
**Ships and marine technology —
Marine securing devices for ro-ro
cargoes**

*Navires et technologie maritime — Dispositifs de retenue marins pour
navires rouliers (ro-ro)*

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Contents

	Page
Foreword.....	iv
1 Scope.....	1
2 Normative references.....	1
3 Terms and definitions.....	1
4 Securing method of ro-ro cargoes.....	3
5 Fixed fittings.....	3
6 Loose fittings.....	3
7 Categorization of fixed fittings.....	3
8 Material.....	5
9 Dimension and strength requirements of fixed fittings.....	5
10 Test method of fixed fittings.....	9
10.1 General requirement.....	9
10.2 Type testing.....	10
10.3 Production testing.....	10
10.4 Test profiles to be used (hook/elephant foot).....	10
10.5 Support of tested fitting.....	11
10.6 Test force.....	11
10.7 Test duration.....	12
10.8 Test angles.....	12
11 Appearance requirements.....	12
12 Tightness requirements.....	13
12.1 General requirement.....	13
12.2 Test methods.....	13
12.2.1 Air tightness test.....	13
12.2.2 Other methods.....	13
13 Marking.....	13
14 Test report of fixed fitting.....	13
15 Manufacturers certificate to customer.....	14
16 Packaging, storage and transportation.....	14
Annex A (informative) Securing methods of ro-ro cargoes.....	16
Annex B (informative) Installation and maintenance.....	21
Annex C (informative) Loose fittings.....	22
Bibliography.....	27

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html. (standards.iteh.ai)

This document was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 4, *Outfitting and deck machinery*. 23575:2022

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Ships and marine technology — Marine securing devices for ro-ro cargoes

1 Scope

This document specifies types, dimensions and strength characteristics of devices used for securing ro-ro cargoes in sea transportation. It can also be used as a reference for road vehicles secured on inland vessels.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 1461, *Hot dip galvanized coatings on fabricated iron and steel articles — Specifications and test methods*

ISO 2768-1, *General tolerances — Part 1: Tolerances for linear and angular dimensions without individual tolerance indications*

ISO 5817, *Welding — Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) — Quality levels for imperfections*

ISO 7452, *Hot-rolled steel plates — Tolerances on dimensions and shape*

ISO 9013, *Thermal cutting — Classification of thermal cuts — Geometrical product specification and quality tolerances*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at <https://www.iso.org/obp>

— IEC Electropedia: available at <https://www.electropedia.org/>

3.1

ro-ro cargoes

all types of cargoes carried on board a ro-ro ship as road vehicles, roll trailers, etc.

3.2

fixed fitting

securing device permanently installed in the vessel

3.3

portable fitting

loose fitting

securing device not permanently installed in the vessel

3.4
maximum securing load
MSL

allowable load capacity of a device used to secure cargo to a ship

Note 1 to entry: It is expressed in kN.

3.5
proof test load
test load during testing of securing devices

Note 1 to entry: It is expressed in kN.

3.6
minimum breaking load
MBL
tested minimum breaking strength of a securing device

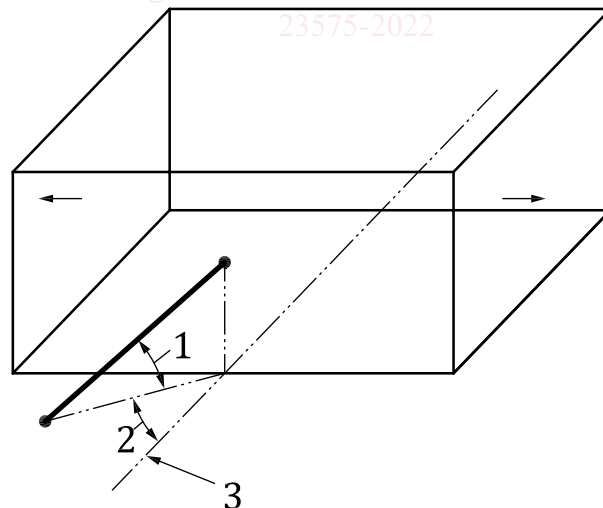
Note 1 to entry: It is expressed in kN.

3.7
vertical lashing angle
 α
angle between the lashing device and the horizontal plane

Note 1 to entry: See [Figure 1](#).

3.8
horizontal lashing angle
 β
angle between the lashing device and the transverse direction on board the vessel

Note 1 to entry: See [Figure 1](#).



Key

- 1 vertical lashing angle, α
- 2 horizontal lashing angle, β
- 3 axis parallel to the transverse direction of the vessel

Figure 1 — Lashing angles

3.9 road vehicle

commercial vehicle, semi-trailer, road train, articulated road train or a combination of vehicles

Note 1 to entry: The IMO Resolution MSC .479(102)^[2] defines road vehicle in 3.2.

4 Securing method of ro-ro cargoes

Rules and guidelines on the securing of cargoes are found in IMO instruments as well as in the vessel's cargo securing manual. For information, typical securing methods for ro-ro cargoes are given in [Annex A](#).

5 Fixed fittings

5.1 The arrangement of fixed fittings shall be left to the discretion of the shipowner provided that for stowage of road vehicles in the ro-ro lanes, the longitudinal distance of fixed fittings shall be not more than 2,5 m, while the transverse distance should be not more than 3,0 m. The MSL of these fittings shall be not less than 100 kN.

5.2 There shall be no sharp edge or sharp angle of the securing point within the area where road vehicles run.

5.3 Fixed fittings shall be marked according to [Clause 13](#). For information purposes, procedures for typical installation and maintenance of fixed fittings for ro-ro cargoes are given in [Annex B](#).

6 Loose fittings

For information, typical loose fittings used for ro-ro cargoes are given in [Annex C](#).

7 Categorization of fixed fittings

Categorization of fixed fittings is specified in [Table 1](#).

Table 1 — Categorization of fixed fittings

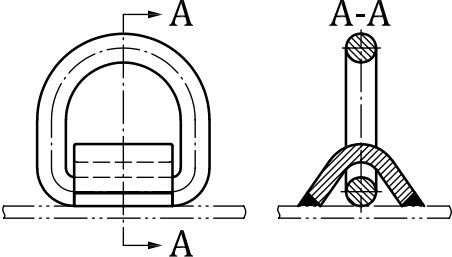
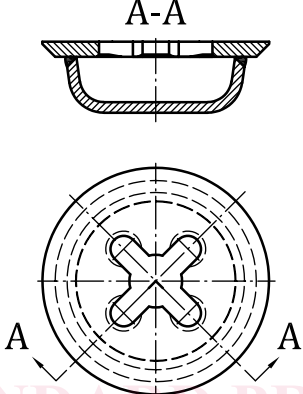
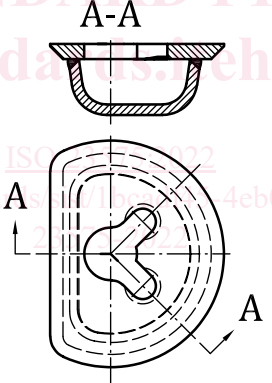
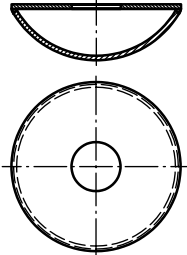

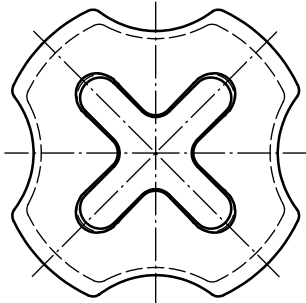
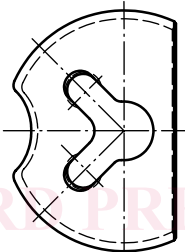
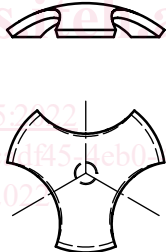
Type	Code	Name	Illustration	Remarks
Fixed fittings	DR	D-ring and clamp		Securing area on deck where no vehicles are running or on bulkheads or other strong structures.
	CL.F4	Flush clover leaf socket		Securing area where the deck is required to be flat and watertight for vehicle running.
	CL.F2	Flush half clover leaf socket		Securing area where the deck is required to be flat and watertight for vehicle running.
	LC	Lashing cup for hole		Securing area where the deck is required to be flat and watertight for vehicle running.

Table 1 (continued)

Type	Code	Name	Illustration	Remarks
Fixed fittings	CB	Crinkle bar		Securing area on deck where no vehicles are running close to the main supporting structures such as bulkheads.
	CL.R4	Raised clover leaf socket		Securing area not required to be flat.
	CL.R2	Raised half clover leaf socket		Securing area where securing loads are large and close to the main supporting structure, such as bulkheads, girders and transverses.
	LS.R3	Raised lashing socket		Securing area not required to be flat.

8 Material

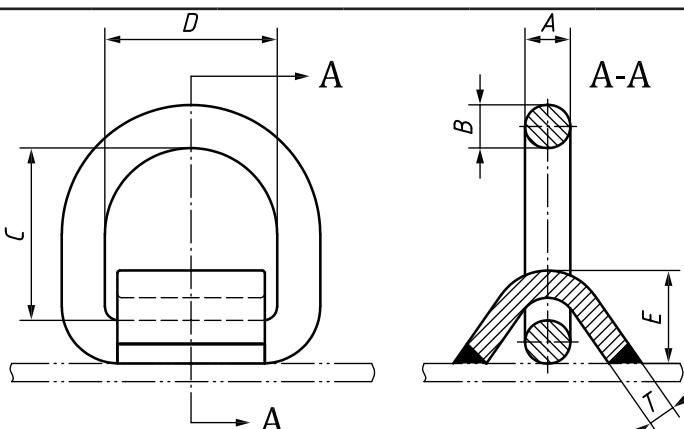
The strength grade of materials of fixing fittings shall not be lower than that of the plate to which they are welded; the low-temperature impact performance shall not be lower than the grade of the plate to which they are welded.

9 Dimension and strength requirements of fixed fittings

The dimension and strength requirements of fixed fittings are specified in [Tables 2 to 9](#). Dimensions are in millimetres and strengths in kN. The plate thickness, t , should meet the requirements of the classification society.

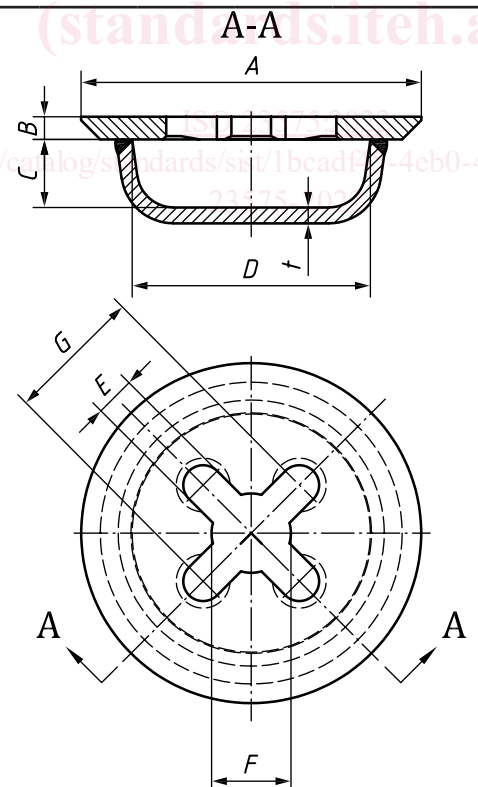
The steel plate thickness shall meet the requirements of ISO 7452. Flame cutting unmarked dimensional tolerances shall meet the requirements of ISO 9013, class 2. Tolerances for linear and angular dimensions without individual tolerance indications shall comply with ISO 2768-1.

Table 2 — Dimensions and strength of D-rings and clamps, DR



TYPE	A max mm	B max mm	C min mm	D min mm	E max mm	T min mm	MSL min kN	Reference mass max kg
DR/40	15	16	40	50	25	6	40	0,5
DR/100	20	25	55	65	40	12	100	1,7
DR/180	25	30	60	75	45	14	180	2,7

Table 3 — Dimensions and strength of flush clover leaf socket, CL.F4



TYPE	A approx mm	B max mm	C min mm	D min mm	E mm	F min mm	G mm	t approx mm	MSL min kN	Reference mass max kg
CL.F4/100	240	16	27	186	35	65	115	12	100	8,2
CL.F4/160	300	20	60	210	35	70	115	14	160	13,2

Table 4 — Dimensions and strength of flush half clover leaf socket, CL.F2

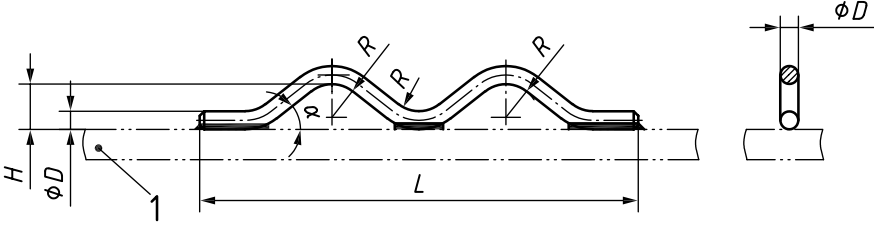
TYPE	A approx mm	B max mm	C min mm	D min mm	E mm	F min mm	G mm	H approx mm	t approx mm	MSL min kN	Reference mass max kg
CL.F2/100	240	16	27	186	35	65	57,5	78	12	100	7,3
CL.F2/160	260	20	60	210	35	70	57,5	80	14	160	11,5

Table 5 — Dimensions and strength of lashing cup for hole, LC

Key
1 deck

TYPE	A approx mm	B mm	C min mm	E mm	t approx mm	D _t min mm	MSL min kN	Reference mass max kg
LC/75	210	6	60	65	6-14	8	75	8,0
LC/100	210	6	60	65	6-14	13	100	8,0

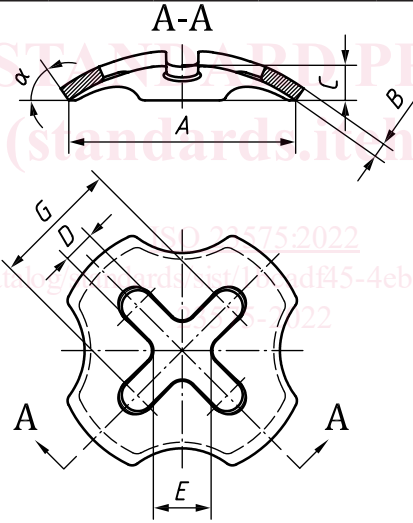
Table 6 — Dimensions and strength of crinkle bars, CB



Key
1 deck

TYPE	<i>L</i> approx mm	<i>R</i> min mm	<i>H</i> min mm	<i>D</i> max mm	α max °	MSL min kN	Reference mass max kg
CB/20	290	23	30	13	40	20	0,4
CB/30	290	22	30	16	40	30	0,5
CB/100	400	25	40	25	40	100	1,7

Table 7 — Dimensions and strength of raised clover leaf socket, CL.R4



TYPE	<i>A</i> approx mm	<i>B</i> max mm	<i>C</i> min mm	<i>D</i> mm	<i>E</i> min mm	<i>G</i> mm	α min °	MSL min kN	Reference mass max kg
CL.R4/100	250	16	39	35	65	115	45	100	5,1
CL.R4/160	300	20	60	35	70	115	45	160	11,4