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BSI Standards Publication

Inland navigation vessels — Railings for decks and side decks — Requirements, designs and types

bsi.

National foreword

This British Standard is the UK implementation of EN 711:2016. It supersedes BS EN 711:1996 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee SME/32, Ships and marine technology - Steering committee.

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Fahrzeuge der Binnenschifffahrt - Geländer für Decks und Gangborde - Anforderungen, Bauarten und Typen

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European Foreword

This document (EN 711:2016) was prepared by the Technical Committee CEN/TC 15, “Inland navigation vessels”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2016, and conflicting national standards shall be withdrawn at the latest by December 2016.

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This document supersedes EN 711:1995.

The following changes have been made in comparison with EN 711:1995:

a) Title was modified;

b) A new definition of "spring balanced unit" was added (3.7);

c) The position of the toe rail was defined (4.1);

d) Prohibition on climbing aids for railings on passenger ships (4.1);

e) The Figures were improved and removed from the table (4.2);

f) Railing height in working areas was redefined (4.2);

g) Additional railing heights in passenger areas were added (4.2);

h) Cables are required, i.e. no plastic ropes are permitted (4.1);

i) The requirement relating to the tensioning of hand rails and intermediate rails were added (4.4);

j) Spring balanced units were added (4.4.6);

k) The minimum diameter for hand rails was added (4.4.7);

l) The design of the mooring equipment was described (4.4.7);

m) Function in the event of breakage in the material was added (5.1);

n) Table 4 added in Annex A (5.2);

o) Test requirements were defined (Clause 6);

p) Designation updated (Clause 7);

q) Sample designs for mooring equipment for transitioning to the bulwark and for increased bulwark height added as Annex B;

r) Editorial changes made.

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1 Scope

This European Standard is applicable to railings for decks and in gangways on inland navigation vessels. It lays down design, dimensions, strength and test conditions which have to be observed for safety reasons. The railings provide protection for persons against falling overboard and from one deck to another.

2 Normative references

The following documents which are cited at the appropriate places in this document are required for the application of this document. For dated references, only the editions referred to apply. For undated references the latest edition of the document (including all modifications) referred to applies.

EN 10025-2, *Hot rolled products of structural steels — Part 2: Technical terms of delivery for non-alloyed structural steels*

EN 10220, *Plain end steel tubes, welded and seamless — General tables for dimensions and masses per unit length*

EN ISO 1461, *Metallic coatings — Hot dipped galvanised coatings on fabricated ferrous products — Requirements and tests (ISO 1461)*

ISO 1835, *Short link chain for lifting purposes — Grade M (4), non-calibrated, for chain slings etc.*

ISO 2232, *Round drawn wire for general purpose non-alloy steel wire ropes and for large diameter steel wire ropes — Specifications*

ISO 2408, *Steel wire ropes for general purposes — Minimum requirements*

ISO 2768 (all parts), *General tolerances*

3 Definitions

For the purposes of this standard, the following definitions apply.

3.1
railing
<Inland navigation vessels> A construction of stanchions and hand rails as well as

— An intermediate rail and toe rail or

— A panel

3.2
stanchion
The vertical part of the railing, onto which the hand rails and intermediate rails or the network are mounted

3.3
hand rail
The uppermost continuous part of the railing, which serves as a handhold against falling overboard and/or for holding on

3.4
intermediate rail
A continuous part fixed between the hand rail and deck which is intended to reduce the risk of persons sliding out under the hand rail

3.5
panelling
The component which fills in - entirely or to a large extent - the space between the hand rail and deck, and which is intended to reduce the risk of persons sliding out under the hand rail

EXAMPLE plates, canvas sheet, bars or the like.

3.6
toe rail
A profile fitted to the deck to prevent persons from slipping under the railing

3.7
spring balanced unit
Steel spring that forms the lower part of the stanchion

4 Safety requirements

4.1 Design

4.1.1 General

The railing design depends on the location as shown in Table 1.

Railings may also be built in order to increase the height of a low bulwark (see Figure B.3).

Designation for each type of design:

— CF (stands for Commercial Fixed) fixed railing in the working area;

— CT (stands for Commercial Tiltable) tiltable railing in the working area;

— CD (stands for Commercial Detachable) removable railing in the working area;

— PF (stands for Passenger Filling) railing in passenger area with a closed network;

— PG (stands for Passenger Grid) railing in the passenger area with vertical bars;

— PZ (stands for Passenger Zonal) railing in the passenger area with horizontal bars and a closed network.

An overview of usual railing types is shown in Table 1.

Table 1 — Overview of the usual railing types

Use in	Application	Symbol	Semi-finished material		Construction notes	Figure
			Hand rail	Intermediate rail or network		
Work area	General in working area	CF[a]	Metal section	Metal section	Stanchions solidly connected to the deck	1
	On gangway where a solid rail is an obstacle to cargo handling	CT	Wire rope chain/round steel chain	Wire rope chain/round steel chain	–	2
	To prevent people falling outside of the gangway	CD	Wire rope chain/round steel chain	Wire rope chain/round steel chain	Depending on position, connectors fixed to the coaming or to the deck with soft toe brackets	3
Passenger area	General in passenger area	PF	Metal section[b]	Netting, plates[c]	Stanchions solidly connected to the deck	4
		PG		Metal section		5
		PZ		Netting, plates[c], metal section		6

[a] The railing is considered to be fixed even if segments thereof can be tilted or removed for special working conditions.

[b] If necessary, with mounted wood or plastic profile.

[c] e.g. glass, wood or plastic.

4.1.2 Railings in work areas

4.1.2.1 Type A

Railings in working areas should comprise stanchions, a hand rail, an intermediate rail and a toe rail (see Figures 1 to 3). The toe rail should be fitted level with the railing or directly onto the stanchion or at a maximum outward distance *g* of 100 mm (see Figure 7).

4.1.2.2 Type B

This differs from Type A in that the toe rail is replaced by an additional intermediate rail at a height of a/2. Type B is only permitted in working areas on construction vessels.

4.1.2.3 Type C

This differs from Type A in that the toe rail is replaced by a coaming at an appropriate distance (see Figure 3).

4.1.3 Railings in passenger areas

Railings in passenger areas

— should comprise stanchions, a hand rail and networks (see Figures 4 to 6);

— should be designed in such a way that they cannot be used as climbing aids.

If the panelling consists of

— horizontal bars (type PZ), the lower half of the railing shall be secured by means of closed panelling on the inside to prevent children from falling overboard through the railing;

— canvas or netting, the canvas shall be sufficiently taught and the netting made of a sufficiently fine mesh so that it cannot be used for climbing.

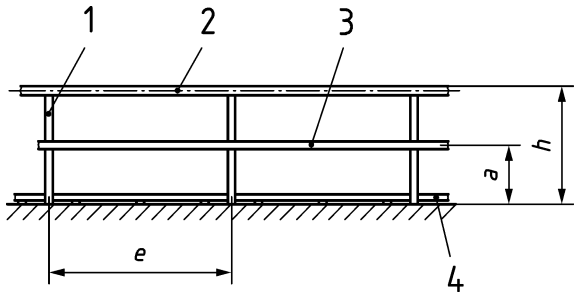
4.2 Safety dimensions

Dimensions in mm

General tolerances: ISO 2768 - c

Details not indicated are to be suitably selected.

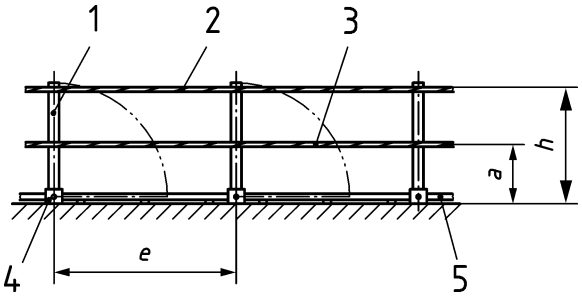
Dimensions as per Figures 1 to 6 and Table 2.



Key

1 Fixed stanchion
2 Hand rail
3 Intermediate rail
4 Toe rail

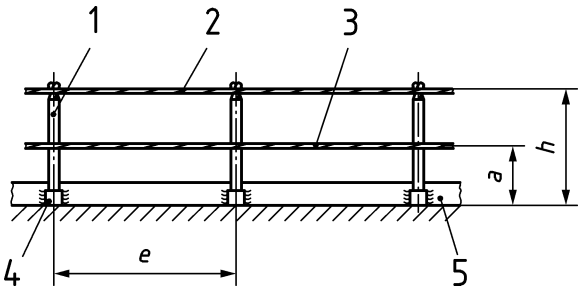
Figure 1 — CF type fixed railing



Key

1 Removable stanchion
2 Hand rail
3 Intermediate rail
4 Connector
5 Toe rail

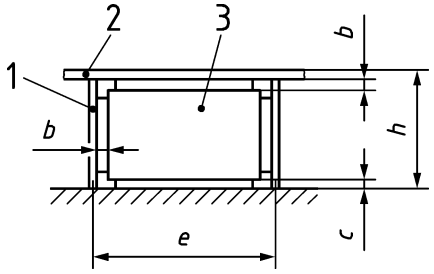
Figure 2 — CT type tiltable railing



Key

1 Removable stanchion
2 Hand rail
3 Intermediate rail
4 Stanchion
5 Coaming

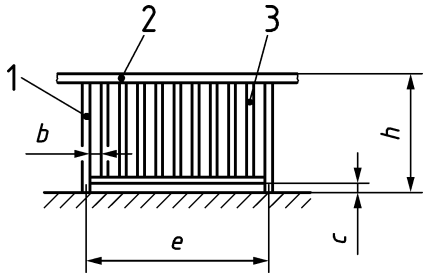
Figure 3 — CD type detachable railing



Key

1 Fixed stanchion
2 Hand rail
3 Network

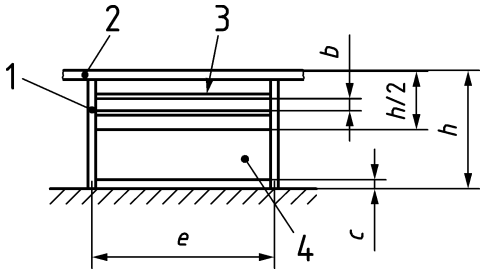
Figure 4 — PF type fixed railing



Key

1 Fixed stanchion
2 Hand rail
3 Bar

Figure 5 — PG type fixed railing



Key

1 Fixed Stanchion
2 Handrail
3 Horizontal Bar
4 Panelling

Figure 6 — PZ-Type Fixed Railing

a) Type A: Toe Rail, here shown in profile **b) Type C: Coaming**

Key

1 Stanchion (shown in simplified form)
2 Baseboard
3 Coaming

Figure 7 — Examples for Type A, Baseboard, and Type C, Coaming

Table 2 — Safety dimensions

All dimensions given in millimetres

Working areas		**Passenger areas**	
CF, CT, CD Type fixed, tiltable, detachable		**PF, PG, PZ Type fixed**	
a	475 ± 25		
b	–	*b*	max. 120
c	–	*c*	max. 50
		c_1	max. 20
e	For steel chains: max. 2 000	*e*	2 000 max.
	For steel cables: max. 3 000		
f	$50\ ^{+10}_{0}$	*f*	$50\ ^{+10}_{0}$
g	max. 100	*g*	max. 100
h	950 ± 50	*h*	General: min. 1 000
			In areas for persons with reduced mobility: min. 1 100

Key to the labels in Figures 1 to 6, Table 2 and Figures B.3 and B.4:

a Distance between intermediate rail and deck for types CF, CD and CT;
b Clear distance between the vertical bars and between network and hand rail or stanchion;
c Clear distance between network and deck for types PF, PG and PZ;
*c*1 Clear distance between network and bulwark for types PF, PG and PZ;
e Space between railing stanchions;
f Distance between upper edge of total rail or upper edge of coaming from deck;
g Distance between inner edge of toe rail or of coaming from the inner edge of the stanchion;
h Railing heights.

4.3 Sturdiness requirements

In Table 3, evaluation loads and admissible deflections for stanchions, hand rails, intermediate rails, bars and panelling are specified which have to be taken into account for testing sturdiness. Concurrent loading of the hand rail and intermediate rails or hand rail and intermediate rails or networks should not be included in the calculations for the stanchions.

For testing, as per Clause 6.

Table 3 — Sturdiness requirements

Abbreviation	**Evaluation Loads** N		**Permissible deflection without permanent deformation** mm	
			horizontal	**vertical**
CF	Hand rail per m	500	50	
	Intermediate rail per m	500	50	
CT CD	Stanchion	500	50	–
	Hand rail	200	200	
	Intermediate rail	200	200	
PF PG PZ	Hand rail per m	1 000	25	
	Network per m^2	1 000	25	–
	Bars per m	500	25	

4.4 Workmanship

4.4.1 The railing shall be free from sharp edges or protrusions which are liable to cause injuries.

4.4.2 Railings of types CT and CD shall be constructed in such a way that there is no risk of stumbling in the area of connectors, stanchions and ropes or chains even if when railings are tilted or detached. Special attention is to be paid to a constant tension of ropes and chains.

A tensioning device shall be provided to tension hand rails and intermediate rails made from ropes or chains so as to fulfil the requirement in Table 3.

4.4.3 Toe rails and coamings shall be constructed such that water drainage is ensured.

4.4.4 Stanchions can be suitably reinforced in the lower range, e.g. by pressed tubes or round steel bars.

4.4.5 Stanchions of railings of type CD shall be protected against unintentional detachment.

4.4.6 If the stanchions are mounted on spring balanced units, the spring balanced units should be pre-tensioned so that the requirements in Table 3 are fulfilled.

4.4.7 In the area of the mooring equipment and of the transitions to the bulwarks, the railings shall be designed in such a way that they retain their fall prevention functionality; for examples, see Annex B (informative).

5 Materials

5.1 Choice of materials

The materials shall fulfil the strength requirements according to Table 3.

Materials which no longer provide fall protection when damaged may not be used in networks; for example, thermally toughened glass is not permitted.

5.2 Example of railing made of steel

Table A.1 shows examples of steel profiles for use in stanchions, hand rails and intermediate rails. If these dimensions and material qualities are selected, a special strength calculation is not necessary. For other materials (e.g. steel of lower strength, aluminium) an evaluation of sturdiness in accordance with 4.3 applies.

5.3 Surface protection

All railing parts shall be durably protected against inclement weather.

If steel components are not made of high-grade steel, then

— hollow steel sections shall be galvanized according to EN ISO 1461;

— chains and cables shall be permanently protected against corrosion, e.g. galvanized according to ISO 2232.

6 Testing

Verification of the safety requirements for railings is carried out according to the specifications of this standard by evaluating sturdiness, visual inspection and measurement.

To verify that stability requirements are met, the evaluation loads listed in Table 3 are applied at right angles to the component as follows:

— For hand rails and intermediate rails, centrally between two stanchions;

— For a stanchion, at the level of the hand rail;

— For panelling, across the entire surface;

— For rods, centrally.

7 Designation

Designation of a railing in the working area, type CF (CF), type A (A) with toe rail:

Railing EN 711 - CF - A

Designation of a railing in the passenger area, design PG (PG), height 1000 mm (1000):

Railing EN 711 – PG - 1000

Annex A
(normative)

Examples of materials and dimensions

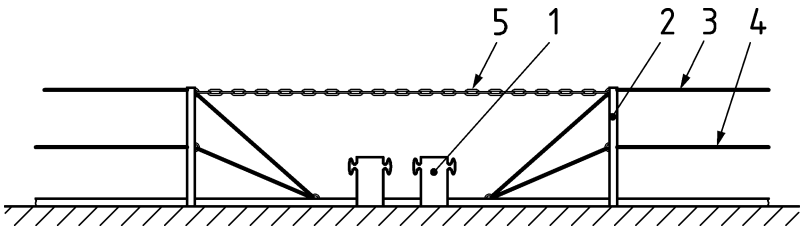
Table A.1 — Example of materials and dimensions for stanchions, hand rails and intermediate rails made of steel

Abbreviation	Distance between stanchions mm	Stanchion[d]		Hand rail[d]		Intermediate rail[d]	
CF	≤ 1 000	Steel tube[a]	42,4 × 2,6	Steel tube[a]	42,4 × 2,3	Round steel diameter 20 mm[b]	
	≤ 1 200		42,4 × 3,2		42,4 × 2,3		
	≤ 1 600		48,3 × 3,2		42,4 × 2,3		
	≤ 1 750		48,3 × 3,2		42,4 × 2,3	Steel tube[a]	42,4 × 2,3
	≤ 2 000	Flat steel[b,f]	60,0 × 10		42,4 × 2,3		42,4 × 2,3
	≤ 2 800		60,0 × 15		42,4 × 2,6		42,4 × 2,6
	≤ 3 000		60,0 × 15		42,4 × 3,2		42,4 × 3,2
CT CD	≤ 3 000	Steel tube[a]	42,4 × 2,6	Steel cable[c] 6 x 19 Nominal diameter 8 mm or Round steel chain[e] Nominal thickness 6,3 mm			
PF PG PZ	≤ 800	Steel tube[a]	48,3 × 3,6	Steel tube[a]	42,4 × 2,3		
	≤ 900	Flat steel[b,f]	60,0 × 10		42,4 × 2,3		
	≤ 1 350		60,0 × 15		42,4 × 2,3		
	≤ 1 850		70,0 × 15		42,4 × 2,6		
	≤ 2 000		80,0 × 12		42,4 × 2,6		

a Seamless and welded steel tubes according to EN 10220.
b Shipbuilding steel according to EN 10025-2.
c Steel wire cable as per ISO 2408.
d The dimensions of the steel profiles were calculated with $E = 21 \times 10^6$ N/cm² and a bending stress = 16,000 N/cm².
e Round steel chain according to ISO 1835.
f Measure the greatest resisting moment at a right angle to the line of the railing!

Annex B
(informative)

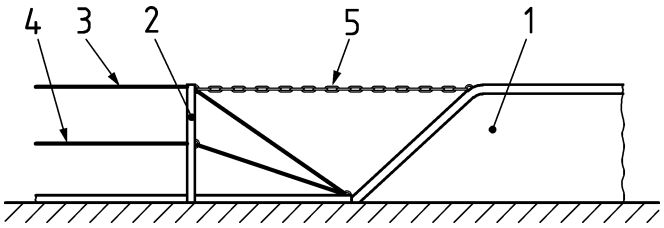
Sample designs for railings in the area of mooring equipment and bulwarks



Key

1 Mooring equipment
2 Tiltable stanchion
3 Hand rail
4 Intermediate rail
5 Round steel chain or steel cable

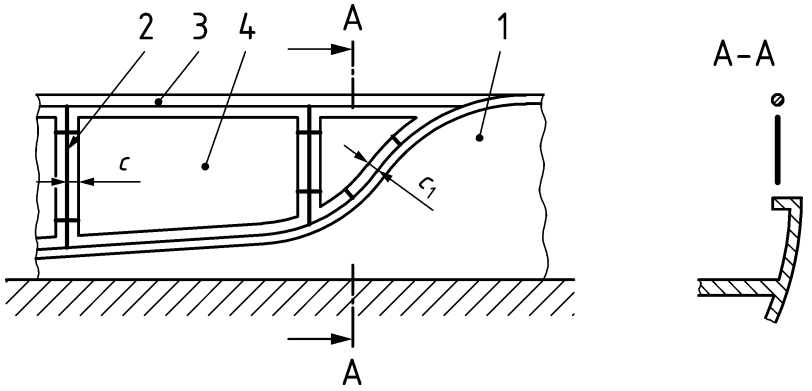
Figure B.1 — Sample design of a railing in area of the mooring equipment



Key

1 Bulwark
2 Tiltable stanchion
3 Hand rail
4 Intermediate rail
5 Round steel chain or steel cable

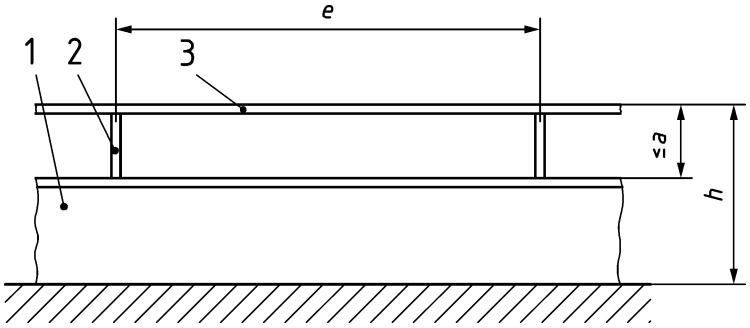
Figure B.2 — Sample design of a railing in the transition to the bulwark — working areas



Key

1 Bulwark
2 Fixed stanchion
3 Hand rail
4 Panelling

Figure B.3 — Sample design of a railing in the transition to the bulwark – passenger areas



Key

1 Bulwark
2 Fixed stanchion (detachable)
3 Hand rail

Figure B.4 — Sample design of a railing for increasing the height of a bulwark

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BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

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