



Explanatory notice

Guidelines on competence requirements for the operation of craft with an electrical power supply for propulsion

1. Context

The CESNI Working group on professional qualifications drew up guidelines for competences for the operation of craft with an electrical power supply for propulsion. The guidelines are intended to address first the training institutes and schools that train students in new technologies. They can also address craft owners, who are responsible for ensuring that the crew is trained in new technologies. They can also be a useful source of information for insurance companies, which insure the crew against work-related accidents and are therefore likely to set requirements for crew members.

The CESNI Secretariat worked out an explanatory notice for the guidelines on competence requirements for the operation of craft with an electrical power supply for propulsion. This notice is for documentary purposes only and intends to provide details and background information about the elaboration of the guidelines.

2. Methodology

CESNI/QP has chosen to elaborate guidelines at this stage for the following reasons:

- it may be premature, due to the absence of substantial feedback and experience with new technologies, to determine competence standards with a long-term and stable vision;
- a risk-based approach enabled experts to determine a list of minimum requirements for competences to ensure a safe handling of the technology for a safe navigation of the vessel and for crew members;
- in addition, also considering that experts and stakeholders alike advocate a simple system from a regulatory point of view, experts tend to believe that it is not desirable to require 1 expert per new technology. This would make crew compositions very complex, all the more so in a context of shortage of personnel. However, to meet all safety requirements, further reflections are necessary before deciding upon such a generalist approach, given the distinct differences in the characteristics of the alternative fuels;
- it may be preferable, at this early stage, to leave flexibility to the market to choose the appropriate approach and in particular to determine which person on board and/or on-shore is most appropriate to fulfil a specialist function, including instructing others involved;
- this tailor-made approach also makes it possible to anticipate the multi-development of new technologies, that will probably be based on a combination of technologies on board the same vessel;
- guidelines provide for flexibility: they can be updated over time to take into account the feedback from the practice.

To work out the guidelines, experts identified the following main risks linked to the operation of craft with an electrical power supply for propulsion:

- **Lithium-ion batteries:** focus is put on craft equipped with lithium-ion batteries for propulsion as risks are linked to lithium-ion batteries; this does not prejudice that other battery technologies may be taken into account;

- **Thermal runaway**: potential fires caused by long chemical reaction can last several hours, if not days; the craft structure may be damaged;
- accumulation of explosive gas in case of fire may lead to **potential explosion**
- **Gas leakage**: in the battery room, gas may be released in case of cell failure. The crew access has to be restricted or the room has to be ventilated;
- **Electrical hazards** may cause injuries to the crew members (electrocution);
- **Incorrect connection** when using interchangeable contactors can be avoided with an automatic connection.

Other elements contributed to the elaboration of the guidelines:

- **Maintenance**: most of the maintenance is regularly carried out by specialised companies/individuals with specific certifications. In case of problems, these companies are called in. Daily maintenance on board which is the responsibility of the crew is limited or not necessary at all.
- **Swappable batteries**: incorrect handling of batteries can lead to damage and make them dangerous, so it is important to follow the instructions provided by the manufacturer.
- **Voltage**: the maximum authorised voltage is currently 690 volts according to ES-TRIN (article 10.06). It is appropriate to limit the scope of application to low voltage (1000 volts), as crew members are in most cases confronted with voltages below 1000v, without prejudice to situations where higher voltages are authorised, such as in the case of exemptions granted by inspection bodies or for recommendation requests.

3. Content of the guidelines

The guidelines provide a list of minimum competence requirements for specialised persons (on board and/or on-shore) who will have to

- 1) be familiar with the specific risks associated with the new technology they will be handling;
- 2) familiarise other persons involved (on land or on board), in an instructive function;
- 3) detect situations likely to result in an accident;
- 4) detect when an incident has occurred and assess the risks for the vessel and the crew;
- 5) take immediate protective measures in the event of an incident.

In order to better frame the reflections, a list of definitions has been developed in addition to the guidelines to ensure a common understanding of the framework related to “alternative technologies”:

1. **“craft with an electrical power supply for propulsion”**: a craft which uses power from (at least one) electrical power source (generators*, batteries, fuel cells).
**generators may use gas-oil, methanol, hydrogen or any other fuel.*
2. **“craft with batteries**”**: a craft whose (all or part of)** power supply for propulsion comes from batteries.
A battery* is a rechargeable **storage** device for electrical energy on an electro-chemical basis.
A battery* can be built-in or swappable.
** the term “accumulator” may also be used.*
*** the use of battery can vary: from assistance to other energy sources (like fuel cell or engine) to full supply for the electric engines used for craft propulsion*
3. **“craft with fuel cells”**: a craft whose power supply for propulsion (all or part of it) comes from fuel cells.
A fuel cell is an energy **converter** in which, by oxidation, the chemical energy of the fuel (i.e. methanol or hydrogen) is directly converted to electrical and thermal energy.
(A craft with fuel cells is always equipped with batteries.)
4. **“craft using methanol as fuel”**: a craft for which methanol is used by the energy converter (combustion engine or fuel cell).

Regarding the holder of the competence, the generic term “specialised person” has been used. This designation does not prejudge whether the holder will be a crew member or not. It also avoids confusion with existing terms such as "expert" or "competent person". It also does not prejudge if and how the legislator will decide how this will be integrated into the legal framework.

4. Impact on inland navigation

The development of guidelines for competence requirements for the operation of craft with an electrical power supply for propulsion allows to go towards a harmonisation of requirements. They contribute the safety of crew members and navigation as they permit to counter the risks associated with the emergence of new technologies used for propulsion thanks to a well-trained crew.
