INTERNATIONAL STANDARD

ISO 9367-2

First edition
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Lashing and securing arrangements on road vehicles for sea transportation on Ro/Ro ships — General requirements —

Part 2:
Semi-trailers

Dispositifs d'arrimage et de saisissage des véhicules routiers en transport maritime sur navires rouliers — Conditions générales —

Partie 2: Semi-remorques

Reference number
ISO 9367-2:1994(E)

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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 9367-2 was prepared by Technical Committee ISO/TC 22, *Road vehicles*.

ISO 9367 consists of the following parts, under the general title *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*

— *Part 2: Semi-trailers*

Annexes A, B and C of this part of ISO 9367 are for information only.

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Lashing and securing arrangements on road vehicles for sea transportation on Ro/Ro ships — General requirements —

Part 2:
Semi-trailers

1 Scope

This part of ISO 9367 specifies the minimum requirements to allow efficient lashing and securing of semi-trailers, as defined in ISO 3833, on board roll-on/roll-off (Ro/Ro) ships, indicating in particular the lashing arrangements on the semi-trailer and the securing method to be used. It also gives, in annex A, for information to semi-trailer designers, the securing point arrangements generally used on Ro/Ro ships as laid down by International Maritime Organization (IMO) recommendations. In annex B, it gives for information some design indications to decrease damage during handling.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 9367. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 9367 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 1726:1989, *Road vehicles — Mechanical coupling between tractors and semi-trailers — Interchangeability.*

ISO 3833:1977, *Road vehicles — Types — Terms and definitions.*

3 Definitions

For the purposes of this part of ISO 9367, the following definitions apply.

3.1 Ro/Ro ship: Ship, normally not transversely subdivided, with one or more decks, closed or open, generally running the entire length of the ship, on which goods can be loaded by means of ramps and/or lifts. The cargo is

— either self-moving, on road vehicles including road tank vehicles, semi-trailers, trailers, rolling pallets and similar cargo transport units,

— or transported on loading vehicles moving between ship and shore.

[ISO 9367-1:1989, definition 3.1]

3.2 semi-trailer: Trailer which is designed to be coupled to a semi-trailer towing vehicle and to impose a substantial part of its total weight on the towing vehicle.

[ISO 3833:1977, definition 3.2.2]

3.3 lashing point: That part on a semi-trailer to which a lashing may be directly attached and which meets the requirements of this part of ISO 9367. [Adapted from ISO 9367-1:1989, definition 3.4]

4 Lashing points

4.1 General requirements

Lashing points shall be designed to enable the semi-trailer to be secured to the ship.

Each lashing point shall be designed for one lashing only. Lashing points may be either hinged, fixed or swivelling.

4.2 Number of lashing points

The same number of lashing points shall be provided on each side of the semi-trailer.

Semi-trailers with a gross mass above 20 tons and up to 40 tons shall be fitted with at least four pairs of lashing points. For semi-trailers with lower or higher gross mass, the manufacturers shall provide a suitable number of lashing points.

It is essential that semi-trailers with a box body (e.g. reefer body) or tank body which has, integral with the body or tank structure, an upper fifth-wheel plate and a king-pin at the front end, with a subframe to support the running gear at the rear, with no chassis as such between these two units, shall be fitted with the same number of lashing points to meet the strength requirement.

4.3 Location

4.3.1 Lashing points shall be located within defined areas on the semi-trailer. The allowable vertical and transverse areas on laden semi-trailers are shown in figure 1 and the longitudinal positions are shown in figure 2. For air-suspended semi-trailers, the figures apply to the Ro/Ro position (see 7.2).

The preferable position of the rear pair of lashing points is 300 mm ± 300 mm (datum line) from the rearmost part of the semi-trailer. The two pairs at the front shall be positioned with one pair in front of and one pair behind the trestle position at a distance l, calculated in accordance with the formula in 4.3.2, from the rearmost pair of lashing points, but shall not protrude below the upper fifth-wheel plate. This longitudinal placing of the lashing points corresponds to a distance of 2 500 mm between the longitudinal lashing points on the ship's deck. When necessary due to practical or structural restraints of the semi-trailer construction, the rearmost lashing points can, alternatively, be positioned in accordance with figure 2 d) or 2 e). Using a datum of 300 mm ± 300 mm from the rearmost part of the semi-trailer, the front lashing points can be calculated at a distance l as described above.

The remaining pair of lashing points shall be located in accordance with the alternative figure 2 a), 2 b) or 2 c).

4.3.2 For the total length of a semi-trailer above 8 250 mm, l in figure 2, in millimetres, is given by

$$l = 625 + (n \times 1\ 250)\ \text{mm}$$

where n is the number of intervals.

Values for length l are given in table 1.

Table 1 — Length l

Number of intervals n	l in figure 2 mm
3	4 375
4	5 625
5	6 875
6	8 125
7	9 375
8	10 625
9	11 875
10	13 125
11	14 375

It is recommended that these specifications be applied to all types of semi-trailers. However, if it is difficult to comply with these specifications for the two front pairs of lashing points due to special design of the base structure, the front pairs should preferably be located according to figure 3. When necessary due to practical or structural restraints of semi-trailer construction, the foremost lashing point can alternatively be located at the front end of the trailer.

4.4 Free space around lashing points

To allow flexibility in the longitudinal stowage of the semi-trailer on the ship's deck, free sectors as large as possible should be provided around the lashing points. For alternative stowage positions, see the examples in annex C.

Dimensions in millimetres

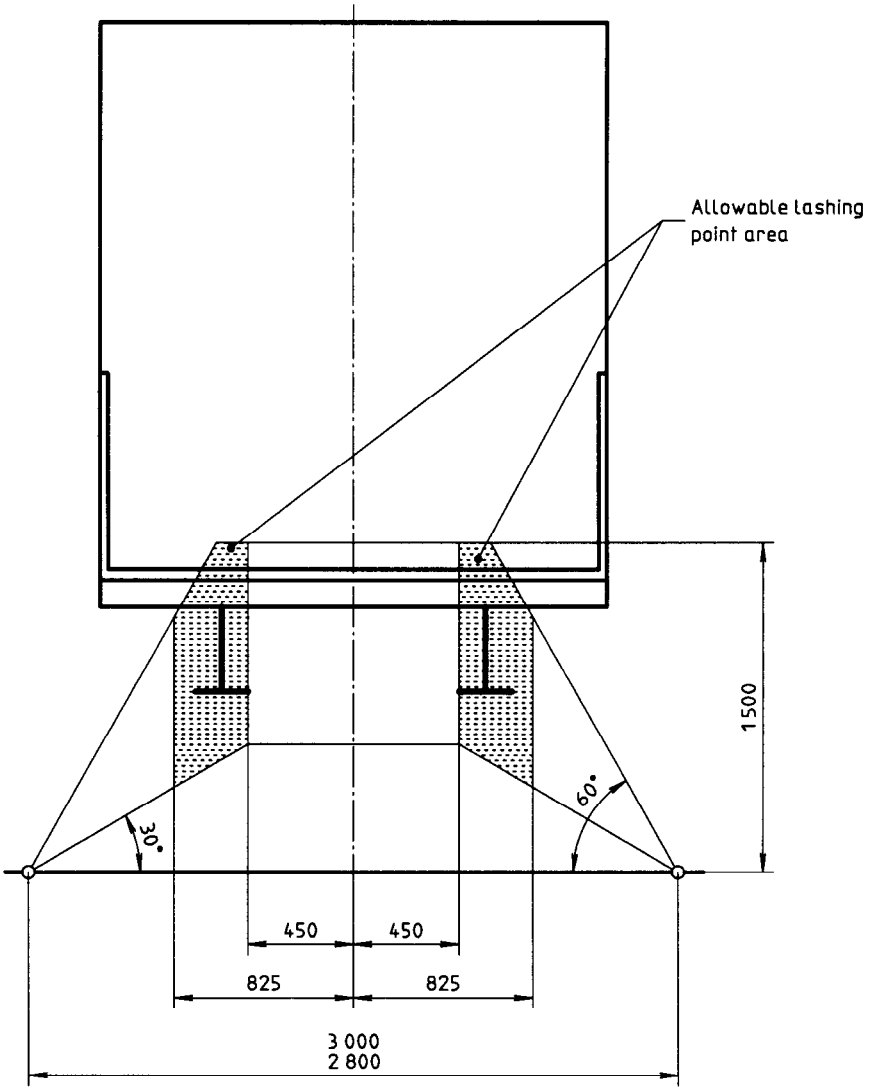
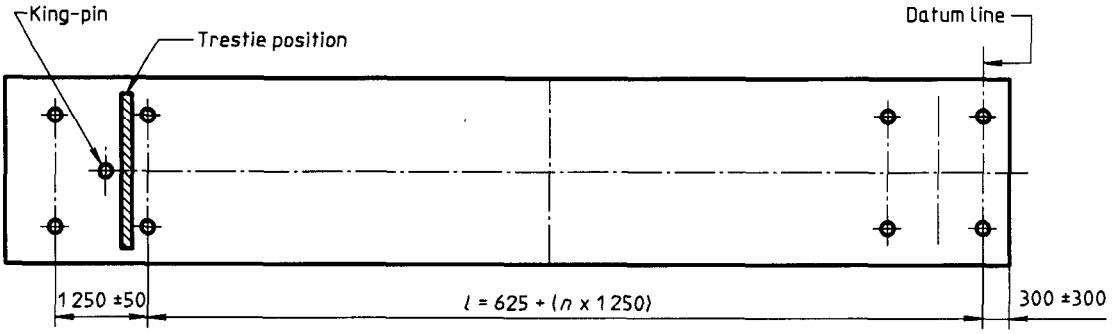
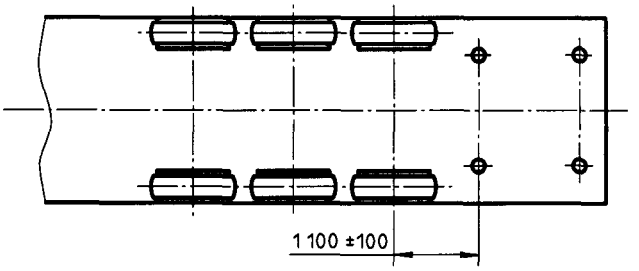


Figure 1 — Allowable vertical and transverse lashing point areas on laden semi-trailers

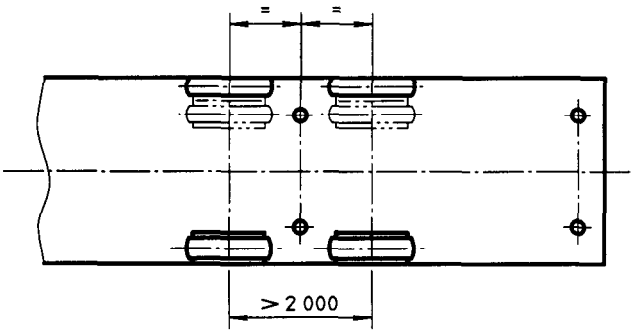
Dimensions in millimetres



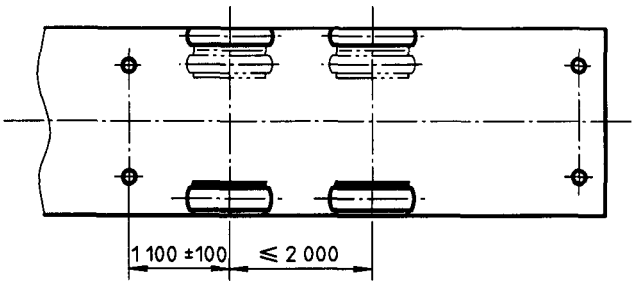
a)

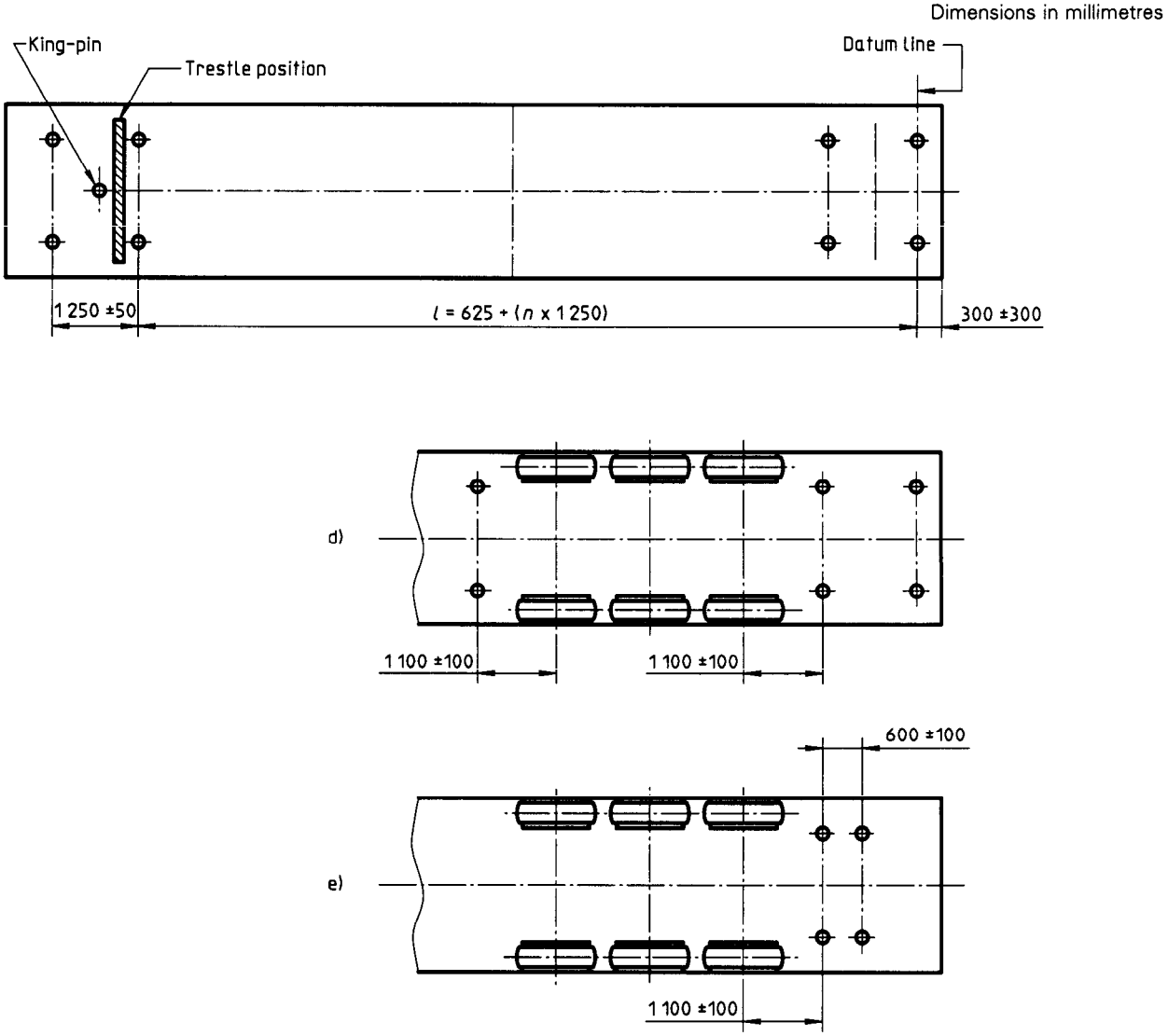


b)



c)





NOTE — Figures 2 d) and 2 e) show tandem or tri-axle layout.

Figure 2 — Longitudinal positions of lashing points

Dimensions in millimetres

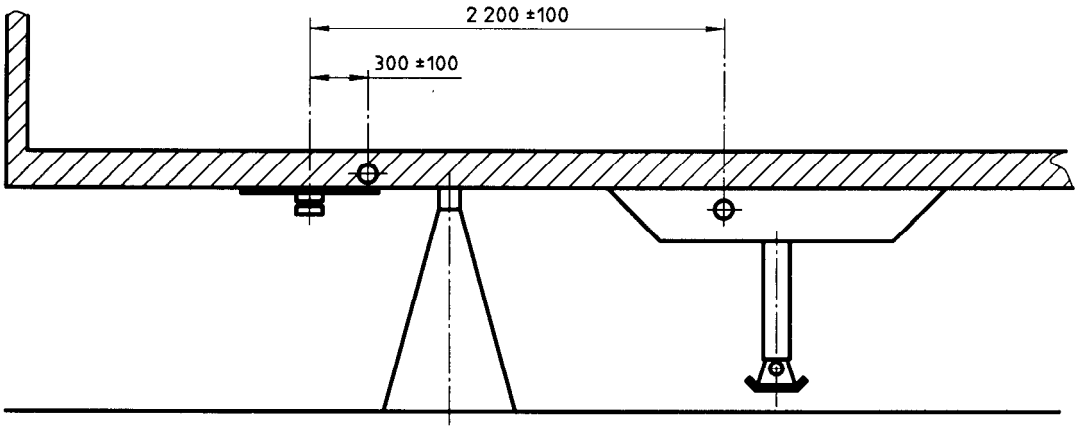


Figure 3 — Semi-trailers with box body or tank body — Front pairs of lashing points

4.5 Free passage and hook opening

Each lashing point shall allow the free passage inside it of a circle of at least 80 mm diameter, but the aperture need not be circular. The thickness of the lashing point material shall allow engagement of a hook of at least 25 mm opening (see figure 4). For hinged or swivelling lashing points, dimension d may exceed 25 mm.

Dimensions in millimetres

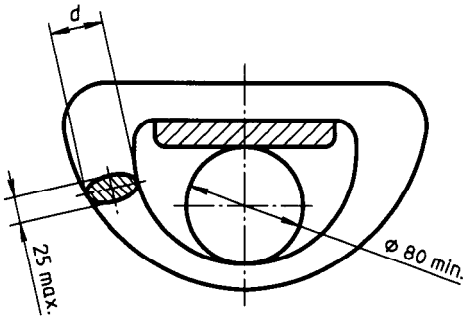


Figure 4 — Free passage and lashing point material thickness

4.6 Strength and testing of lashing points

4.6.1 Strength requirement

There shall be no deformation, breaks or cracks that could affect the function of the lashing points after testing to 120 kN in accordance with 4.6.2.

4.6.2 Check

The strength of the lashing points shall be checked either by calculation or by a static test carried out in accordance with 4.6.3. Other test methods may be used if an efficiency at least equivalent can be proved.

4.6.3 Static test

The value of the test force, F, to be used is 120 kN.

Apply the test force in the plane passing through the lashing point and forming an angle of 60° with the horizontal plane passing through this point, at 60° to the transverse plane (plane perpendicular to the longitudinal median plane of the vehicle — see figure 5).

5 Trestle location

The trestle should be located, if possible, within the range of the horizontal plane of the goose-neck contour as specified in ISO 1726 and as shown in figure 6.

No vertical force should go into the fifth wheel coupling pin.

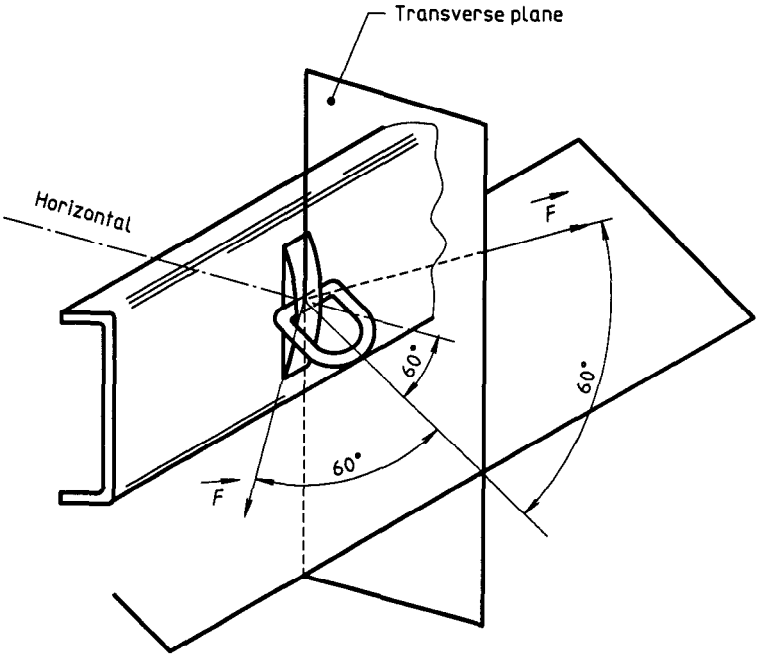


Figure 5 — Direction of application of test force

Dimensions in millimetres

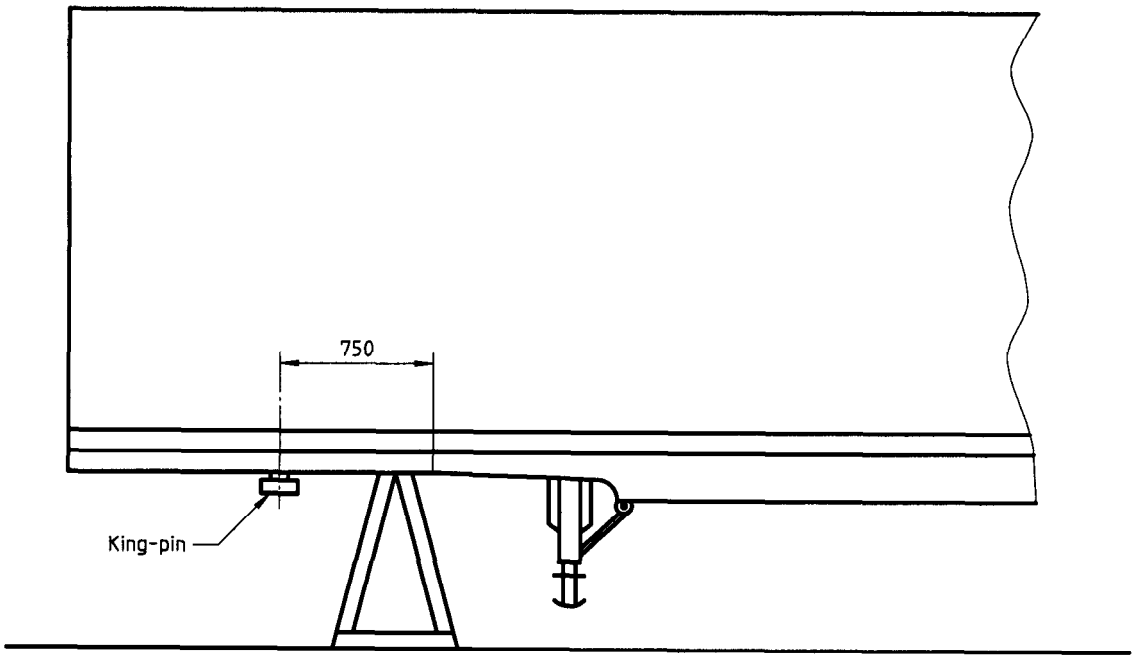


Figure 6 — Recommended range of trestle location

If the semi-trailer has more than one fifth-wheel coupling pin, the trestle location shall be measured from the rearmost fifth-wheel coupling pin position.

For semi-trailers for special purposes which are normally not disconnected from the towing vehicle, clause 5 does not apply.

6 Marking

6.1 Marking of lashing points and trestle location

The lashing ring shall be painted a bright colour, strikingly different from the background colour.

A clearly visible marking on the outer side wall of the semi-trailer, or on some other clearly visible place, shall indicate the location of the trestle.

The symbol of the trestle shall be in accordance with figure 7.

Dimensions in millimetres

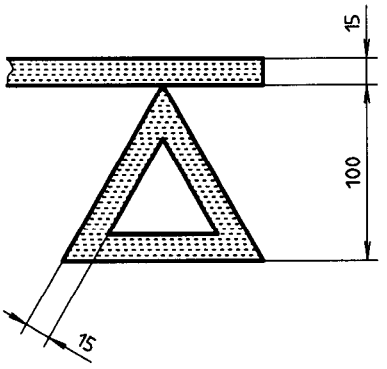


Figure 7 — Trestle symbol

The marking of the recommended range of trestle location shall be as shown in figure 8.

6.2 Information plate

A plate measuring 200 mm × 150 mm shall be affixed permanently on both sides of the vehicle at or within 1 600 mm from the front end or on the front side. If due to operational conditions further plates are necessary, they may be fitted.

The height from the ground to the lower plate edge should be 1 000 mm to 1 500 mm where possible.

Markings on the plate shall comprise the following (see the example in figure 9):

— a number indicating the number of lashing points per side;

— the sketch of an anchor.

The number and anchor on the plate shall be at least of sizes indicated in figure 9 and be such that they cannot easily be removed, defaced or damaged.

7 Additional design requirements

7.1 Parking brake

The parking brake shall be easily actuated in order to

— allow the transfer onto the ship, in particular using the port handling tractor,

— enable the brake to be applied during maritime transfer.

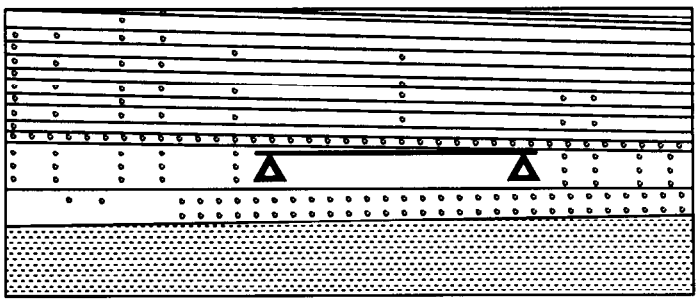


Figure 8 — Marking of recommended range of trestle location

Towed vehicles fitted with spring-actuated brakes shall have a pneumatic control valve for spring application and release.

Sufficient pressure shall be available in the braking system to feed the system during transfers, even when the operation is carried out by the port handling tractors.

7.2 Air suspension device

Trailers equipped with air suspension shall have a device which can easily be used to eliminate the effect of the air on the suspension system during sea transportation.

The device shall be easily accessible and be marked "Road position" and "Ro/Ro position".

7.3 Jacking-up points

If the semi-trailer is equipped with jacking-up points, these shall be placed just below the rear pair of lashing points.

Jacking-up points should be designed for a minimum vertical jacking-up force corresponding to four times the gross vehicle mass (GVM) for each jacking-up point.

Jacking-up points shall be clearly marked on the chassis sides.

7.4 Lashing points for securing of goods

The semi-trailer shall be equipped with appropriate lashing points to enable the goods to be firmly fixed to the trailer.

In dimensioning these points, the goods should be assumed to meet the following accelerations at the same time:

— transverse acceleration: $\pm$ 0,63 g;

— vertical acceleration: 1 g $\pm$ 0,55 g.

7.5 Rear underride protection device (bumper bar)

In order to decrease damage to the rear underride protection device during movement on the rampways of the ship, the device should be positioned to be above the clearance angle shown in figure 10 when the trailer is in road running position, subject to the legal requirements of road vehicles. This requirement may necessitate using a folding device.

Dimensions in millimetres

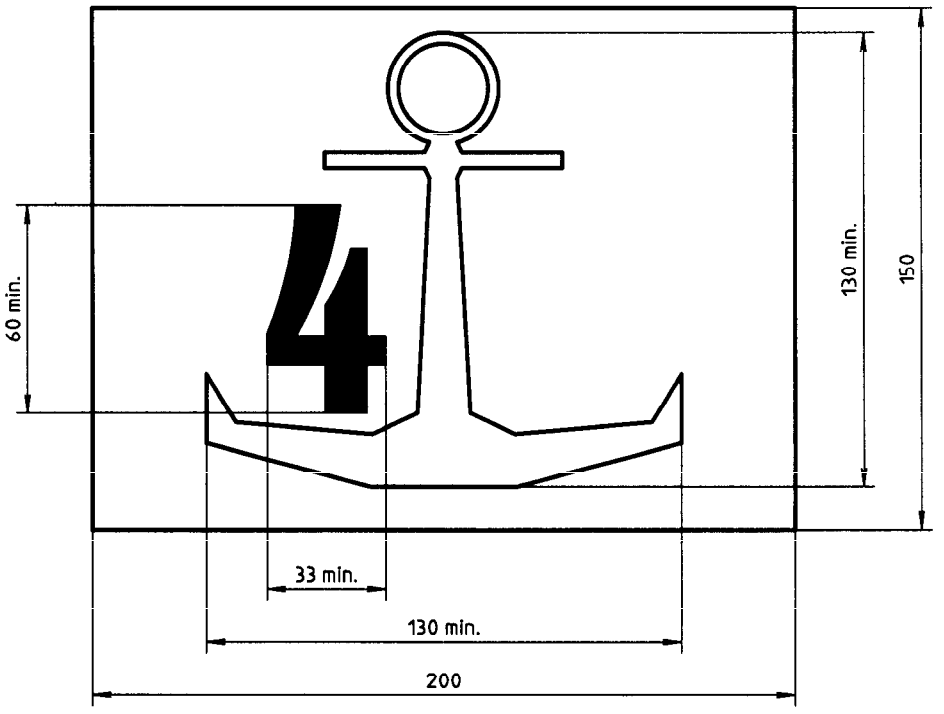


Figure 9 — Information plate

7.6 Support legs and other protruding equipment

The support legs with the semi-trailer in road running position should be capable of being raised above the limits specified in figure 10.

Leg supports should be mounted so that the support legs will not affect each other if a deformation of one leg arises.

8 Identification

To facilitate the identification of the semi-trailer during handling in the terminal and on the ship, the semi-trailer shall have an identification marking, consisting of the owner's mark and/or a number.

This identification marking shall appear at least on the front side of the trailer: ideally it should be marked on all four sides of the trailer. The marking on the front side shall be placed within the left third (when facing forward). This position of the marking should enable easy reading from the driver's seat.

Dimensions in millimetres

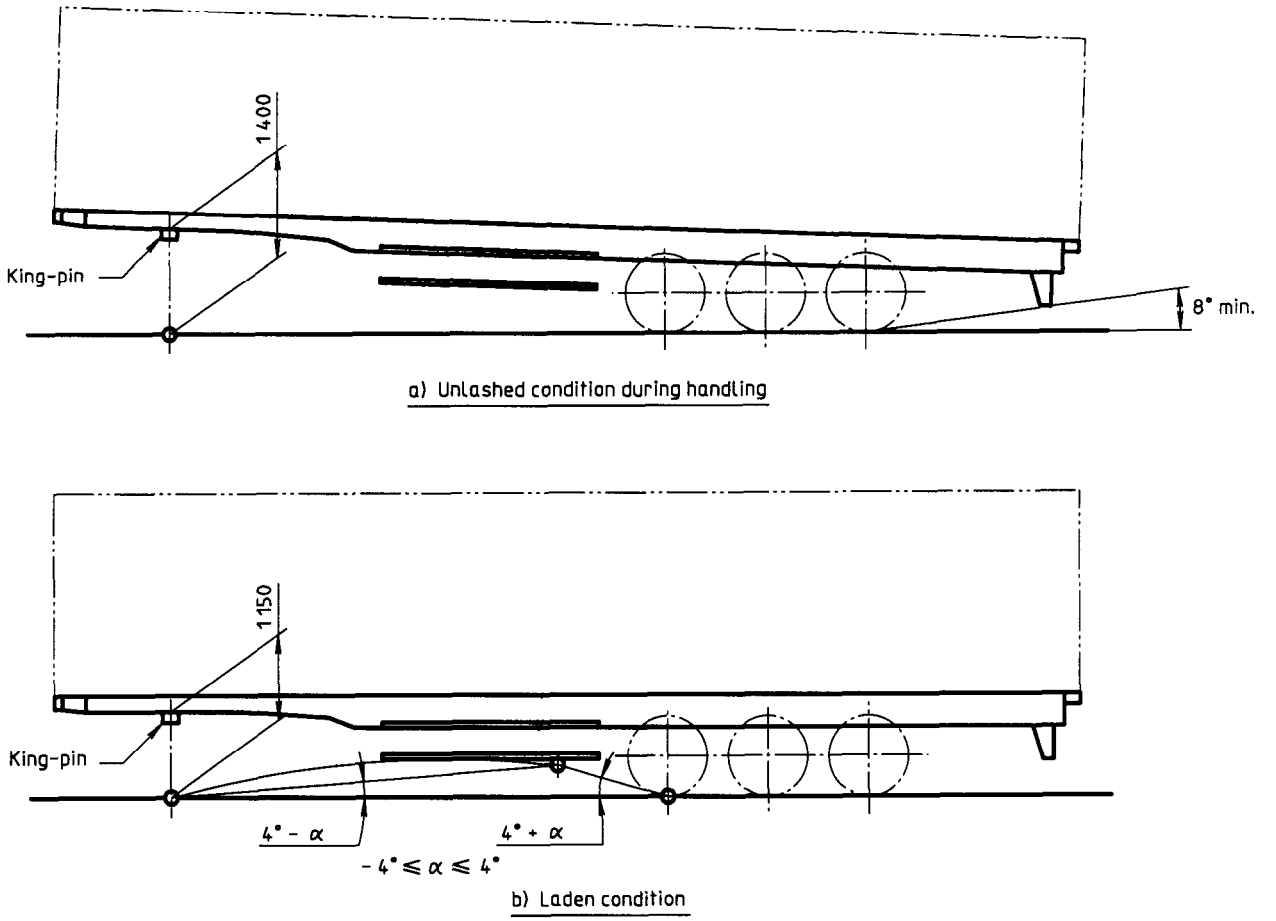


Figure 10 — Clearance gauge

Annex A
(informative)

Securing points on ship's decks and lashings

A.1 Information on minimum requirements

The decks of a ship intended for semi-trailers as defined in 3.2 need to be equipped with securing points. The arrangement of securing points is left to the discretion of the shipowner, with the intention that for each road vehicle or element of a road vehicle combination the minimum requirements in A.1.1 to A.1.3 are met.

A.1.1 The distance between securing points in the longitudinal direction in general does not exceed 2 500 mm. However, there may be a need for the securing points in the forward and after parts of the ship to be more closely spaced than they are amidships.

A.1.2 The spacing between longitudinal lines of securing points should be not less than 2 800 mm nor more than 3 000 mm. If no other specification is given, the preferred value is 3 000 mm. However, there may be a need for the securing points in the forward and after parts of the ship to be more closely spaced than they are amidships.

A.1.3 The minimum strength without permanent deformation of each securing point is 120 kN. If the securing point is designed for more than one lashing, its strength is not less than 120 kN times the number of lashings.

A.2 Periodic transport

In Ro/Ro ships which only occasionally carry road vehicles, the spacing and strength of securing points should be such that special considerations which may be necessary to stow and secure road vehicles safely are taken into account.

A.3 Lashings

Lashings should be made of chain or any other material of strength and elongation characteristics equivalent or superior to those of steel. The strength of the lashings, without permanent deformation, is not less than 120 kN.

Annex B
(informative)

Design indications to decrease damage during handling

B.1 Design of semi-trailer frame

When supported by the trestle on board the ship, the frame is exposed to the largest bending moment directly above the trestle. Therefore, the frame at this section should be strong enough to carry the cargo in the trailer and the trailer itself plus the additional forces from the lashings, without becoming permanently deformed.

The maximum moment of force, M, in kilonewton metres, for the trailer frame is calculated with the following equation:

$$M = \left(4b + 0{,}8c^2\right)\text{GVM}$$

where

b is the distance, in metres, from the front pair of lashing points to the trestle in the rearmost position (see figure B.1);

c is the distance, in metres, from the vehicle front to the trestle in the rearmost position (see figure B.1);

GVM is the gross vehicle mass, in tons.

B.2 Bumpers

At the front side, the semi-trailer should be equipped with a bumper which protects protruding connections and the rear dropside of the trailer parked in front.

The bumper should cover the protruding connections of the semi-trailer and protrude about 150 mm (see figure B.2).

Bumpers should be made of elastic material, e.g. rubber.

B.3 Semi-trailer sides

The sides of the semi-trailer should be designed to be as smooth as possible. The extreme width may consist of protection bars capable of withstanding contacts.

TIR-eyes, hinges, etc. should be recessed into the dropsides in order to avoid tearing or damage during stowage on the ship.

B.4 Superstructure

The superstructure of a trailer should be designed in such a way that damage to the stanchions is limited if a collision occurs on the ship with, for example, an upper deck (see figures B.3 to B.7).

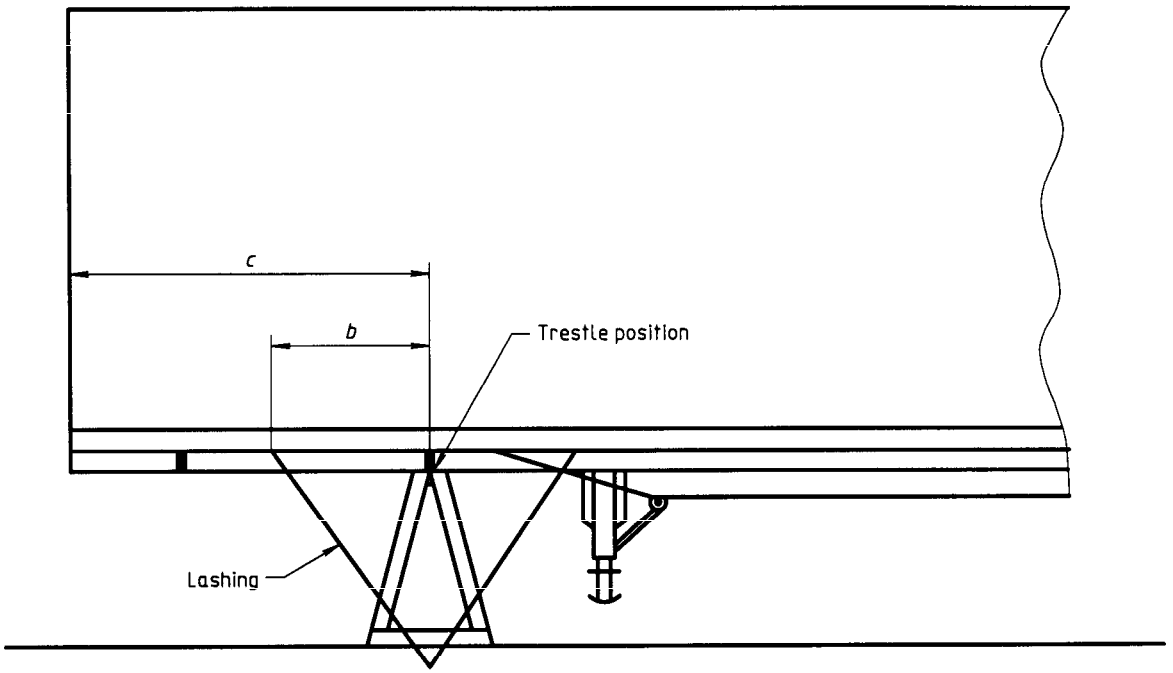


Figure B.1 — Maximum moment for semi-trailer frame

Dimensions in millimetres

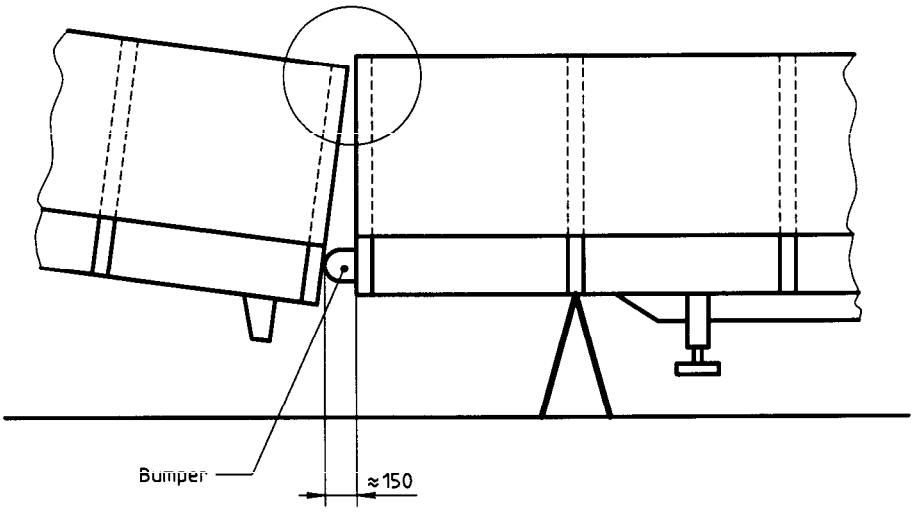


Figure B.2 — Frontside bumper

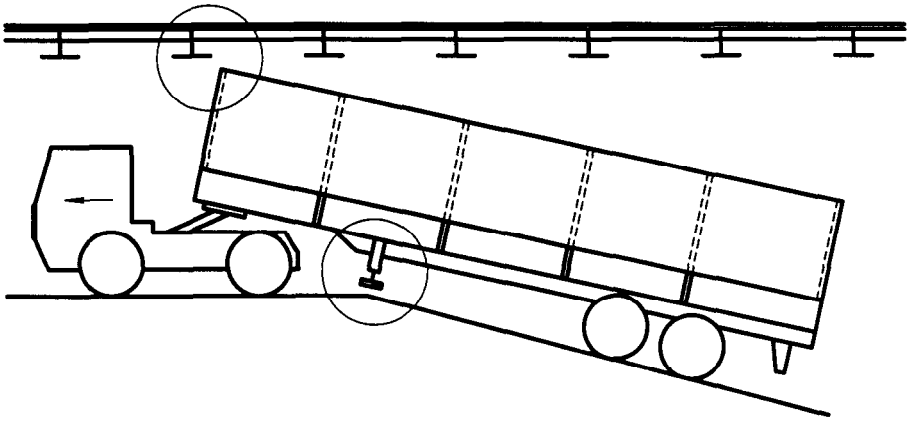


Figure B.3 — Superstructure and support legs

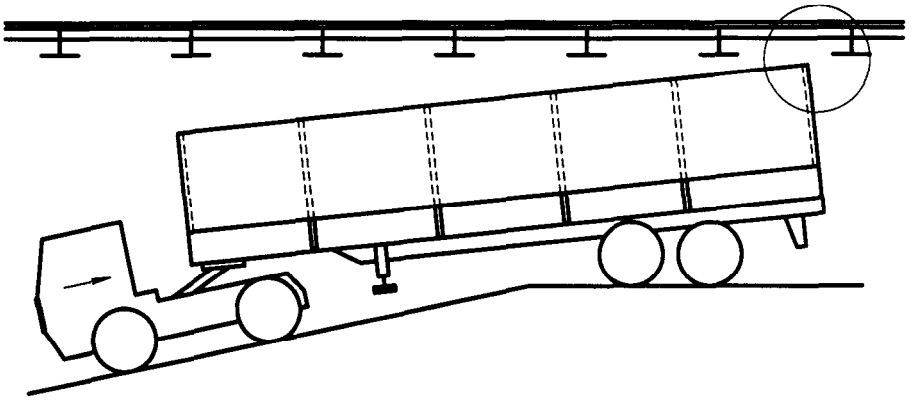


Figure B.4 — Superstructure

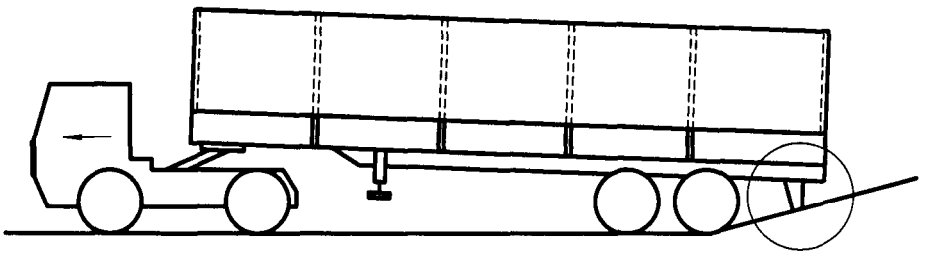


Figure B.5 — Rear underride protection

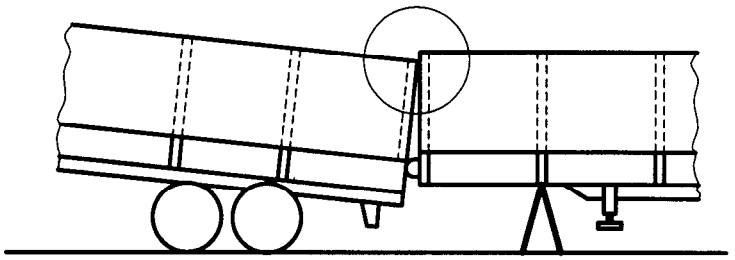


Figure B.6 — Superstructure

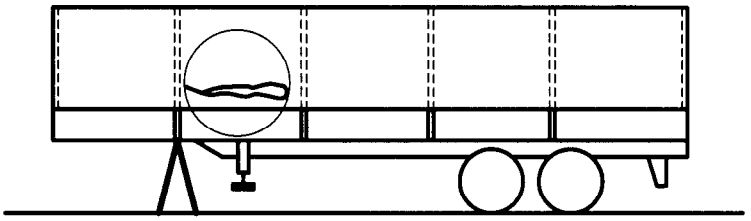


Figure B.7 — Semi-trailer sides

Annex C
(informative)

Alternative stowage positions

Dimensions in millimetres

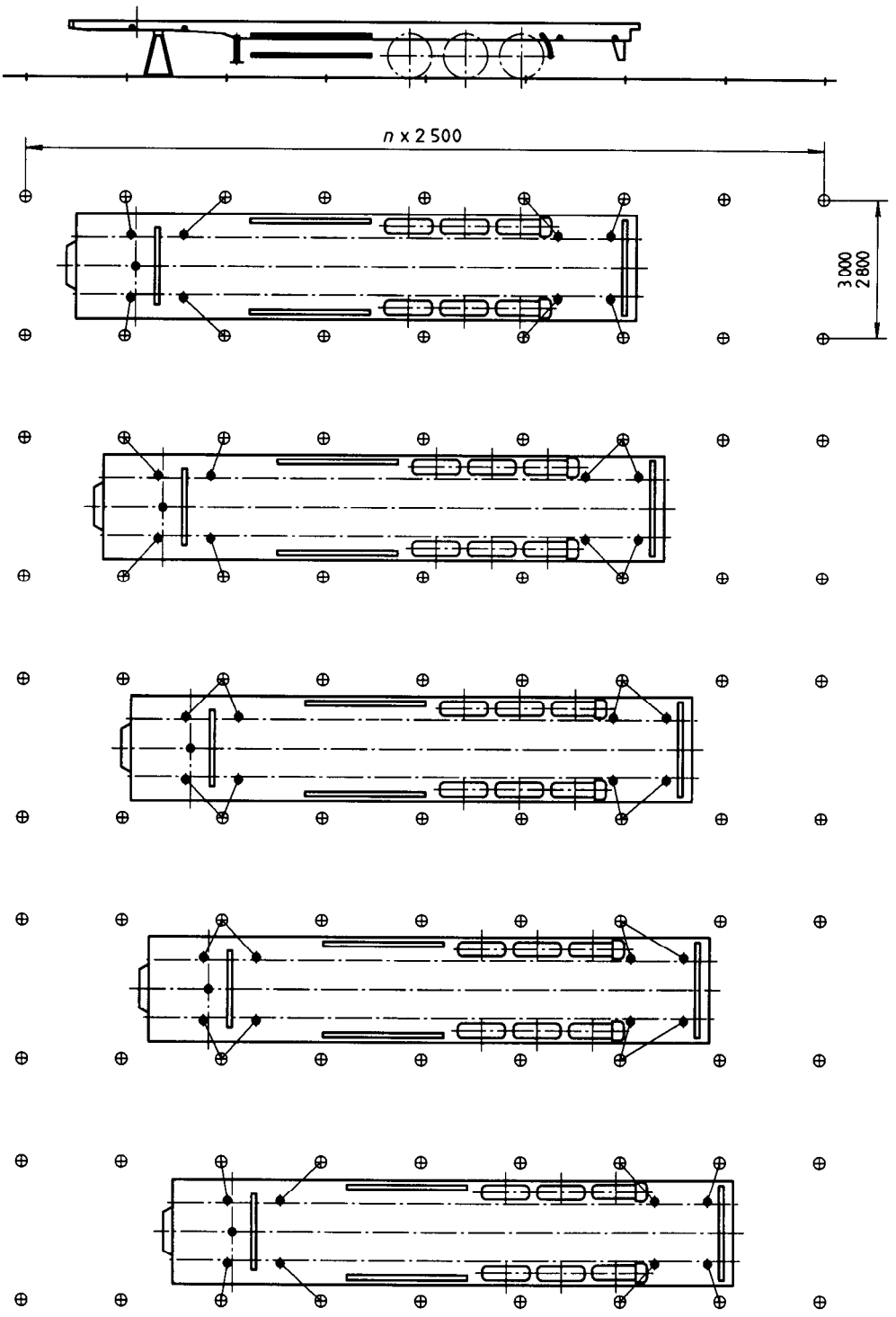


Figure C.1 — Examples of alternative stowage positions with location as in figure 2 a)

Dimensions in millimetres

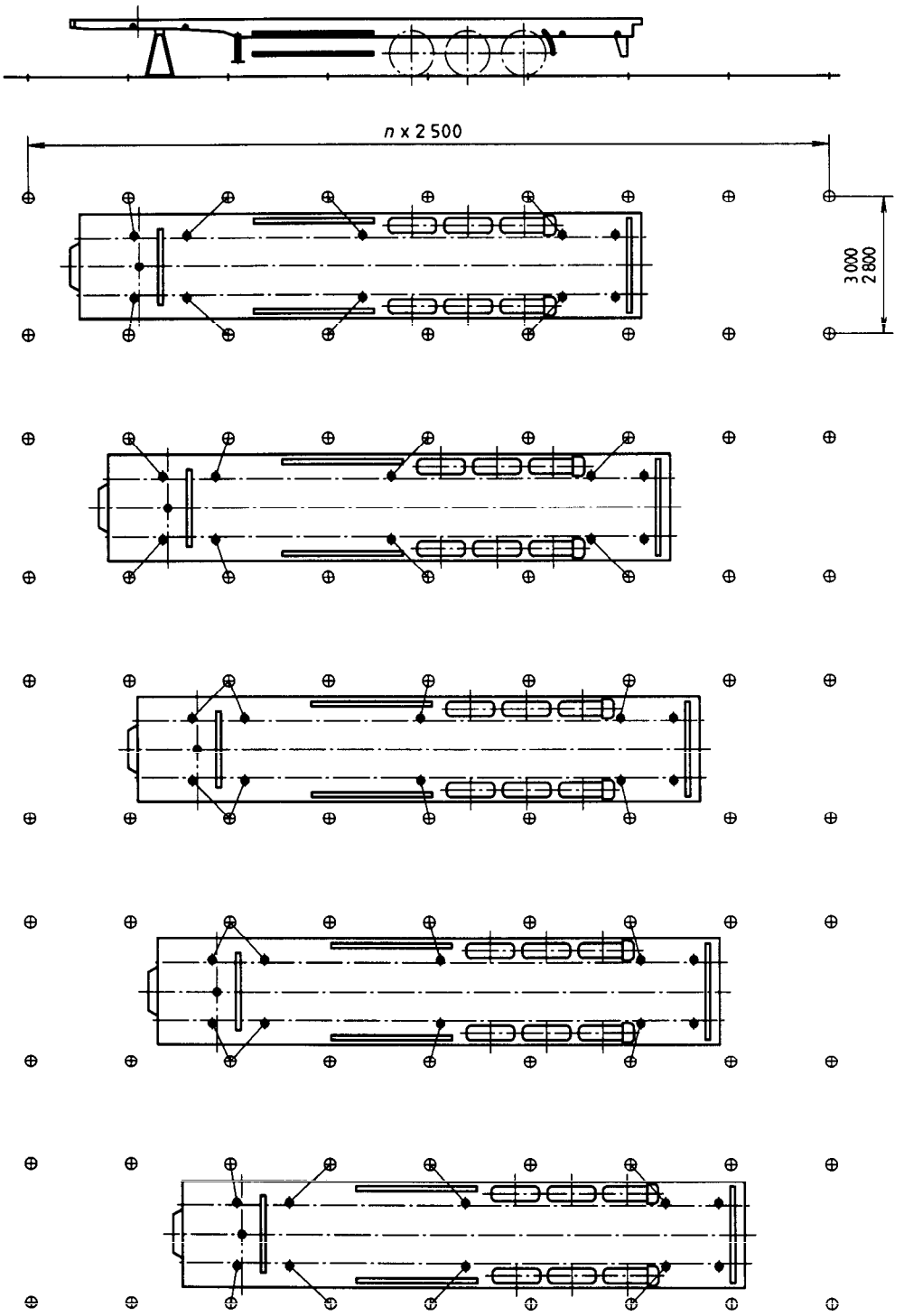


Figure C.2 — Examples of alternative stowage positions with location as in figure 2 d)

Dimensions in millimetres

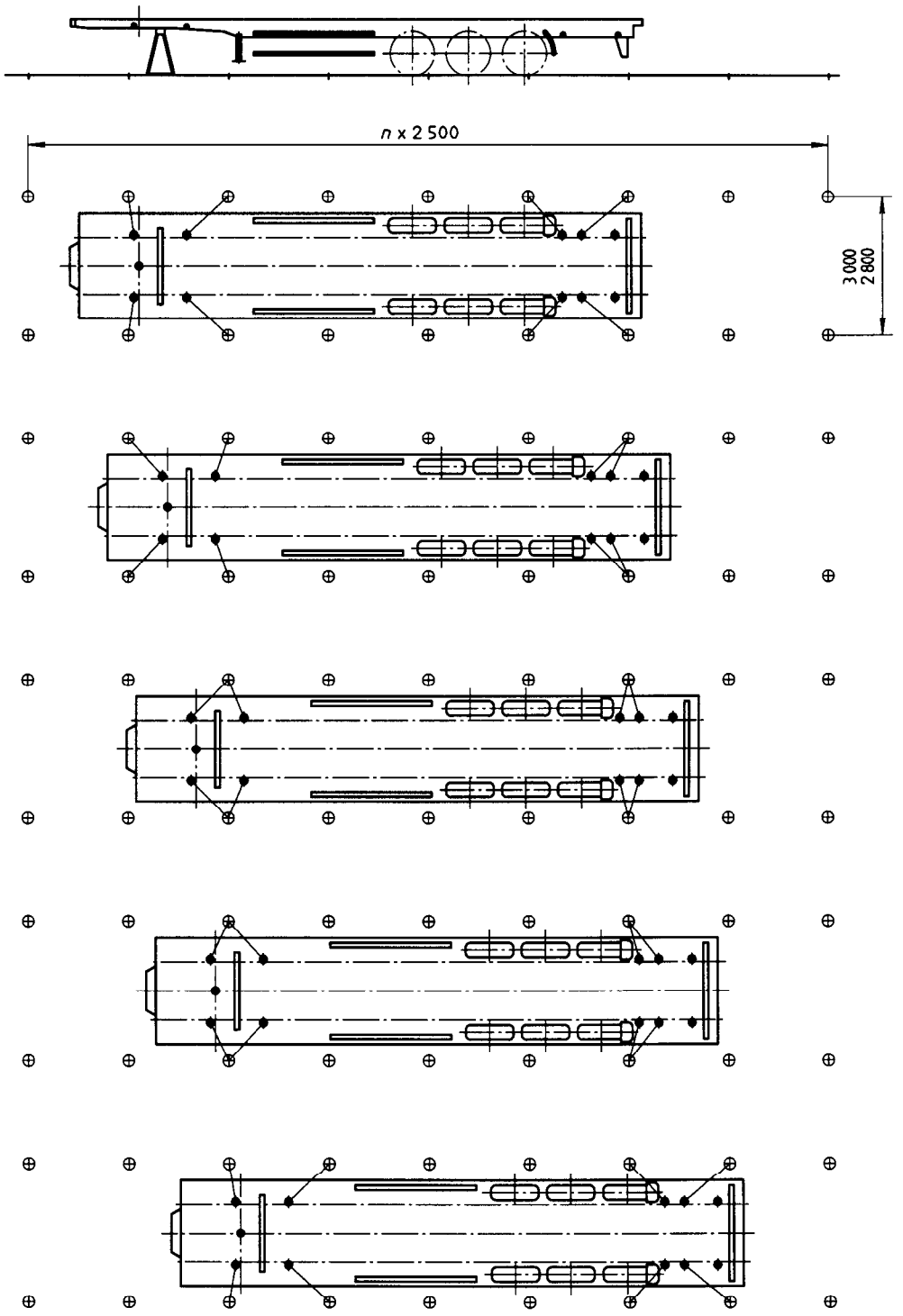


Figure C.3 — Examples of alternative stowage positions with location as in figure 2 e)

ICS 43.040.70

Descriptors: road vehicles, semitrailers, transportation, sea transport, fastenings, lashing devices, specifications, safety requirements, marking, general conditions.

Price based on 19 pages