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## Economic Commission for Europe

### Inland Transport Committee

#### Working Party on Inland Water Transport

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

###### Fifty-fourth session

Geneva, 13–15 February 2019

Item 6 (c) of the provisional agenda

##### 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 Instructions for the application of special provisions of the European Standard laying down Technical Requirements for Inland Navigation Vessels Edition 2017**

#### Note by the secretariat

#### Mandate

1. This document is submitted in line with cluster 5: Inland Waterway Transport, paragraph (a) 5.2 of the Transport subprogramme of work 2018–2019 (ECE/TRANS/2018/21/Add.1) adopted by the Inland Transport Committee at its eightieth session (23 February 2018).
2. It is recalled that the Working Party on Inland Water Transport 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). The present document reproduces the text of the Instructions for the application of the technical standard ES-TRIN 2017: Part III, “Special provisions” (ESI-III-1 to ESI-III-7).
3. Working Party on the Standardization of Technical and Safety Requirements in Inland Navigation may wish to develop a new appendix to the annex to resolution No. 61, using them as a basis.

**Annex**

**Proposal for a new appendix of the annex to  
resolution No. 61, revised  
“Instructions for the application of the technical standard**

**PART III  
SPECIAL PROVISIONS**

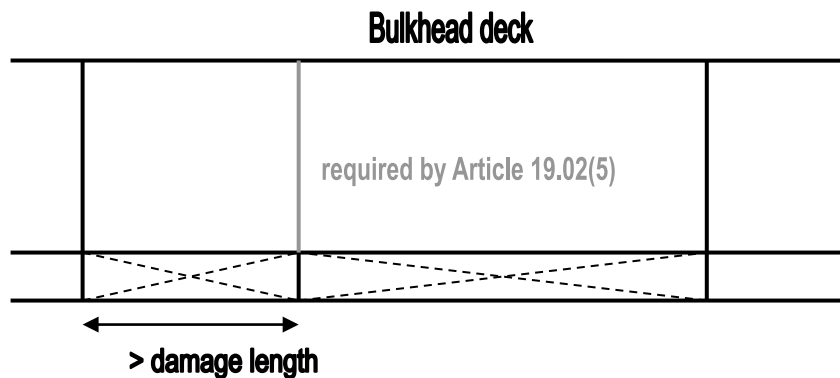
**ESI-III-1  
Application of requirements of Chapter 19**

- **Local subdivisions**
- **Transitional provisions for enclosures made with awnings or similar mobile installations**

(Article 19.02(5), 19.03(5))

**1. Local subdivisions (article 19.02(5))**

Under Article 19.02(5) it is conceivable that local watertight subdivisions, such as transversally subdivided double bottom tanks of a greater length than the damage length to be considered, will not be included in the evaluation. In this case it might not be possible to take the transversal subdivision into account if it is not extended up to the bulkhead deck. This might lead to inappropriate subdivisions of bulkheads.



**Interpretation of the requirement:**

If a watertight compartment is longer than required by Article 19.03(9) and it contains local subdivisions which form watertight sub compartments, and between which the minimum damage length can be contained, these can be taken into account in the damage stability calculation.

## **2. Transitional provision for enclosures made with awnings or similar mobile installations with regard to stability (Article 19.03(5))**

Enclosures made with awnings or similar mobile installations can cause problems with the stability of the vessel since, if of sufficient size to do so, they influence the heeling moment due to wind pressure.

### **Interpretation of the requirement:**

In the case of passenger vessels for which a vessel certificate was issued for the first time before 1 January 2006 according to RVIR, or for which Article 32.05(2), second sentence, is invoked, after the erection of an enclosure made with awnings or similar mobile installations, a new stability calculation must be made according to Article 19.04 of this Standard, in so far as its lateral plane  $A_{wz}$  exceeds 5% of the total lateral plane  $A_w$  to be taken into account in each case.

## **ESI-III-2**

### **Specific safety needs of persons with reduced mobility**

**(Article 1.01(12.2), article 19.01(4) , article 19.06(3) to (5), (9), (10), (13) and (17), article 19.08(3), article 19.10(3), article 19.13(1) to (4))**

#### **1. Introduction**

Persons with reduced mobility have safety needs exceeding those of other passengers. These needs are taken into account in the requirements of Chapter 19, which are explained as follows.

These requirements are intended to ensure that persons with reduced mobility can stay and move safely on board vessels. In addition, in an emergency such persons should have the same level of safety as other passengers.

It is not necessary that all passenger areas fulfil the specific safety requirements of persons with reduced mobility. Therefore those requirements apply only to certain areas. However, the persons in question must be given the opportunity of being informed of the areas specially adapted for them in view of safety, so that they can organise their stay on board accordingly. It is the responsibility of the ship-owner to make the corresponding areas available, make them known and communicate them to persons with reduced mobility.

The provisions concerning persons with reduced mobility make reference to:

- Directive 2009/45/EC<sup>1</sup> and
- the guide for the adaptation of inland waterway passenger vessels to people with disabilities in accordance with resolution No. 69 of ECE.<sup>2</sup>

The definition of the term “persons with reduced mobility” used in the Standard is largely identical to that of the Directive and most of the technical requirements are based on the above mentioned guide. In cases of doubt, therefore, both can be referred to when taking

<sup>1</sup> Directive 2009/45/EC of the European Parliament and of the Council of 6 May 2009 establishing safety rules and standards for passenger ships (OJ L 163, 25.6.2009).

<sup>2</sup> Guidelines for passenger vessels also suited for carrying persons with reduced mobility - United Nations Economic Commission for Europe, Inland Transport Committee, Working Group on Inland Water Transport – Adopted on 15 October 2010.

decisions. In general, the requirements of the Directive and the guide go beyond those of this Standard.

The requirements of the Standard do not concern berths and similar installations. These are subject to national provisions.

**2. Article 1.01(12.2) – term “persons with reduced mobility”**

“Persons with reduced mobility” means anyone who, as a result of physical impairments, cannot move or distinguish their surroundings in the same way as other passengers. This definition includes persons with impaired eyesight or hearing or persons accompanying children in buggies or being carried. However, for the purposes of these provisions, persons with reduced mobility do not include anyone with psychic impairments.

**3. Article 19.15(4) – Areas provided for use by persons with reduced mobility**

Areas provided for use by persons with reduced mobility range from, in the simplest case, the entrance area to the places from which an evacuation will take place in an emergency. They shall include:

- a place where life-saving equipment is stowed or issued in an emergency,
- seats,
- a suitably-adapted toilet (see (10) of this instruction), and
- connecting corridors.

The number of seats corresponds at least approximately to the number of persons with reduced mobility that – over a lengthy period – are most frequently onboard simultaneously. The number should be determined by the ship-owner on the basis of experience, as this is beyond the knowledge of the competent authority.

On cabin vessels consideration shall also be given to connecting corridors to passenger cabins used by persons with reduced mobility. The number of such cabins is to be determined by the ship-owner in the same way as the number of seats. With the exception of the width of doors, no requirements are imposed for the special arrangement of cabins. It is the responsibility of the owner to make any further necessary arrangements.

**4. Article 19.06(3)(g) – Exits of rooms**

With regard to the requirements concerning the width of connecting corridors, exits and openings in bulwarks or guard rails intended for use by persons with reduced mobility or usually used for the embarkation or disembarkation of persons with reduced mobility, consideration shall be given to buggies and the fact that people may be dependent on various types of walking aids or wheelchairs. In the case of exits or openings for embarkation or disembarkation account shall also be taken of the additional space needed for any assisting staff.

**5. Article 19.06(4)(d) – Doors**

The requirements regarding the arrangement of the area surrounding doors intended for use by persons with reduced mobility shall ensure that persons dependent for example on walking aids can open such doors safely.

**6. Article 19.06(5)(c) – Connecting corridors**

See (4) of this instruction.

**7. Article 19.06(9) – Stairways and elevators**

The requirements for the arrangement of stairways shall, in addition to possible reduced mobility, also take into account eyesight impediments.

**8. Article 19.06(10)(a) and (b) – Bulwarks and guard rails**

The requirements for bulwarks and guard rails of decks intended for use by persons with reduced mobility shall provide for a greater height since such persons are more likely to lose their balance or be unable to hold on by themselves.

See also (4) of this instruction.

**9. Article 19.06(13) – Passageways**

For various reasons, persons with reduced mobility need to support themselves or hold on more frequently, so walls in passageways intended for use by persons with reduced mobility shall be equipped with handrails at an appropriate height.

See also (4) of this instruction.

**10. Article 19.06(17) – Toilets**

Persons with reduced mobility shall also be able to stay and move safely in toilets, so at least one toilet shall be adapted accordingly.

**11. Article 19.08(3)(a) and (b) – Alarm system**

Persons with reduced mobility are more likely to encounter situations in which they are dependent on the help of others. In rooms in which, as a general rule, they cannot be seen by crew members, shipboard personnel or passengers, the possibility of triggering an alarm should therefore be provided for. This applies to toilets intended for use by persons with reduced mobility.

Persons with reduced mobility include persons with impaired eyesight or hearing. Consequently, at least in areas intended for use by persons with reduced mobility, the passenger alarm system shall provide suitable visual and audible alarms.

**12. Article 19.10(3)(d) – Sufficient lighting**

Persons with reduced mobility also include persons with impaired eyesight. Sufficient lighting in areas intended for use by persons with reduced mobility is therefore essential and shall meet higher requirements than lighting for other passenger areas.

**13. Article 19.13(1) – Safety rota**

The special safety measures necessary for persons with reduced mobility to be taken into consideration in the safety rota shall take into account both the possibility of reduced mobility and impaired hearing and eyesight. For such persons measures for normal operation shall be taken into account in addition to measures in the event of emergencies.

**14. Article 19.13(2) – Safety plan**

The areas covered by (3) of this instruction shall be designated.

**15. Article 19.13(3)(b) – Displaying the safety rota and the safety plan**

At least the copies of the safety rota and the safety plan displayed in the areas intended for use by persons with reduced mobility shall be such that they can, where possible, also be

read by persons with impaired eyesight. This can be achieved for example by appropriate use of contrast and character size.

In addition, the plans shall be displayed at a height so that wheelchair users can read them as well.

**16. Article 19.13(4) – Code of conduct for passengers**

(15) of this instruction applies accordingly.

**ESI-III-3  
Strength of watertight windows**

**(Article 19.02(16))**

**1. General**

According to Article 19.02(16), watertight windows may be situated below the margin line if they are watertight, cannot be opened, possess sufficient strength and conform to Article 19.06(14).

**2. Construction of watertight windows**

The requirements of Article 19.02(16) are deemed to be fulfilled if the construction of watertight windows complies with the following provisions.

2.1 Only pre-stressed glass complying with International Standard ISO 614:2012 shall be used.

2.2 Round windows shall comply with International Standard ISO 1751:2012, Series B: medium heavy-duty windows, Type: non-opening window.

2.3 Angular windows shall comply with International Standard ISO 3903:2012, Series E: heavy-duty windows, Type: non-opening window.

2.4 ISO Standard windows may be replaced by windows whose construction is at least equivalent to the requirements of (2.1) to (2.3).

**ESI-III-4  
Safety guidance system**

**(Article 19.06(7); Article 29.09(d))**

**1. General**

1.1 According to the abovementioned provisions, passenger vessels and high-speed vessels shall have suitable guidance systems to clearly identify the escape routes and emergency exits when the normal emergency lighting is less effective due to smoke. Such guidance systems shall take the form of low-location lighting (LLL). This instruction covers the approval, installation and maintenance of such guidance systems.

1.2 In addition to the emergency lighting required by Article 19.10(3) the escape routes, including stairways, exits and emergency exits, shall be marked by low-location lighting (LLL) throughout the whole of the escape route, particularly at corners and intersections.

1.3 The LLL system shall function for at least 30 minutes after its activation.

1.4 LLL products shall be neither radioactive nor toxic.

1.5 Instructions on the LLL system shall be displayed with the safety plan in accordance with Article 19.13(2) and in every cabin.

## **2. Definitions**

2.1 Low-location lighting (LLL) – Electrically powered lighting or photoluminescent indicators placed along the escape routes so as to ensure that all such routes can be easily identified.

2.2 Photoluminescent (PL) system – An LLL system which uses PL material. Photoluminescent material contains a chemical (example: zinc sulphide) that has the quality of storing energy when illuminated by visible light. The PL material emits light which becomes visible when the ambient light source is less effective. Without the light source to re-energise it, the PL material gives off the stored energy for a period of time with diminishing luminance.

2.3 Electrically powered (EP) system – An LLL system which requires electrical power for its operation, such as systems using incandescent bulbs, light-emitting diodes, electroluminescent strips or lamps, electrofluorescent lamps, etc.

## **3. Passageways and stairways**

3.1 In all passageways, the LLL shall be continuous, except where interrupted by corridors and cabin doors, in order to provide a visible delineation along the escape route. LLL systems in compliance with an International Standard having a visible delineation without being continuous shall also be acceptable. The LLL shall be installed at least on one side of the corridor, either on the wall no more than 0,3 m from the floor, or on the floor no more than 0,15 m from the wall. In corridors more than two metres wide, LLL shall be installed on both sides.

3.2 In dead-end corridors, the LLL shall have arrows placed at intervals of no more than 1 m, or equivalent direction indicators, pointing in the direction of the escape route.

3.3 In all stairways, LLL shall be installed on at least one side at no more than 0,3 m above the steps, which will make the location of each step readily identifiable to any person standing above and below that step. Low-location lighting shall be installed on both sides if the width of the stairway is 2 m or more. The top and bottom of each set of stairs shall be identified to show that there are no further steps.

## **4. Doors**

4.1 Low-location lighting shall lead to the exit door handle. To prevent confusion, no other doors shall be similarly marked.

4.2 Where sliding doors are fitted in partitions in accordance with Article 19.11(2) and in bulkheads in accordance with Article 19.02(5), the direction of opening shall be indicated.

## **5. Signs and markings**

5.1 All escape route signs shall be of photoluminescent material or marked by electric lighting. The dimensions of such signs and markings shall be commensurate with the rest of the LLL system.

5.2 Low-location lighting exit signs shall be provided at all exits. The signs shall be located within the prescribed area on the side of the exit doors where the handle is located.

5.3 All signs shall contrast in colour to the background (wall or floor) on which they are installed.

5.4 Standardized symbols (for example those described in IMO Decision A.760(18)) shall be used for the LLL.

## **6. Photoluminescent systems**

6.1 PL strips shall be no less than 0,075 m wide. Narrower strips may however be used if their luminance is increased proportionally to compensate for their width.

6.2 Photoluminescent materials shall provide at least 15 mcd/m<sup>2</sup> measured 10 minutes after the removal of all external illuminating sources. The system shall then continue to provide luminance values greater than 2 mcd/m<sup>2</sup> for 20 minutes.

6.3 Any PL system materials shall be provided with not less than the minimum level of ambient light necessary to charge the PL material to meet the above luminance requirements.

## **7. Electrically powered systems**

7.1 Electrically powered systems shall be connected to the emergency switchboard required by Article 19.10(4) so as to be powered by the main source of electrical power under normal circumstances and also by the emergency source of electrical power when the latter is in operation. For the purpose of dimensioning the capacity of the emergency source of electrical power the EP systems shall be included in the list of emergency consumers.

7.2 Electrically powered systems shall either switch on automatically or be capable of being activated by means of a single operation at the steering position.

7.3 Where electrically powered systems are installed, the following standards of luminance shall be applied:

1. the active parts of electrically powered systems shall have a minimum luminance of 10 cd/m<sup>2</sup>;
2. the point sources of miniature incandescent lamps shall provide not less than 150 mcd mean spherical intensity with a spacing of not more than 0,1 m between lamps;
3. the point sources of light-emitting-diode systems shall have a minimum peak intensity of 35 mcd. The angle of half-intensity cone shall be appropriate to the likely track directions of approach and viewing. Spacing between lamps shall be no more than 0,3 m; and
4. for electroluminescent systems, these shall function for 30 minutes from the instant when the main power supply to which it was required to be connected by Section 7.1 fails.

7.4 All EP systems shall be arranged so that the failure of any single light, lighting strip, or battery will not result in the marking being ineffective.

7.5 Electrically powered systems shall meet the requirements of Article 10.19 for vibration and heat testing. By way of derogation from Article 10.19(2)(c) the heat test may be conducted at a reference ambient temperature of 40 °C.

7.6 Electrically powered systems shall meet the electromagnetic compatibility requirements laid down in Article 10.20.

7.7 Electrically powered systems shall provide a type of minimum protection of IP 55 in accordance with European Standard EN 60529:2014.



## **8. Acceptance test**

8.1 The luminance of the LLL must be checked 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,
- c) regularly, at least every five years,

Checks as referred to in subsection (c) above may also be carried out by a competent person trained in safety guidance systems.

8.2 An inspection certificate shall be issued, signed by the expert or competent person and showing the date of the inspection.

8.3 If, after a single measurement, the luminance does not meet the requirements set out in this instruction, measurements are to be taken at least ten equidistant points. If over 30% of the measurements do not meet the requirements set out in this instruction, the safety guidance systems must be replaced. If 20% to 30% of the measurements do not meet the requirements set out in this instruction, the safety guidance systems are to be checked again within one year.

## **ESI-III-5**

### **Suitable gas warning equipment**

#### **(Article 19.15(8))**

1. In accordance with Sections 32.02(2) and 32.05(5) (in each case transitional provision to Article 19.01(2)(e)) liquefied gas installations for domestic purposes on board existing passenger vessels may only be operated until the first renewal of the inland navigation vessel certificate after 1 January 2045, on condition that a gas warning equipment in accordance with Article 19.15(8) is available. In accordance with Article 19.15(9), liquefied gas installations for domestic purposes may in the future also be installed on passenger vessels put into operation for the first time and of which the length does not exceed 45 m, if such warning equipment is installed at the same time.

2. In accordance with Articles 32.02(2) and 32.05(5) (in each case transitional provision to Article 19.15(8)) this gas warning equipment shall be installed on the first renewal of the certificate in accordance with Article 17.15.

3. The gas warning equipment consists of sensors, equipment and pipes and shall be considered suitable if it at least meets the following prescribed requirements:

3.1 Requirements to be met by the system (sensors, equipment, pipes):

3.1.1 Gas warning shall be given at the latest when reaching or exceeding one of the following values:

- a) 10% lower explosion limit (LEL) of a propane-air mixture; and
- b) 30 ppm CO (carbon monoxide).

3.1.2 The time until activation of the alarm for the whole system must not exceed 20 s.

3.1.3 The limit values mentioned in numbers 3.1.1 and 3.1.2 must not be adjustable.

3.1.4 The test gas production shall be so designed that any interruption or obstruction is detected. Any falsification due to air admission or loss of test gas as a consequence of leakage shall be avoided or detected and reported.

3.1.5 The equipment shall be designed for temperatures ranging from –10 to 40 °C and an air humidity ranging from 20 to 100%.

3.1.6 The gas warning equipment must be self-monitoring. It shall be impossible to switch off the equipment unauthorised.

3.1.7 Gas warning equipment supplied by the onboard power supply network shall be buffered against power failure. Battery-powered appliances shall be provided with a warning device indicating a reduction of the battery voltage.

3.2 Requirements to be met by the equipment:

3.2.1 The equipment shall consist of an evaluation and display unit.

3.2.2 The alarm indicating that the limit values in (3.1.1)(a) and (b) have been reached or exceeded shall be given optically and acoustically, both in the room monitored and in the wheelhouse or at any other permanently manned location. It shall be clearly visible and audible even in operating conditions with the highest noise level. It shall be clearly distinguishable from any other acoustic and optical signals in the room to be protected. The acoustic alarm shall also be clearly audible with closed connecting doors at the entrances and in neighbouring rooms.

The acoustic alarm may be silenced after activation, the optical alarm may only be cancelled if the limit values fall below those given mentioned in (3.1.1).

3.2.3 It shall be possible to separately detect and clearly assign the reports indicating that the limit values in (3.1.1)(a) and (b) have been reached or exceeded.

3.2.4 If the appliance has a special status (start-up, failure, calibration, parameterisation, maintenance etc.), this shall be indicated. The failure of the whole system or one of the components shall be indicated by an alarm in analogy to (3.2.2). The acoustic alarm may be silenced after activation, the optical alarm may only be cancelled if the failure is removed.

3.2.5 If it is possible to issue different reports (limit values, special status) it shall also be possible to discern them separately and to assign them clearly. If necessary, a collective signal shall be displayed indicating that it is not possible to issue all reports. In this case, the reports shall be issued by order of priority, beginning with the report with the highest safety relevance. The display of the reports which cannot be issued shall be possible by pressing a button. The order of priority shall be evident from the documentation of the appliance.

3.2.6 The equipment shall be so designed that unauthorised interference is not possible.

3.2.7 In all cases where detection and alarm equipment are used, the control alarm unit and indicating device shall be operable from outside the spaces containing the gas storage and consuming appliances.

3.3 Requirements to be met by the sensors/sampling devices:

3.3.1 In every room with consuming appliances, sensors of the gas warning equipment shall be provided in the vicinity of these appliances. The sensors/sampling devices shall be installed in such a way that gas accumulation is detected before the limit values mentioned in (3.1.1) are reached. Arrangement and installation of the sensors shall be documented. The selection of the locations shall be substantiated by the manufacturer or the specialised firm installing the equipment. The pipes of the sampling devices should be as short as possible.

3.3.2 The sensors shall be easily accessible in order to enable regular calibration, maintenance and safety checks.

### 3.4 Requirements to be met by the installation:

3.4.1 The whole gas warning equipment shall be installed by a specialised firm.

3.4.2 For the installation, the following aspects shall be taken into consideration:

- a) local ventilation systems;
- b) structural arrangements (design of walls, partitions etc.) facilitating or complicating the accumulation of gases; and
- c) prevention of adverse effects due to mechanical damage, water or heat damage.

3.4.3 All pipes of the sampling devices shall be arranged in such a way that condensate formation is not possible.

3.4.4 The installation shall be effected in such a way that any unauthorised tampering is not possible.

4. Calibration and inspection of gas leak detectors, replacement of parts with limited service life.

4.1 Gas leak detectors shall be calibrated and inspected by an expert or a competent person as directed by the manufacturer:

- a) before being put into service for the first time;
- b) before being put back into service after any major modification or repair;
- c) regularly.

A calibration and inspection certificate shall be issued, signed by the expert or competent person and showing the date of the inspection.

4.2 Parts of the gas warning equipment which have a limited service life must be replaced before expiry of their specified operational life.

## 5 Marking

5.1 All appliances shall at least show the following information in a clearly legible and indelible form:

- a) name and address of the manufacturer;
- b) legal marking;
- c) designation of series and type;
- d) if possible, serial number;
- e) if required, any advice indispensable for safe use; and
- f) for each sensor the indication of the calibration gas.

5.2 Elements of the gas warning equipment with limited restricted lifespan shall be clearly marked as such.

6. Manufacturer's details relating to the gas warning equipment:

- a) complete instructions, drawings and diagrams concerning the safe and proper operation as well as the installation, starting-up and maintenance of the gas warning equipment;
- b) operating instructions containing at least:
  - aa) measures to be taken in the case of an alarm or error indication;

- bb) safety measures in the case of non-availability (e.g. calibration, inspection, interruption); and
- cc) persons responsible for installation and maintenance;
- c) instructions for calibration before the starting-up, and for routine calibration, including time intervals to be followed;
- d) supply voltage;
- e) type and meaning of the alarms and displays (e.g. special status);
- f) information concerning the detection of operating difficulties and the removal of faults;
- g) type and scope of the replacement of components with limited lifespan; and
- h) type, scope and time interval of the inspections.

### **ESI-III-6**

#### **Coupling systems and coupling devices for craft suitable for propelling or being propelled in a rigid assembly**

(Articles 21.01, 21.02, 21.06, 21.07)

In addition to the requirements of Chapter 21, the relevant provisions of the navigational authority regulations in force in the member States shall be observed.

#### **1. General requirements**

- 1.1 Every coupling system shall guarantee the rigid coupling of all the craft in a convoy, i.e. under foreseen operating conditions the coupling device shall prevent longitudinal or transversal movement between the vessels, so that the assembly can be seen as a “nautical unit”
- 1.2 The coupling system and its components shall be safe and easy to use, enabling craft to be coupled rapidly without endangering personnel.
- 1.3 The forces arising from foreseen operating conditions shall be properly absorbed and safely transmitted into the vessel’s structure by the coupling system and its components.
- 1.4 A sufficient number of coupling points shall be available.

#### **2. Coupling forces and dimensioning of coupling devices**

The coupling devices of convoys and formations of vessels to be authorised shall be dimensioned so as to guarantee sufficient safety levels. This condition is deemed to be fulfilled if the coupling forces determined according to (2.1), (2.2) or (2.3) are assumed to be the tensile strength for the dimensioning of the longitudinal coupling components.

- 2.1 Coupling points between pusher and pushed lighters or other craft:

$$F_{SB} = 270 \cdot P_B \cdot \frac{L_S}{B_S} \cdot 10^{-3} [kN]$$

- 2.2 Coupling points between pushing motor vessel and pushed craft:

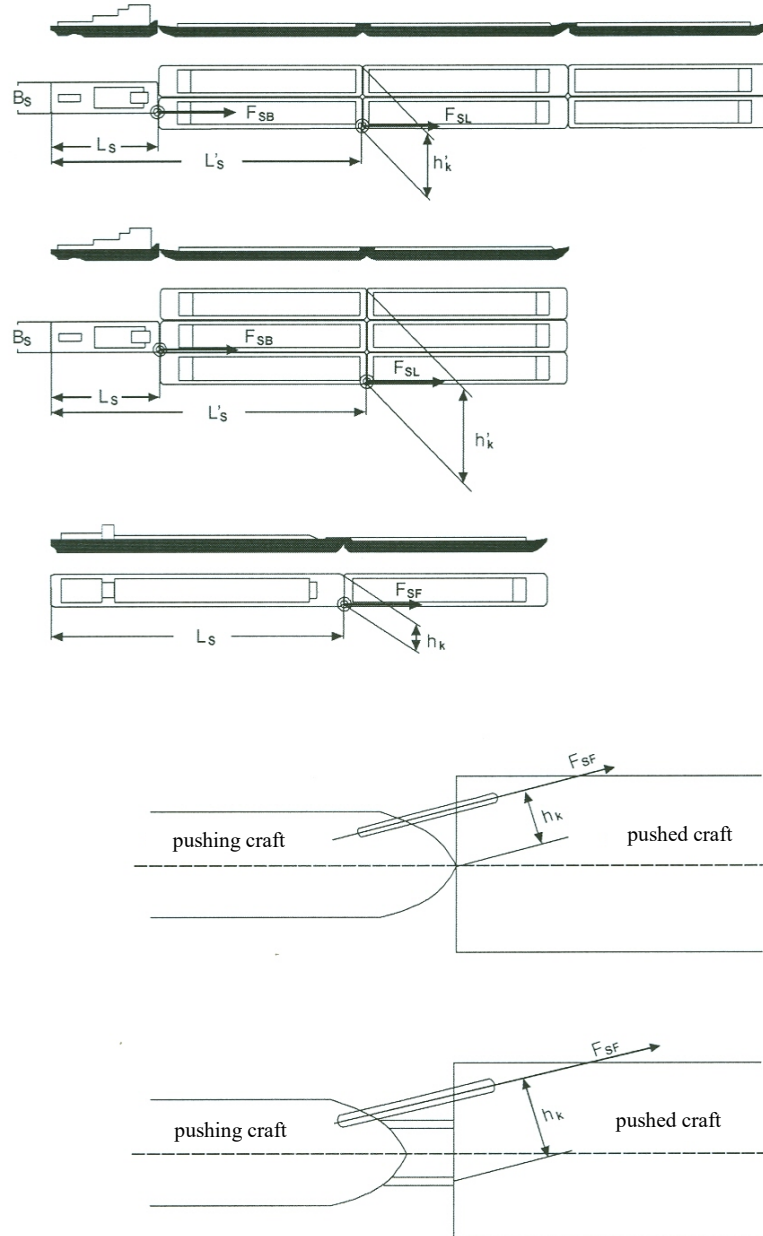
$$F_{SF} = 80 \cdot P_B \cdot \frac{L_S}{h_K} \cdot 10^{-3} [kN]$$

### 2.3 Coupling points between pushed craft:

$$F_{SL} = 80 \cdot P_B \cdot \frac{L'_S}{h'_K} \cdot 10^{-3} [kN]$$

A value of 1200 kN is deemed to be sufficient for the maximum coupling force for a pushing craft at the coupling point between the first pushed craft and the craft coupled ahead of it, even if formula in (2.3) produces a higher value.

For the coupling points of all other longitudinal connections between pushed craft, the dimensioning of the coupling devices shall be based on the coupling force determined according to formula in (2.3).



Where:

$F_{SB}, F_{SF}, F_{SL}$	[kN]	Coupling force of the longitudinal connection;
$P_B$	[kW]	Installed power of the propulsion engine;
$L_S$	[m]	Distance from the stern of the pusher or pushing craft to the coupling point;
$L'_S$	[m]	Distance from the stern of the pushing craft to the coupling point between the first pushed craft and the craft coupled ahead of it;
$h_K, h'_K$	[m]	Respective lever arm of the longitudinal connection;
$B_S$	[m]	Width of the pushing craft;
270 and 80	$\left[ \frac{kN}{kW} \right]$	Empirically established values for the conversion of installed power to thrust while ensuring adequate levels of safety.

2.4.1 For the longitudinal coupling of individual craft at least two coupling points shall be used. Each coupling point shall be dimensioned for the coupling force determined according to (2.1), (2.2) or (2.3). If rigid coupling components are used, a single coupling point may be authorised if that point ensures secure connection of the craft.

The tensile strength of the cables shall be selected according to the foreseen number of windings. There shall be no more than three windings at the coupling point. Cables shall be selected according to their intended use.

2.4.2 In the case of pushers with a single pushed lighter, formula in (2.2) can be used to determine the coupling force if such pushers have been authorised to propel several such lighters.

2.4.3 Sufficient numbers of bollards or equivalent devices shall be available and be capable of absorbing the coupling forces arising.

### 3. Special requirements for articulated couplings

Articulated couplings shall be designed so as to also ensure a rigid coupling between craft. Compliance with the requirements of Chapter 5 shall be checked during navigation tests with a rigid convoy in accordance with Article 21.06.

The drive unit of the articulated coupling shall enable a satisfactory return from the articulated position. The requirements of Articles 6.02 to 6.04 shall be applied *mutatis mutandis*, hence when a powered drive unit is used, a second independent drive unit and energy source shall be available in the event of failure.

It shall be possible to operate and monitor the articulated coupling (its articulated movement, at least) from the wheelhouse, the requirements of Articles 7.03 and 7.05 shall be applied *mutatis mutandis*.

### ESI-III-7

#### Fuel tanks on floating equipment

##### (Article 8.05(1) and article 22.02(1)(d))

According to Article 8.05(1), fuel tanks shall form an integral part of the hull or shall be firmly attached to it.

Fuel tanks for engines of working gear on floating equipment do not have to form an integral part of the hull or be firmly attached to it. Mobile tanks may be used, provided that they comply with the following conditions:

1. The capacity of these tanks shall not exceed 1,000 litres.
  2. It shall be possible to attach the tanks sufficiently firmly and to earth them.
  3. The tanks shall be made from steel of a sufficient wall thickness and shall be installed in a drip tray. The latter shall be designed to prevent leaking fuel contaminating the waterways. The drip tray may be dispensed with if double-skin tanks with a leak protection or leakage warning system are used and which are filled only via an automatic delivery valve. The provisions of (3) shall be deemed to be fulfilled if the construction of a tank has been certified and approved according to the regulations of a member State. An appropriate entry shall be made in the inland navigation vessel certificate.
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