
International Standard



7545

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Shipbuilding and marine structures — Inland navigation — Single-lock automatic couplings for push tows

Construction navale et structures maritimes — Navigation intérieure — Dispositifs d'accouplement automatique à un seul verrou pour convois poussés

First edition — 1983-09-15

ITeH STANDARD PREVIEW
(standards.iteh.ai)

[ISO 7545:1983](https://standards.iteh.ai/catalog/standards/sist/7ad843f5-8e0d-401a-a24f-8fd77902cacb/iso-7545-1983)

<https://standards.iteh.ai/catalog/standards/sist/7ad843f5-8e0d-401a-a24f-8fd77902cacb/iso-7545-1983>

UDC 629.12.013 : 629.122

Ref. No. ISO 7545-1983 (E)

Descriptors : shipbuilding, inland navigation, coupling, classification, specifications, dimensions.

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been authorized 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 7545 was developed by Technical Committee ISO/TC 8, *Shipbuilding and marine structures*, and was circulated to the member bodies in February 1982.

It has been approved by the member bodies of the following countries:

Austria	Egypt, Arab Rep. of	Romania
Belgium	India	Spain
Brazil	Japan	United Kingdom
China	Korea, Dem. P. Rep. of	USSR
Czechoslovakia	Korea, Rep. of	Yugoslavia

The member bodies of the following countries expressed disapproval of the document on technical grounds:

France
Germany, F.R.
Netherlands

Shipbuilding and marine structures — Inland navigation — Single-lock automatic couplings for push tows

1 Scope and field of application

This International Standard specifies types and main dimensions of single-lock automatic couplings intended for a bow-to-stern connection of vessels in push tows, navigating in waters with a wave height of not more than 2 m. It also lays down basic technical requirements for the couplings.

This International Standard does not cover side couplings.

2 Definitions

2.1 automatic coupling: A coupling mechanism together with rest elements, ensuring:

- a) a quick connection of vessels;
- b) a reliable and safe bow-to-stern connection of vessels in a push tow travelling and manoeuvring in navigation conditions as stated in this International Standard;
- c) a quick disconnection of the vessels.

2.2 bow-to-stern connection: Connection of the vessels of a push tow in one of the following ways:

- a) the bow of the pushboat to the stern of the non-powered vessel;
- b) the bow of the non-powered vessel to the stern of another non-powered vessel.

2.3 For the purpose of this International Standard, the following designations are applicable:

- a) the automatic single-lock coupling: "coupling";
- b) the system of the coupling mechanism with gripping elements: "coupling lock".

3 Arrangement of coupling

3.1 The bow coupling of pushboat/non-powered vessel shall consist of a coupling lock and rest elements. The coupling lock

shall be set in the centre plane of the vessel, and the rest elements located symmetrically to the coupling lock on either side (see figure 1).

3.2 The stern coupling of a non-powered vessel shall consist of a coupling beam and rest elements. The coupling beam shall be set in the centre plane of the vessel, and the rest elements located symmetrically to the coupling beam on either side (see figure 2).

3.3 The width location of the rest elements shall ensure the possibility of coupling either a pushboat to a non-powered vessel or non-powered vessels to one another.

4 Classification

Two types of couplings are specified:

- **Type A:** for pushboats of up to 220 kW inclusive and for non-powered vessels with a carrying capacity of up to 1 000 t inclusive, operating in waterways with a wave height up to 1,2 m and a maximum wind speed of 12 m/s.

The design stress on the coupling lock shall be not more than 200 kN. The maximum carrying capacity of a push tow shall be not more than 2 000 t.

- **Type B:** for pushboats of over 220 kW up to 1 500 kW inclusive and for non-powered vessels with a carrying capacity of up to 4 000 t inclusive, operating in waterways with a wave height up to 2 m and a maximum wind speed of 19 m/s.

The design stress on the coupling lock shall be not more than 2 000 kN. The maximum carrying capacity of a push tow shall be not more than 19 000 t.

5 Dimensions

The main dimensions, in millimetres, of the couplings shall correspond to figures 3 to 8 and the table.

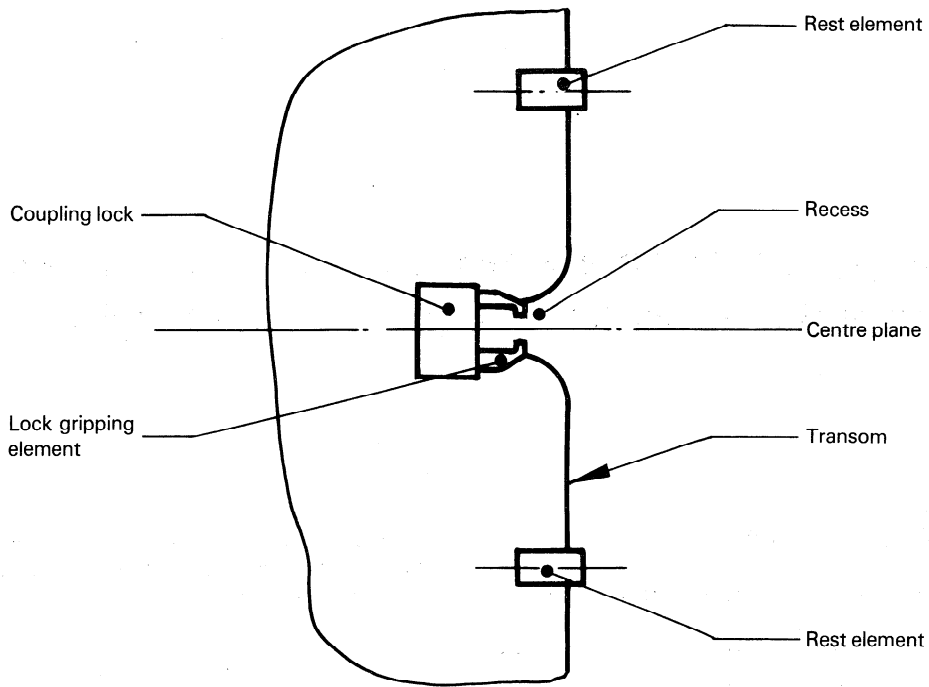


Figure 1 – Bow coupling of the pushboat/non-powered vessel
(standards.iteh.ai)

ISO 7545:1983

<https://standards.iteh.ai/catalog/standards/sist/7ad843f5-8e0d-401a-a24f-8fd77902cacb/iso-7545-1983>

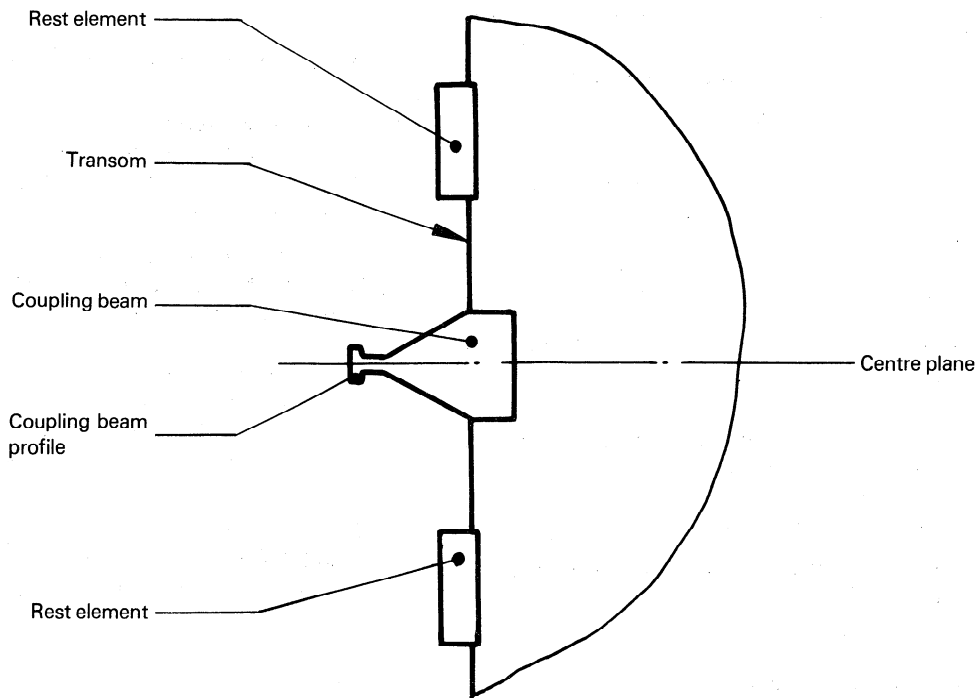


Figure 2 – Stern coupling of the non-powered vessel

Dimensions in millimetres

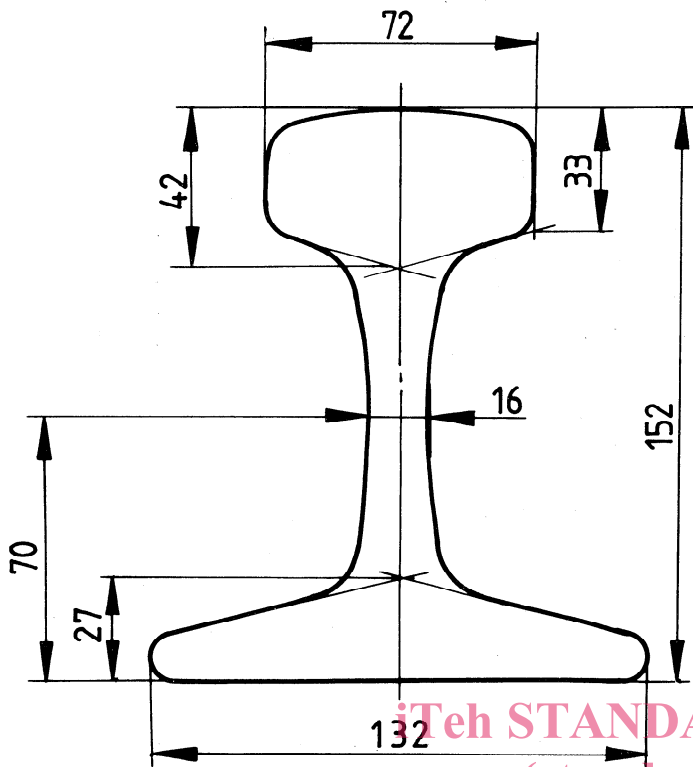


Figure 3 — Type A coupling beam profile

Dimensions in millimetres

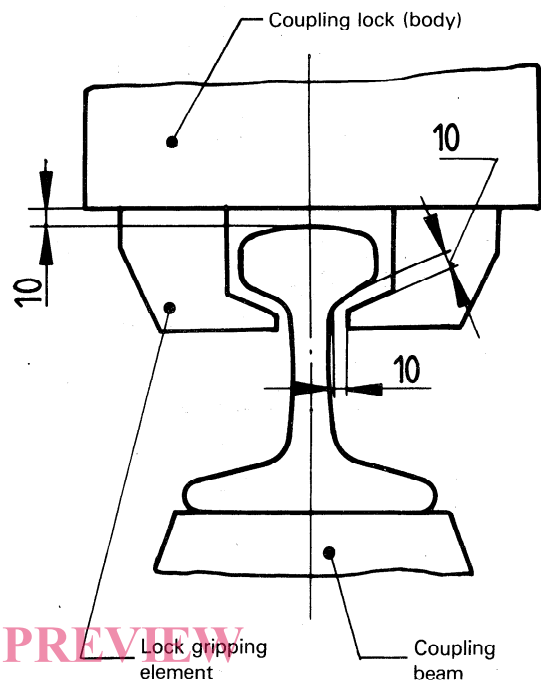


Figure 4 — Connection of lock with type A coupling beam

ISO 7545:1983
<https://standards.iteh.ai/catalog/standards/sist/7ad843f5-8e0d-401a-a24f-8fd77902cacb/iso-7545-1983>

Dimensions in millimetres

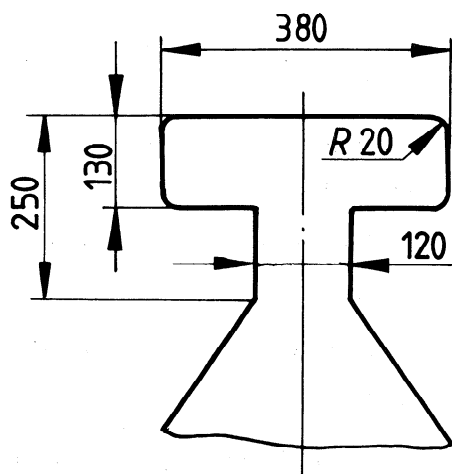


Figure 5 — Type B coupling beam profile

Dimensions in millimetres

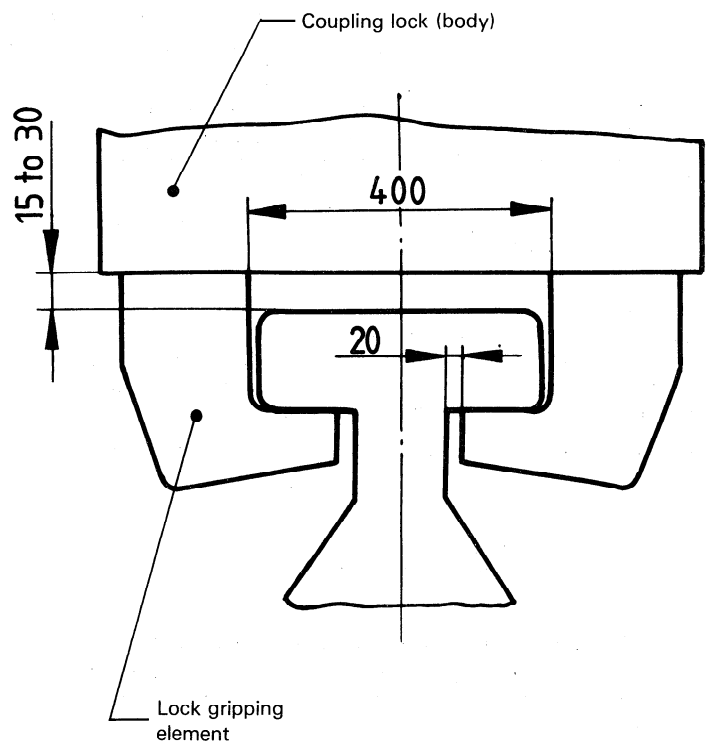


Figure 6 — Connection of lock with type B coupling beam

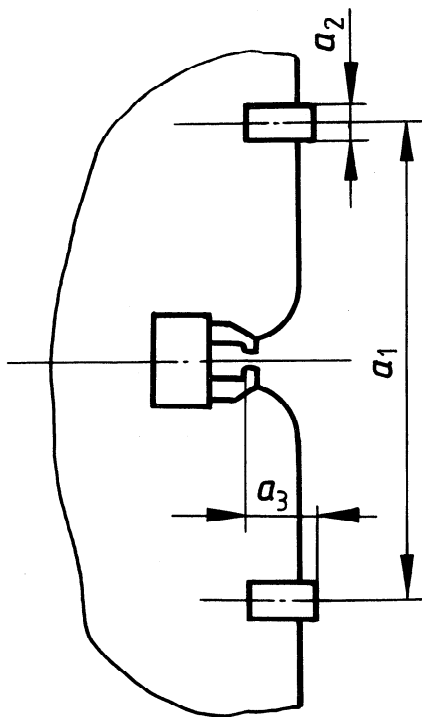


Figure 7 — Mating dimensions of bow coupling of a pushboat/non-powered vessel

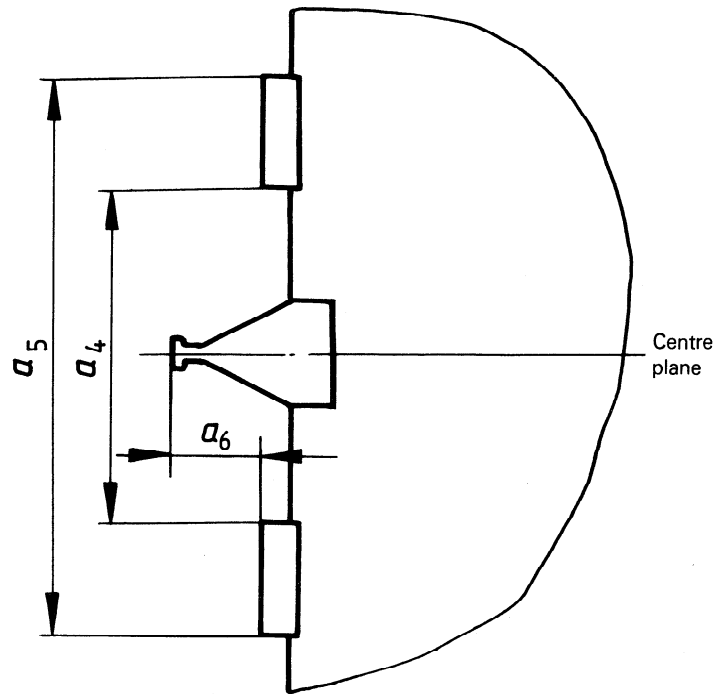


Figure 8 — Mating dimensions of stern coupling of a non-powered vessel

iTech STANDARD PREVIEW
(standards.iteh.ai)

Table — Mating dimensions of couplings
Dimensions in millimetres

Type of coupling	a_1	a_2	a_3	a_4	a_5	a_6
A	2 500	400	415	1 900	3 100	450
B	From 5 000 to 7 000	From 600 to 800	520	Not more than 3 400	Not less than 8 800	650

NOTES

1 Dimensions a_1 and a_4 are given in the table for type A couplings as the minimum possible for the bow-to-stern connection of pushboats with non-powered vessels.

With the necessity of reducing external forces, an increase in dimensions a_1 and a_4 is allowed for the bow-to-stern connection of non-powered vessels by moving the rest elements to the sides, or by installing additional rest elements, while retaining the possibility of connecting the pushboat to each of the non-powered vessels.

2 The dimensions a_1 , a_2 and a_4 for type B couplings may be proportionally increased with the design stress increase.

6 Technical requirements

6.1 The connection of the lock gripping elements with the coupling beam and the contacts between the rest elements shall ensure coupling of the vessels under the following initial conditions:

- a) the pushboat with tanks 10 % full — non-powered vessel in full load;

ISO 7545:1983

- b) the pushboat with complete tanks — non-powered vessel empty;

- c) non-powered vessels between themselves with a draught difference up to 0,5 m inclusive.

The following additional reserve height h of the coupling beam and the rest elements as indicated in figure 9 shall be provided:

- 600 mm for type A;
- 1 000 mm for type B.

6.2 The possible ranges of the distance between the axis of the coupling lock and the water are as follows:

- a) for type A couplings:
 - on non-powered vessels 1,2 to 2,3 m
 - on pushboats 1,4 to 2,0 m
- b) for type B couplings:
 - on non-powered vessels 2,7 to 6,0 m
 - on pushboats 2,4 to 4,0 m

The indicated ranges are chosen when designing the couplings depending on the depth and draught of the vessels forming push tows of the assigned tonnage. (The draughts of the pushboat and of the non-powered vessel shall be taken with tanks full and fully-laden respectively.)

6.3 A positional adjustment of the coupling lock (or its gripping elements) in the vessel length shall be provided for in the couplings. The ranges of adjustment in relation to the initial mounting position of the couplings shall be as follows:

- 40 to 60 mm fore and aft for type A;
- 60 to 120 mm fore and aft for type B.

6.4 Type A couplings shall be fitted with a coupling lock whose gripping elements are designed for coupling with the coupling beam made of a railway rail or other beam having a profile similar to that of a rail. Main dimensions of the section of a rail used as a coupling beam shall correspond to those indicated in figure 3.

6.5 Type B couplings shall be fitted with a coupling lock whose gripping elements are designed for coupling with the coupling beam having the profile shown in figure 5.

6.6 To provide for natural oscillations of the lock along the coupling beam, heel (up to 0,175 rad) and trim (up to 0,09 rad), clearances between the surfaces of the coupling beam and the gripping elements shall be provided, their values being as indicated in figures 5 and 6.

6.7 The couplings shall be manufactured in compliance with the provisions of this International Standard in accordance with drawings approved by the national classification society and following the adopted procedure.

6.8 Carbon steel shall be used as a primary material for the load-carrying parts, units and structures of couplings.

6.9 The carbon steel for the parts, units and structures manufactured or installed by welding shall comply with the requirements of weldability.

6.10 When using a rail for the coupling beam in type A couplings, its material shall have the property of guaranteed weldability.

6.11 The details, units and structures carrying load shall be checked by a strength calculation in conformity with the standing rules of the national classification society.

6.12 Each newly manufactured coupling lock shall be bench-tested under a test load prescribed by the classification society but not less than 1,5 of the design stress. The maximum stresses appearing in the main parts of a coupling lock under the effect of the test load shall not exceed 0,95 of the yield point of the material.

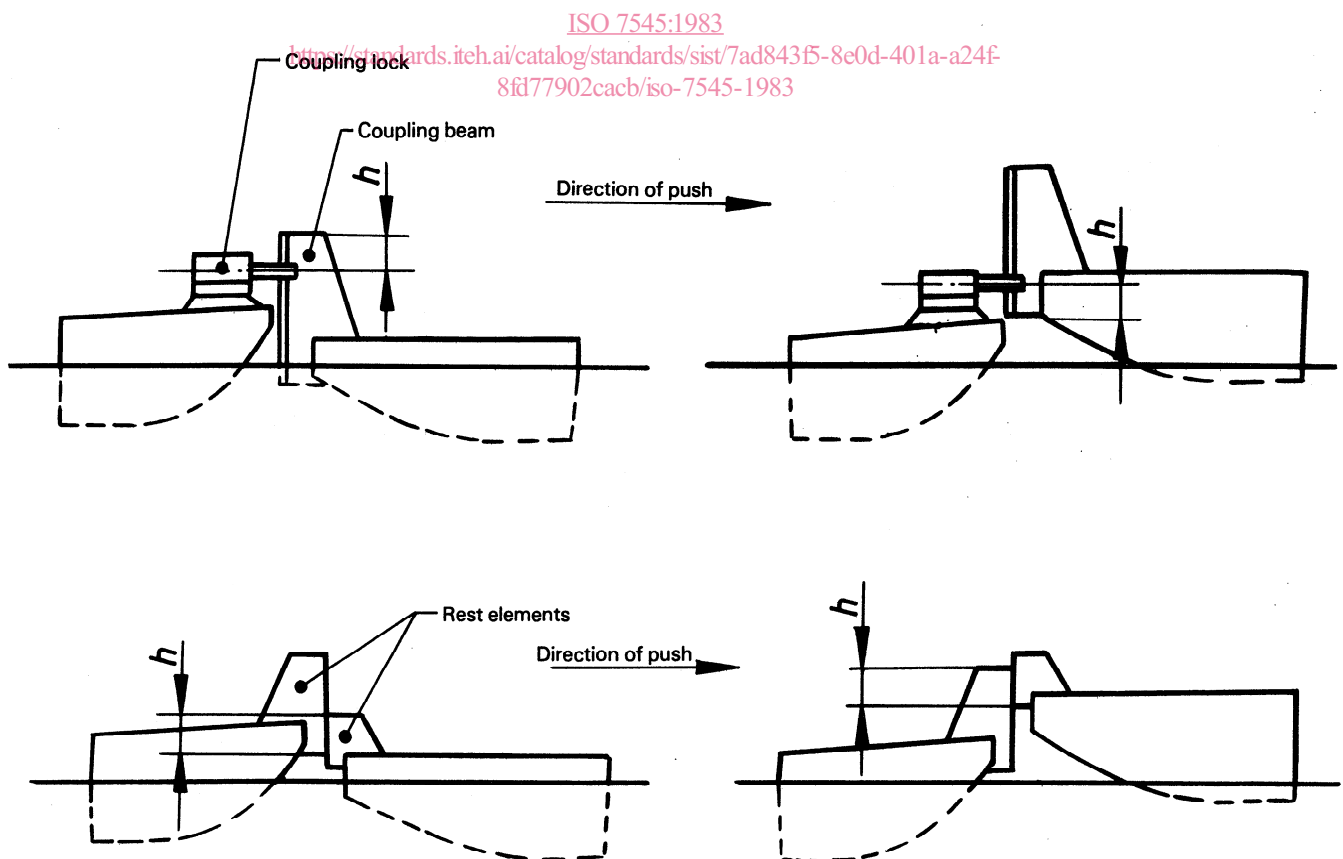


Figure 9 — Height reserves (h) of coupling elements

6.13 The final choice of the type of coupling and the design stress for the coupling lock shall be made based on a preliminary determination of the external forces which may appear during travel and manoeuvres of the push tow of the assigned tonnage.

6.14 Type B couplings shall be fitted with devices for suppressing (damping) the dynamic effect of the external longitudinal and transverse forces in rolling and pitching.

6.15 The mechanisms of coupling locks shall have devices to ensure the following operations during the operation of a push tow:

a) disconnection of the lock under a load equal to the design stress;

b) disconnection of the lock of a pushboat from the wheelhouse of the vessel and from the local post at the coupling lock itself;

c) disconnection of the lock of a non-powered vessel from the local post at the coupling lock itself.

6.16 The disconnection of the coupling lock shall be carried out for not more than 3 min.

6.17 The coupling structure shall not project beyond the sides of the vessel.

6.18 The whole coupling shall meet the requirements of maintenance safety.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[ISO 7545:1983](https://standards.iteh.ai/catalog/standards/sist/7ad843f5-8e0d-401a-a24f-8fd77902cacb/iso-7545-1983)

<https://standards.iteh.ai/catalog/standards/sist/7ad843f5-8e0d-401a-a24f-8fd77902cacb/iso-7545-1983>