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

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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	2
5 Fixed fittings	2
6 Loose fittings	3
7 Categorization of fixed fittings	3
8 Material	4
9 Dimension and strength requirements of fixed fittings	4
10 Test method of fixed fittings	8
10.1 General requirement	8
10.2 Test interval	8
10.3 Number of tests	8
10.4 Test profiles to be used (hook/elephant foot)	8
10.5 Support of tested fitting	8
10.6 Test force	8
10.7 Time that the test force shall be applied	9
10.8 Test angles	9
11 Appearance requirements	9
12 Tightness requirement	9
12.1 General requirement	9
12.2 Test methods	9
12.2.1 Water tightness test	9
12.2.2 Air tightness test	9
12.2.3 Other methods	10
13 Marking	10
14 Test certificate of fixed fittings tested	10
15 Test report of fixed fitting tested	11
16 Packaging, storage and transportation	11
Annex A (informative) Securing methods of ro-ro cargoes	12
Annex B (Informative) Installation and maintenance	16
Annex C (informative) Loose fittings	17

Foreword

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For an explanation on 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 the following URL: 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*.

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

1 Scope

This document specifies examples of types, dimensions and strength of devices for securing of ro-ro cargoes in sea transportation. It may 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 9001:2015, *Quality management systems — Requirements*

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

ISO 9367-1, *Lashing and securing arrangements on road vehicles for sea transportation on Ro/Ro ships — General requirements — Part 1: Commercial vehicles and combinations of vehicles, semi-trailers excluded*

IMO resolution A.581(14), *Guidelines for securing arrangements for transport of road vehicles on ro-ro ships*

MSC 1/Circ.1353, *Revised guidelines for the preparation of the cargo securing manual*

3 Terms and definitions

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

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

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1

ro-ro cargoes

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

3.2

fixed fittings

securing devices permanently installed in the vessel

3.3
loose fittings

securing devices not permanently installed in the vessel

3.4
MSL

Maximum Securing Load, in kN
the allowable load capacity for a device used to secure cargo to a ship

3.5
PL

Proof Load, in kN
the test load during testing of securing devices.

3.6
MBL

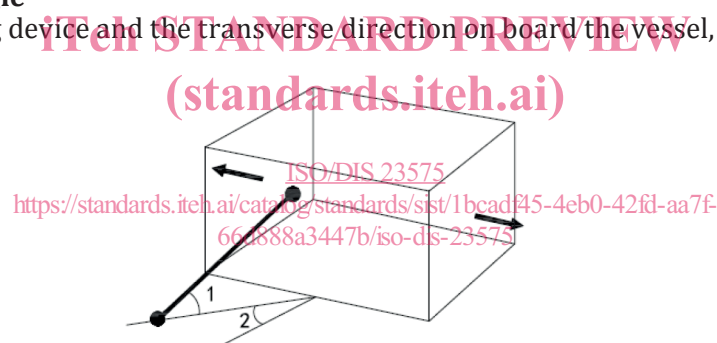
Minimum Breaking Load, in kN
the tested minimum breaking strength of a securing device

3.7
 α vertical lashing angle

angle between the lashing device and the horizontal plane, see [Figure 1](#)

3.8
 β horizontal lashing angle

angle between the lashing device and the transverse direction on board the vessel, see [Figure 1](#)



Key

- 1 vertical lashing angle α
- 2 horizontal lashing angle β

Figure 1 — Lashing angles

4 Securing method of ro-ro cargoes

Rules and guidelines on the securing of cargoes are found in IMO instrument as well as in the vessels Cargo Securing Manual. For information typical securing methods for ro-ro cargoes are found in the informative [Annex A](#) to this standard.

5 Fixed fittings

5.1 The longitudinal distance of fixed fittings shall be not more than 2,5 m, while the transverse distance shall in general be between 2,8 m and 3 m.

5.2 The MSL of fixed fittings shall in general be not less than 100 kN. The MSL of fixed fittings for the vehicle with gross weight of less than 15 tons may be less than 100 kN after calculation proves it can meet the requirement of securing safety.

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

5.4 Fixed fittings shall be marked according to Chapter 13. For information typical installation and maintenance of fixed fittings for ro-ro cargoes are found in the informative Annex B to this standard.

6 Loose fittings

For information typical loose fittings used for ro-ro cargoes are found in the informative Annex C to this document.

7 Categorization of fixed fittings

Categorization of fixed fittings is as shown in Table 1.

Table 1 — Categorization of fixed fittings


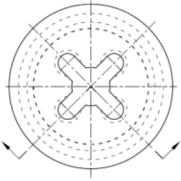
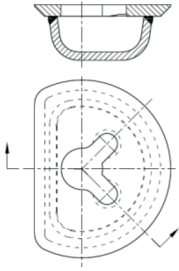
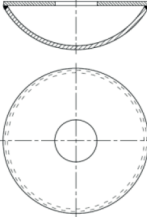

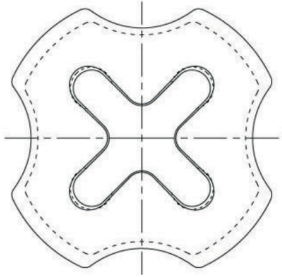
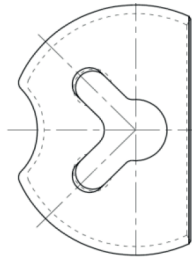
Type	Code	Name	Illustration	Remarks
Fixed fittings	I11	D-ring and clamp		Securing area where the deck is not required to be flat for vehicle running.
	C21	Flush Lashing Pot		Securing area where the deck is required to be flat and watertight for vehicle running.
	C22	Flush Lashing Pot		Securing area where the deck is required to be flat and watertight for vehicle running.
	C23	Flush Lashing 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	C24	Crinkle Bar		Suitable for securing of small vehicles
	C25	Raised Lashing Pot		Securing area not required to be flat
	C26	Raised Lashing Pot		Securing area where securing loads are large and close to the main supporting structures such as bulkheads, girders and transverses

8 Material

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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.

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9 Dimension and strength requirements of fixed fittings

The dimension and strength requirements of fixed fittings are as shown in [Figure 2~8](#) and [Table 2~8](#). Dimensions are in millimeters and strength in kN. The shown plate thickness *t* is the value, which should meet the requirements of the classification society.

Steel plate thickness should comply with ISO 7452 requirements; Flame cutting unmarked dimensional tolerances shall comply with ISO 9013 class 2 requirements; Tolerances for linear and angular dimensions without individual tolerance indications shall comply with ISO 2768-v.

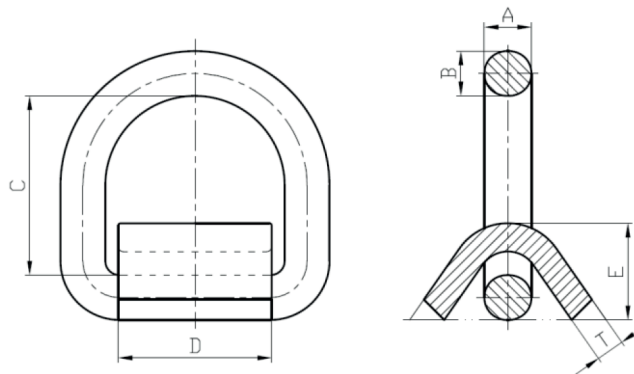
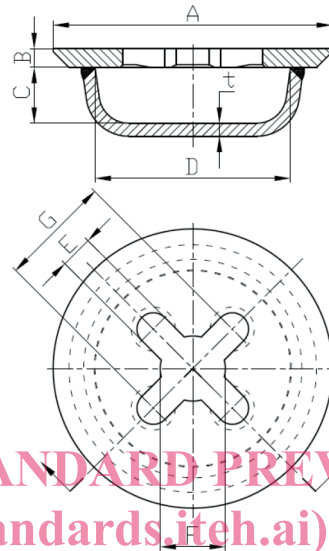


Figure 2 — I11 D-rings and clamps

Table 2 — Dimensions and strength of I11 D-rings and clamps

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)
I11/40	15	16	40	50	25	6	40	0,5
I11/100	20	25	55	65	40	12	100	1,7
I11/180	25	30	60	75	45	14	180	2,7



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Figure 3 — C21 flush lashing pot

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Table 3 — Dimensions and strength of C21 flush lashing pot

TYPE	A abt (mm)	B max (mm)	C min (mm)	D min (mm)	E (mm)	F min (mm)	G (mm)	t abt (mm)	MSL min (kN)	Reference Mass max (kg)
C21/100	240	16	27	186	35	65	115	12	100	8,2
C21/160	300	20	60	210	35	70	115	14	160	13,2

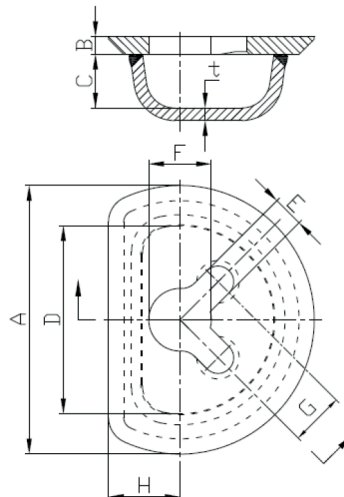
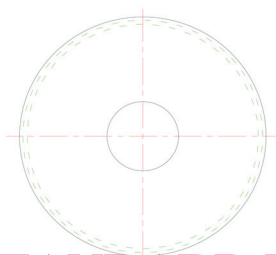
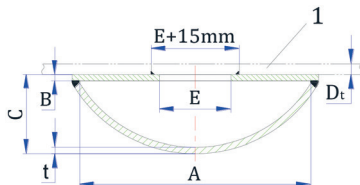


Figure 4 — C22 flush lashing pot

Table 4 — Dimensions and strength of C22 flush lashing pot

TYPE	A abt (mm)	B max (mm)	C min (mm)	D min (mm)	E (mm)	F min (mm)	G (mm)	H abt (mm)	t abt (mm)	MSL min (kN)	Reference Mass max (kg)
C22/100	240	16	27	186	35	65	57,5	78	12	100	7,3
C22/160	260	20	60	210	35	70	57,5	80	14	160	11,5



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Key

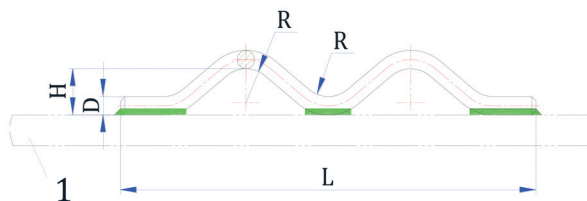
1 deck.

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Figure 5 — C23 flush lashing hole

Table 5 — Dimensions and strength of C23 flush lashing hole

TYPE	A abt (mm)	B (mm)	C min (mm)	E (mm)	t abt (mm)	Dt min (mm)	MSL min (kN)	Reference Mass max (kg)
C23/75	210	6	60	65	6~14	8	75	8,0
C23/100	210	6	60	65	6~14	13	100	8,0



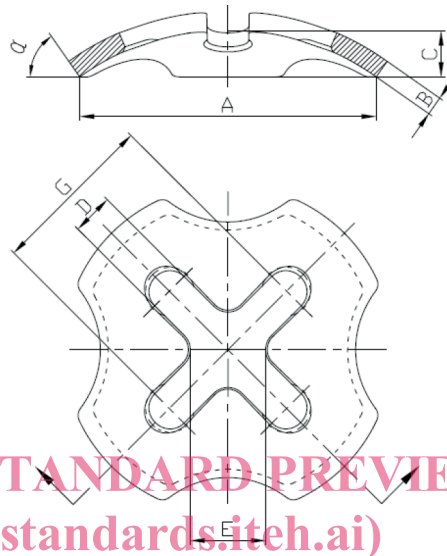
key

1 deck.

Figure 6 — C24 crinkle bar

Table 6 — Dimensions and strength of C24 crinkle bar

TYPE	L abt (mm)	R min (mm)	H min (mm)	D max (mm)	MSL min (kN)	Reference Mass max (kg)
C24/20	290	23	30	13	20	0,4
C24/30	290	22	30	16	30	0,5
C24/100	400	25	40	25	100	1,7



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Figure 7 — C25 raised lashing pot

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Table 7 — Dimensions and strength of C25 raised lashing pot

TYPE	A abt (mm)	B max (mm)	C min (mm)	D (mm)	E min (mm)	G (mm)	α min (mm)	MSL min (kN)	Reference Mass max (kg)
C25/100	250	16	39	35	65	115	45°	100	5,1
C25/160	300	20	60	35	70	115	45°	160	11,4

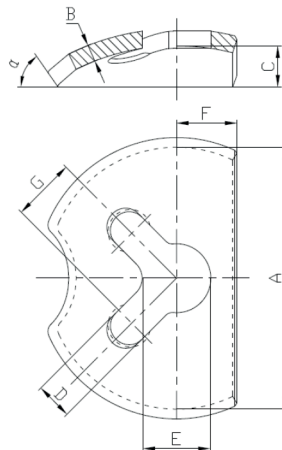


Figure 8 — C26 raised lashing pot