engine production, and who is also responsible for market surveillance concerns for the engines produced, whether or not they are directly involved in all stages of the design and construction of the engine which is the subject of the type-approval process;

6. 'engine parameter protocol': the document pursuant to Annex 6, in which all the parameters, together with changes, and including components and engine settings which affect the level of emission of gaseous and particulate pollutants from the engine are duly recorded.

Article 9.01
General provisions

1. The provisions of this Chapter shall apply to all internal combustion engines with a reference power that is greater than or equal to 19 kW installed on board craft.

2. Internal combustion engines comply with the requirements of Regulation (EU) 2016/1628[6]. Only internal combustion engines of categories

a) IWP,

b) IWA,

c) NRE with reference power less than 560 kW or

d) engines recognized equivalent according to Regulation (EU) 2016/1628

shall be installed. [7] This compliance is established by means of a type approval certificate.

3. A copy of the type approval certificate, the engine manufacturer's instructions and the engine parameter protocol shall be kept on board.

4. The installation of replacement engines, as defined in Regulation (EU) 2016/1628, is prohibited.

5. For the purpose of discharging tasks pursuant to this Chapter, the inspection body may employ a technical service. Only technical services notified according to Regulation (EU) 2016/1628 are recognised for the purpose of this Standard.

Article 9.02
Entry in the inland navigation vessel certificate

The identification number, as well as the type-approval number where applicable, of all internal combustion engines on board the craft shall be entered in item 52 of the inland navigation vessel certificate.

[6] Regulation (EU) 2016/1628 of the European Parliament and of the Council of 14 September 2016 on requirements relating to gaseous and particulate pollutant emission limits and type-approval for internal combustion engines for non-road mobile machinery, amending Regulations (EU) No. 1024/2012 and (EU) No. 167/2013, and amending and repealing Directive 97/68/EC (OJ L 252, 16.9.2016).

[7] *Note of the secretariat*: the following definitions apply in Article 4(1) of Regulation (EU) 2016/1628:
(1) 'category NRE':
(a) engines for non-road mobile machinery intended and suited to move, or to be moved, by road or otherwise, that are not excluded under Article 2(2) and are not included in any other category set out in points (2) to (10) of this paragraph;
(b) engines having a reference power of less than 560 kW used in the place of Stage V engines of categories IWP, IWA, RLL or RLR;
…
(5) 'category IWP':
(a) engines exclusively for use in inland waterway vessels, for their direct or indirect propulsion, or intended for their direct or indirect propulsion, having a reference power that is greater than or equal to 19 kW;
(b) engines used in place of engines of category IWA provided that they comply with Article 24(8);
(6) 'category IWA': auxiliary engines exclusively for use in inland waterway vessels and having a reference power that is greater than or equal to 19 kW;
(7) 'category RLL': engines exclusively for use in locomotives, for their propulsion or intended for their propulsion;
(8) 'category RLR':
(a) engines exclusively for use in railcars, for their propulsion or intended for their propulsion;
(b) engines used in the place of Stage V engines of category RLL;
…

Article 9.03
Provisions for the installation of internal combustion engines

The installation of engines in craft shall comply with the restrictions set out in the scope of the type approval.

Article 9.04
Engine manufacturer's instructions

1. The engine manufacturer's instructions, to be drawn up by the engine manufacturer, shall specify the exhaust relevant components as well as adjustments and parameters, whereby continuous compliance with the exhaust gas emission limit values can be assumed.

2. The instructions contain at least the following details:

a) type of engine and, where appropriate, engine family with an indication of the reference power and rated speed;

b) list of the components and engine parameters of relevance in an exhaust gas emission context;

c) unambiguous features to identify the permitted components of relevance in an exhaust gas emission context (e.g. part numbers appearing on the components);

d) engine parameters of relevance in an exhaust gas emission context such as setting ranges for the injection timing, permitted cooling water temperature, maximum exhaust gas backpressure.

Article 9.05
Tests of the internal combustion engines

1. At the time of the installation test and in the event of intermediate tests and special tests, the inspection body will inspect the current state of the engine with reference to the components, adjustments and parameters specified in the engine manufacturer's instructions and the engine parameter protocol.

2. The results of the tests pursuant to (1) shall be registered in the engine parameter protocol in accordance with Annex 6.

3. If the installation, intermediate and special tests show that, in relation to their parameters, components and adjustable features, the internal combustion engines installed on board comply with the specifications set out in the documents covered by Article 9.01(3), it may be assumed that the exhaust gas and particulate emissions from the internal combustion engines comply with the limit values.

If the inspection body finds that the internal combustion engine does not comply with the requirements set out in the documents covered by Article 9.01(3), it shall require that steps are taken to re-establish internal combustion engine conformity.

4. In the case of internal combustion engines with exhaust gas after treatment systems, checks shall be carried out to establish that these systems are functioning properly in the context of the installation, intermediate or special tests.

Article 9.06
Installation tests

1. After the installation of the internal combustion engine on board, but before it is brought into service, an installation test shall be carried out. This test, which forms part of the initial inspection of the craft, or of a special inspection by virtue of the relevant internal combustion engine having been installed, shall result either in the registration of

the engine in the inland navigation vessel certificate to be issued for the first time or in the modification of the existing inland navigation vessel certificate.

2. During the installation test, the inspection body shall ensure that an engine installed on board still complies with the technical requirements with regard to the level of emissions of gaseous and particulate pollutants, even after undergoing modifications or adaptations since the issuing of the type-approval.

3. The inspection body may dispense with an installation test pursuant to (1), if an internal combustion engine having a reference power output P_N of less than 130 kW is replaced by an internal combustion engine covered by the same type-approval according to Article 9.01(2). As a pre-condition, the inspection body shall be notified of the engine's replacement and shall be provided with a copy of the type-approval document and details of the identification number of the newly installed engine. The inspection body shall make the appropriate amendments to item 52 of the inland navigation vessel certificate.

Article 9.07
Intermediate tests

1. In the event of intermediates tests, the inspection body shall ensure that an engine installed on board still complies with the technical requirements with regard to the level of emissions of gaseous and particulate pollutants, even after undergoing modifications or adaptations since the installation test, have been undergone.

2. Intermediate tests on the internal combustion engine shall be carried out in the context of the craft periodical inspection.

Article 9.08
Special tests

1. In the event of special tests, the inspection body shall ensure that an engine installed on board still complies with the technical requirements with regard to the level of emissions of gaseous and particulate pollutants, after each significant modification.

2. After each significant modification to an engine, where such modifications have the potential to affect the emission of gaseous and particulate pollutants from the internal combustion engine, a special test must invariably be carried out.

Article 9.09
Specific requirements concerning exhaust gas after treatment systems

1. The exhaust gas after treatment systems shall not impair the safe operation of the craft, including propulsion system and power supply, nor block the exhaust system.

2. When the exhaust gas after treatment system of internal combustion engines, which ensure the main propulsion of a craft, is equipped with a bypassing device, the bypassing device must comply with the following conditions:

a) In the event of a failure of the exhaust gas after treatment system, the activation of the bypassing device must allow the craft to continue to make steerageway under its own power.

b) In the event of activation of the bypassing device, the by-pass device control system shall trigger an acoustic and optical alarm signal in the wheelhouse.

c) A by-pass device control system shall record in nonvolatile computer memory all incidents of engine operation with use of the bypassing device. The information shall be readily available for the competent authorities.

3. When a control diagnostic system is installed according to Article 25(3)(f) of Regulation (EU) 2016/1628, the required alarms shall trigger an acoustic and optical alarm signal in the wheelhouse in case of malfunctions.

4. If an after-treatment system relies on the use of a reagent in order to reduce emissions, the required alarms shall alert crew to the need to refill the reagent tank before it is empty, or to replace the reagent if it does not meet the concentration specifications.

When a control diagnostic system installed according to Article 25(3)(f) of Regulation (EU) 2016/1628 can activate power reduction of the internal combustion engine, the following requirements must be fulfilled:

a) The activation of the power reduction must allow the craft to continue to make steerageway under its own power.

b) In the event of activation of the power reduction, the control system shall trigger an acoustic and optical alarm signal in the wheelhouse.

5. The requirement of (1) shall be deemed to be fulfilled when the vessel is equipped with

a) a second independent propulsion system (even if that second system also includes an exhaust gas after treatment system) allowing the craft to continue to make steerageway under its own power; or

b) an after-treatment system with a bypass device according to (2).”

IV. Proposal for revising Chapter 9 “Electrical Installations”

The present part reproduces the text of revised articles 10.04, 10.08-10.11, 10.15 and 10.18 from Chapter 10 “Electrical equipment and installations”of ES-TRIN 2017.

“**Article 10.04**
Protection from explosion

“1. Only electrical equipment that has been explosion proofed (certified safety) may be installed in rooms or areas where explosive atmosphere is likely to accumulate. This equipment must be tested and approved as to its operating safety in an explosive atmosphere by testing institution recognised on the basis of national provisions of one of the Member States.

The installation in these rooms or areas of switching devices for lighting appliances and other electrical equipment is to be avoided as far as possible. The explosion proofing shall take account of the characteristics of the atmosphere that is likely to arise (explosion-potential group, temperature class) and of the requirements of the relevant zone.

Information and restrictions in the approval certificates of the equipment must be observed.

The classification and evaluation of areas at risk of explosion is to be conducted and documented in accordance with International Standards EN 60079-10-1:2015 and EN 60079-10-2:2015.

2. The applicable rules for hazardous areas:

a) In Zone 0 areas only intrinsically safe circuits (protection class Ex ia) in accordance with International Standard IEC 60079-11:2012 are permitted.

b) In zone 1 areas only explosion-protected electrical equipment (certified safety) is permitted.

c) In zone 2 areas measures need to be taken to protect electrical equipment that are appropriate to the type and intended purpose of the service equipment.

Approval in these areas is restricted to:

aa) explosion-protected electrical equipment (certified safety) or

bb) service equipment, which in normal use do not produce any sparks and whose surfaces might come into contact with the outside air, do not reach impermissible temperatures, or

cc) service equipment which is protected by pressurization or which is encapsulated in a vapour-proof manner (minimum protection class IP 55) and whose surfaces do not reach impermissible temperatures.

3. For dust explosion protection, the requirements shall apply according to European Standard EN 60079-10-2:2015.

…

Article 10.08
Connection to the shore or other external networks

1. The feed-in unit, that is the entire onboard equipment for transferring electrical power to the craft, must be designed as follows:

a) Transfer from shoreside power supply systems:

aa) For currents up to 125 A, the requirements of European Standards EN 15869-1 and EN 15869-3 in the version in force on 6 July 2017 are to be complied with.

bb) For currents greater than 250 A, the requirements of European Standard EN 16840:2017 are to be complied with.

b) In all other cases, the requirements of (2) to (9) shall apply. The requirements specified shall be deemed to have been complied with if the standards referred to in (a) are adhered to for the use in question.

…

9. If sockets devices rated at more than 16 A are used, steps shall be taken to ensure that connection and disconnection can take place only when the line is dead.

Article 10.09
Power supply to other craft

1. When power is applied to other craft, a separate connection must exist.

2. Article 10.08(2) and (4) to (9) shall apply *mutatis mutandis.*

Article 10.10
Generators, engines and transformers

1. Generators driven by the main engine, the propeller shaft or by an auxiliary set intended for another function shall be designed as a function of the range of rotational speeds which can occur during operation.

2. Transformers must be installed in well-ventilated locations or in well-ventilated rooms.

3. Primary and secondary windings of transformers shall be executed in an electrically isolated manner. Autotransformers are excluded hereof.

4. Corresponding tappings of the nominal voltage shall be provided for setting the secondary voltage of transformers. Autotransformers are excluded hereof.

5. Engines, generators, and transformers shall be provided by the manufacturer with a plate, which in addition to the company name, the machine's serial number and the rated power must contain the essential rating data.

Article 10.11
Batteries, accumulators and their charging devices

1. Accumulators shall be accessible and so arranged as not to shift with movements of the craft. They shall not be placed where they will be exposed to excessive heat, extreme cold, spray, steam or vapour.

2. Accumulators shall not be installed in the wheelhouse, accommodation lounges and holds and in the case of passenger vessels in passenger rooms, cabins and galleys. The first sentence shall not apply for accumulators:

a) in mobile equipment; or

b) with charging power of less than 0.2 kW.

3. Accumulators requiring a charging power of more than 2.0 kW shall be installed in a special room. If placed on deck, they may also be enclosed in a cupboard. If gas can escape from accumulators, this room or cupboard must be mechanically ventilated to the open deck (supply and exhaust air).

4. The charging power is calculated on the basis of the maximum charging current and the nominal voltage of the accumulator, taking into account the characteristic charging curves of the charging device.

5. Accumulators requiring a charging power not exceeding 2.0 kW may also be installed below decks in a cupboard or chest. They may also be installed without casing in an engine room, electrical service room or any other well-ventilated place provided that they are protected against falling objects and dripping water.

6. The interior surfaces of all rooms, cupboards or chests, as well as shelving or other components intended for accumulators shall be protected against the harmful effects of the electrolyte.

7. Provision shall be made for effective ventilation when accumulators are installed in a closed room, cupboard or chest. Mechanical ventilation shall be provided for charging power of more than

a) 2.0 kW for nickel-cadmium accumulators;

b) 3.0 kW for lead accumulators.

The air shall enter at the bottom and be discharged at the top so that a total evacuation of gases is ensured.

Ventilation ducts shall not include devices which obstruct the air flow such as stop valves.

8. The required air throughput (Q) shall be calculated by the following formula:

$$Q = f \cdot I_{gas} \cdot n \; [m^3/h],$$

where

f = 0.11 for accumulators with liquid electrolytes;

f = 0.03 for accumulators with enclosed cells (electrolyte immobilised in gel, non-woven fibrous material);

I_{gas} = ¼ of the maximum current of the charging device in A;

n = number of cells in series circuit.

In the case of buffer accumulators of the onboard network, other methods of calculation taking into account the characteristic charging curve of the charging devices may be accepted by the inspection body, provided that these methods are based on the provisions of recognised classification societies or on relevant standards.

9. Where natural ventilation is used, the cross-section of the air ducts shall be sufficient for the required air throughput on the basis of an air flow velocity of 0.5 m/s. However, the cross section shall have a minimum value of

a) 80 cm^2 for lead accumulators;

b) 120 cm^2 for nickel-cadmium accumulators.

10. Where mechanical ventilation is used, a fan shall be provided, preferably with an exhauster device; its motor shall be clear of the gas stream and the air stream. Fans shall be of a construction precluding the production of sparks through contact between a blade and the fan casing and shall avoid any electrostatic charges.

11. A symbol for ‘Fire, naked flame and smoking prohibited’ in accordance with figure 2 of Annex 4 with a diameter of at least 10 cm shall be affixed to the doors or covers of accumulator rooms, cupboard or chest.

12. Charging devices must basically be designed so that discharged accumulators can be re- charged within a maximum of 15 hours to 80 % of their nominal capacity, without exceeding the amperage of maximum permissible charge rate.

13. Only automatic charging devices which correspond to the charging characteristics of the accumulator type must be used.

14. For the simultaneous supply of consumer equipment while charging, the power requirements of the consumer equipment must be taken into account when selecting the charger. A charging voltage of up to a maximum of 120 % of the rated voltage must be observed irrespective of the current power requirements.

15. The requirements of European Standard EN 62619 in the version in force on 6 July 2017 and EN 62620:2015 shall apply for lithium-ion accumulators.

16. Accumulator management systems for monitoring the accumulators are to be used if possible. Lithium-ion accumulators must be equipped with such systems.

These systems shall at a minimum comprise the following functionality:

a) cell protection (short-circuit, external, internal, overcurrent, deep discharge, etc.);

b) charge control, provided this is not by means of the charger;

c) load management;

d) determination of the charge level;

e) balancing of the cells;

f) thermal management.

Depending on use, if possible, they should also feature the following functionality:

g) determination of ageing, remaining capacity, internal resistance etc.;

h) communication (e.g. with inverters and control devices);

i) authentication and identification;

j) history.

17. For batteries, (1) to (12) and (16) shall apply *mutatis mutandis*.

…

Article 10.15
Cables, insulated cables and cable systems

1. Cables shall be flame-retardant, self-extinguishing and resistant to water and oil.

In accommodation, the inspection body may authorise the use of other types of cables, provided they are effectively protected, flame-retardant or self-extinguishing.

For determining that electric cables are flame-retardant, shall

a) the requirements of European Standards series EN 60332-1 and EN 60332-3 in the version in force on 6 July 2017 or

b) equivalent regulations of one of the Member States be recognised.

…

7. Cable connections must be protected against mechanical load and against pulling load.

8. When cables pass through bulkheads or decks, the mechanical strength, water tightness and required fire protection properties (e.g. non-combustible, flame-retardant, fire-resistant) of these bulkheads and decks shall not be affected by these cable penetrations.

9. Terminations and connections of all conductors must be designed so that the original electrical, mechanical, fire protection properties (e.g. non-combustible, flame-retardant, fire-resistant) of the cable are preserved. This requirement shall have been fulfilled if the terminations and the connections meet:

a) International Standard IEC 60092-352:2005 number 3.28 in conjunction with Annex D of the standard or

b) equivalent regulation or Standard recognised by one of the Member States. The number of cable connections must be restricted to a minimum.

For repaired or replaced cables, sentence 1 shall have been fulfilled if the cable connections comply with International Standard IEC 60092-352:2005 number 3.28 in conjunction with annex D of the standard, or rules recognised by a Member state as being equivalent.

10. Cables connected to elevating wheelhouses shall be sufficiently flexible and be fitted with insulation with sufficient flexibility at temperatures down to -20 °C and resistant to steam and vapour, ultraviolet rays and ozone.

11. When setting up cable harness penetrations, the fire protection properties of the partition must not be impaired. This shall be deemed to be met if the cables meet the provisions of European Standard series EN 60332-3 in the version in force on 6 July 2017 or one of the rules recognised as an equivalent by a Member State. If this is not the case, fire stop equipment must be provided in the penetrations for long cable harnesses (more than 6 m vertical and 14 m horizontal) if the cables are not completely enclosed by cable ducts.

12. Cables from an emergency electrical power source to consumer equipment must be laid as far as possible in the safe area.

13. The running of cables through areas with high ambient temperatures should be avoided. If this is not possible,

a) the ambient temperatures must be taken into account when determining the maximum permissible amperage or

b) the cable must be protected against damage by heat and fire.

14. Main and emergency power supply cables must not run through the same room. The inspection body may waive this requirement if:

a) main and emergency power supply cables are laid as far apart from each other as possible or

b) the emergency power supply cables are fire-resistant. This requirement shall have been fulfilled if they satisfy the requirements of International Standards series IEC 60331 in the version in force on 6 July 2017.

…

Article 10.18
Power electronics

1. A separate device for disconnecting from the mains must be provided for each power electronics system. The combination fuse – switch may be used for consumer equipment up to a nominal current of 315 A. In all other cases, a circuit-breaker must be provided on the network side.

2. The power electronics should be readily accessible for repairs and measurements. Appropriate devices must be provided for checking functions and detecting malfunctions.

3. Control and signal electronics must be galvanically separated from power circuits.

4. Converter systems must ensure safe operation even with the largest permissible voltage and frequency fluctuations. For impermissibly high frequency and/or voltage variations in the supply voltage, the system must switch itself off or remain in a safe operating condition.

5. Electric charges in assemblies should be reduced to a voltage below 50V in less than 5 seconds after disconnecting from the network. If longer discharge times are required, a warning sign must be affixed to the device.

6. The failure of external control signals, must not lead to a dangerous condition.

7. Power electronics must be designed and installed in such a way that the failure of control voltages cannot lead to threats or damage to the system or device where the power electronics is installed, or to the overall system.

8. In installation which is required for propulsion and manoeuvrability as well as safety of the crew, craft or cargo, components must be provided for monitoring the individual power electronic assemblies and subsystems in order to facilitate error detection in the event of a malfunction and prevent the existence of undetected errors.

9. The monitoring of the power electronics must detect errors with certainty and prevent them from remaining unrecognised.

10. Except for components, only power electronics that have undergone type examination may be used. If the power electronics feature protective and monitoring devices, the examination must also include proof of the response thresholds and coordinated interaction of all protective and monitoring equipment. The type examination report is to be included with the system documentation.”

V. Proposal for revising Chapter 10 “Equipment”

The present part reproduces the text of revised paragraphs from Article 13.05, Chapter 13 “Equipment” of ES-TRIN 2017.

“**Article 13.05**
Permanently installed firefighting systems for protecting engine rooms, boiler rooms and pump rooms

1. Extinguishing agents

For protecting engine rooms, boiler rooms and pump rooms, the following extinguishing agents may be used in permanently installed fire-fighting systems:

a) CO_2 (carbon dioxide);

b) HFC 227 ea (heptafluoropropane);

c) IG-541 (52 % nitrogen, 40 % argon, 8 % carbon dioxide);

d) FK-5-1-12 (Dodecafluoro-2-methylpentane-3-on);

e) Water.

…

9. Installation, inspection and documentation

a) The system shall be installed or converted only by a firm specialising in fire-fighting systems. The requirements specified by the extinguishing agent manufacturer and the system manufacturer (product data sheet, safety data sheet) are to be complied with. Maintenance, in particular of the condition of the spray nozzles, shall be carried out regularly in accordance with the instructions of the system manufacturer or producer of the extinguishing agent (data sheet).

…

14. Fire-fighting systems using water as the extinguishing agent

Fire-fighting systems using water as the extinguishing agent may only release this agent into the room to be protected in the form of a water mist. The droplet size must be between 5 and 300 microns.

In addition to the requirements laid down in (1) to (7) and (9), (8) applies *mutatis mutandis*, these fire-fighting systems must comply with the following provisions:

a) The fire-fighting system shall have a type-approval pursuant to MSC/Circ. 1165[8] or another Standard recognised by one of the Member States. Type-approval shall be carried out by a recognised classification society or an accredited testing institution. The accredited testing institution shall comply with the European Standard for general requirements for the competence of testing and calibrating laboratories (EN ISO/IEC 17025:2005).

b) The fire-fighting system must be sized according to the largest of the rooms to be protected and must be able to spray water continuously into the room for a minimum of 30 minutes.

[8] Circular MSC/Circ. 1165 – Revised guidelines for the approval of equivalent water-based fire-extinguishing systems for machinery spaces and cargo pump-rooms – adopted on 10 June 2005 and as amended by MSC/Circ.1269 , MSC/Circ.1386 and MSC/Circ.1385.

c) The pumps, their switching mechanisms and the valves that are required in order for the system to operate should be installed in a room outside the rooms to be protected. The room in which they are installed should be separated from adjacent by at least type A30 partition walls.

d) The fire-fighting system must be completely full of water at all times at least as far as the trip valves and be under the required initial operating pressure. The water supply pumps must be automatically initiated when the system is triggered. The system must feature a continuously operating water supply. Measures must be taken to ensure impurities do not affect system operation.

e) The capacity and design of the system's pipe network must be based on an hydraulic calculation.

f) The number and arrangement of nozzles must ensure sufficient distribution of water in the rooms to be protected. The spray nozzles must be located so as to ensure that the water mist is distributed throughout the room to be protected, especially in those areas where there is a higher risk of fire, including behind the fittings and beneath the floor.

g) The fire-fighting system's electrical components in the room to be protected must at a minimum comply with protection class IP54. The system shall feature two independent energy sources with automatic switching. One of the power sources must be located outside the room to be protected. Each power source should on its own be capable of ensuring the operation of the system.

h) The fire-fighting system must feature redundant pumps.

i) The fire-fighting system must be equipped with a monitoring device which triggers an alarm signal in the wheelhouse in the following cases:

- drop in water tank level (if fitted),
- power supply failure,
- loss of pressure in the low pressure system pipework,
- loss of pressure in the high pressure circuit,
- when the system is activated.

j) The documents required for the installation, functional testing and documentation of the installation referred to in (9) must include at a minimum:

- a schematic diagram of the system showing the sections of pipe work and the types of spray nozzle,
- the hydraulic calculation referred to in (d),
- the manufacturer's technical documentation covering all aspects of the installation,
- the maintenance manual.”