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**Ships and marine technology —  
Tanker cargo manifold shore  
connection — Technical requirements**

*Navires et technologie maritime — Connection à quai de la traverse  
des pétroliers — Exigences techniques*

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## Foreword

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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](http://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](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 3, *Piping and machinery*.

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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](http://www.iso.org/members.html).

# Ships and marine technology — Tanker cargo manifold shore connection — Technical requirements

## 1 Scope

This document specifies the types, structure, dimensions and technical requirements of manifolds for oil and chemical tankers.

It applies to the cargo and vapour piping systems for the transfer of cargoes of oil or chemical tankers.

NOTE This document can be also be applied to the design of bunker (ship fuel) transfer system manifolds for oil or chemical tankers at terminals. ISO 23212 is generally applicable to flanged connections for bunker fuel and lubricating oil transfer to ships from supply vessels or onshore facilities.

## 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 898-1, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 1: Bolts, screws and studs with specified property classes — Coarse thread and fine pitch thread*

ISO 3506-1, *Fasteners — Mechanical properties of corrosion-resistant stainless steel fasteners — Part 1: Bolts, screws and studs with specified grades and property classes*

ASME B16.5, *Pipe Flanges and Flanged Fittings*

## 3 Terms and definitions

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

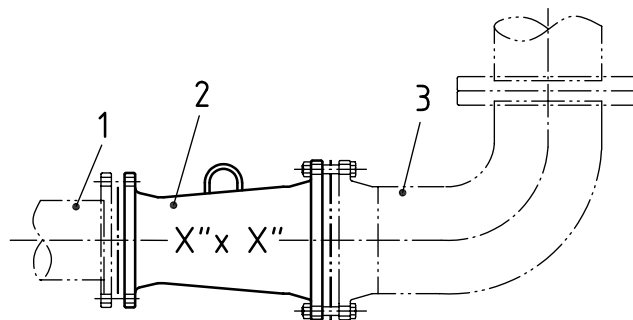
ISO and IEC maintain terminology databases for use in standardization at the following addresses:

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

### 3.1 manifold

flanged pipe assembly, mounted onboard ship to which the presentation flange of the loading arm, hose or spool piece is connected

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



**Key**

- 1 onboard piping
- 2 manifold
- 3 loading arm or hose or spool piece

**Figure 1 — Typical arrangement of cargo manifold**

## 4 Classification

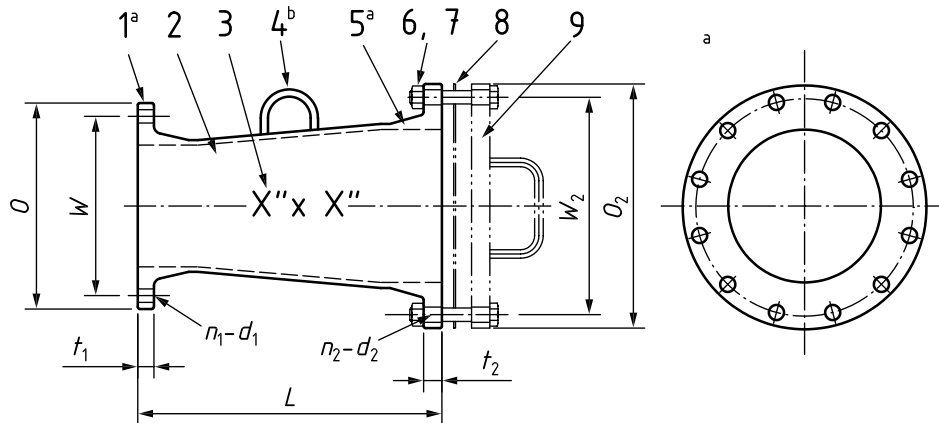
### 4.1 Type

Manifolds shall be classified as belonging to one of the following according to the purpose:

- a) Type A: for cargo, bunker, diesel oil and gas oil line;
- b) Type B: for vapour line.

### 4.2 Structure and dimensions

The structure and dimensions of the manifold shall be in accordance with [Figure 2](#), [Figure 3](#), [Table 1](#) and [Table 2](#).



**Key**

- |   |   |     |   |
|---|---|-----|---|
| 1 | inboard flange                                | $d$ | diameter of bolt hole   |
| 2 | short length of pipe                          | $n$ | number of bolts   |
| 3 | marking (see <a href="#">Figure D.1</a> )     | $W$ | diameter of bolt circle   |
| 4 | lifting lug (see <a href="#">Figure B.1</a> ) | $o$ | outside diameter of flange                                      |
| 5 | outboard flange                               | $t$ | thickness of flange   |
| 6 | bolt  | $L$ | body length   |
| 7 | nut   | a   | Execution 1 (alignment of flange bolt holes).                   |
| 8 | gasket (see <a href="#">Annex A</a> )         | b   | Execution 2 (arranged near the balance centre of the manifold). |
| 9 | blind flange (see <a href="#">Annex E</a> )   |     |   |

NOTE The figure is given as an example.

**Figure 2 — Structure of Type A**

**Table 1 — Dimensions of Type A**

Dimensions in millimetres

Marking <sup>a</sup>	Nominal diameter <sup>b</sup>	Inboard flange			Outboard flange			Short length of pipe thickness <sup>c</sup>	L				
		O <sub>1</sub>	t <sub>1</sub>	Bolt hole			O <sub>2</sub>			t <sub>2</sub>	Bolt hole		
				W <sub>1</sub>	n <sub>1</sub>	d <sub>1</sub>					W <sub>2</sub>	n <sub>2</sub>	d <sub>2</sub>
4" x 4"	100 x 100								8,8 (8,56)	300			
4" x 6"	100 x 150								8,8 (8,56)	300			
5" x 4"	125 x 100								8,8 (9,53)	300			
5" x 5"	125 x 125								10 (9,53)	300			
6" x 4"	150 x 100								8,8 (8,56)	300			
6" x 6"	150 x 150								11 (10,97)	300			
6" x 8"	150 x 200								11 (10,97)	300			
8" x 4"	200 x 100								8,8 (8,56)	400			
8" x 6"	200 x 150								11 (10,97)	400			
8" x 8"	200 x 200								12,5 (8,18)	400			
8" x 10"	200 x 250								12,5 (8,18)	400			
10" x 4"	250 x 100								8,8(8,56)	400			
10" x 6"	250 x 150								11 (10,97)	400			
10" x 8"	250 x 200								12,5 (8,18)	400			
10" x 10"	250 x 250								10 (9,27)	400			
10" x 12"	250 x 300								10 (9,27)	400			
12" x 8"	300 x 200								12,5 (8,18)	500			
12" x 10"	300 x 250								10 (9,27)	500			
12" x 12"	300 x 300								11 (9,52)	500			
16" x 8"	400 x 200								12,5 (8,18)	500			
16" x 10"	400 x 250								10 (9,27)	500			
16" x 12"	400 x 300								10 (9,52)	500			
16" x 16"	400 x 400								12,5 (9,52)	500			
20" x 12"	500 x 300								10 (9,52)	500			
20" x 16"	500 x 400								12,5 (9,52)	500			
20" x 20"	500 x 500								11 (9,52)	500			
24" x 12"	600 x 300								10 (9,52)	500			
24" x 16"	600 x 400								12,5 (9,52)	500			
24" x 20"	600 x 500								11 (9,52)	500			
26" x 12"	650 x 300								10 (9,52)	500			
26" x 16"	650 x 400								12,5 (9,52)	500			
26" x 20"	650 x 500								11 (9,52)	500			

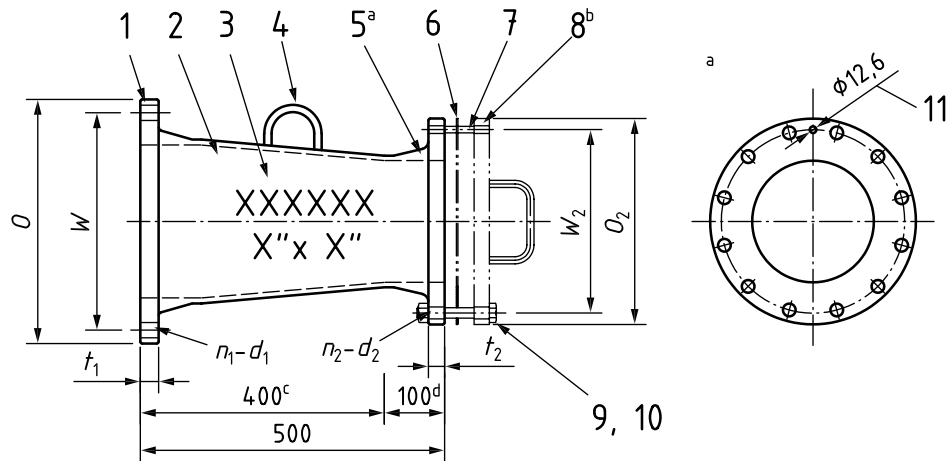
In accordance with ASME B16.5 class 150 welding neck flanges

<sup>a</sup> The left number in the marking column represents the inboard flange size, in inches. The right number represents the outboard flange size, in inches.

<sup>b</sup> Nominal diameter of inboard and outboard flanges, respectively, in millimetres.

<sup>c</sup> The thickness in the table has been selected according to ISO 4200, and the thickness in brackets is the minimum recommended thickness, in millimetres.





**Key**

- |   |  |
|---|--|
| 1 inboard flange  | 11 hole  |
| 2 short length of pipe                                      | <i>d</i> diameter of bolt hole                       |
| 3 marking (see <a href="#">Figure D.1</a> )                 | <i>W</i> diameter of bolt circle                     |
| 4 lifting lug (see <a href="#">Figure B.1</a> )             | <i>n</i> number of bolts                             |
| 5 outboard flange   | <i>t</i> thickness of flange                         |
| 6 gasket (see <a href="#">Annex A</a> )                     | <i>o</i> outside diameter of flange                  |
| 7 stud at outboard flange (see <a href="#">Figure C.1</a> ) | <i>a</i> Execution (alignment of flange bolt holes). |
| 8 blind flange (see <a href="#">Annex E</a> )               | <i>b</i> Paint yellow on exterior surfaces.          |
| 9 bolt  | <i>c</i> Paint yellow at the length.                 |
| 10 nut  | <i>d</i> Paint red at the length.                    |

NOTE 1 Stud at outboard flange was recommended by the Oil Companies International Marine Forum (OCIMF).

NOTE 2 The figure is given as an example.

NOTE 3 Only key number 5 (outboard flange) has the hole.

**Figure 3 — Structure of Type B**

Table 2 — Dimensions of Type B

Dimensions in millimetres

Marking <sup>a</sup>	Nominal diameter <sup>b</sup>	Inboard flange			Outboard flange			Short length of pipe thickness <sup>c</sup>				
		$O_1$	$t_1$	Bolt hole			$O_2$		$t_2$	Bolt hole		
				$W_1$	$n_1$	$d_1$				$W_2$	$n_2$	$d_2$
8" x 6"	200 x 150	In accordance with ASME B16.5 class 150 welding neck flanges						11(10,97)				
8" x 8"	200 x 200							12,5 (8,18)				
10" x 8"	250 x 200							12,5 (8,18)				
10" x 10"	250 x 250							10(9,27)				
12" x 8"	300 x 200							12,5 (8,18)				
12" x 10"	300 x 250							10(9,27)				
12" x 12"	300 x 300							10(9,52)				
16" x 12"	400 x 300							10(9,52)				
16" x 16"	400 x 400							12,5 (9,52)				
20" x 12"	500 x 300							10(9,52)				
20" x 16"	500 x 400							12,5 (9,52)				

<sup>a</sup> The left number in the marking column represents the inboard flange size, in inches. The right number represents the outboard flange size, in inches.

<sup>b</sup> Nominal diameter of inboard and outboard flanges, respectively, in millimetres.

<sup>c</sup> The thickness in the table has been selected according to ISO 4200, and the thickness in brackets is the minimum recommended thickness.

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## 5 Technical requirements

### 5.1 Materials

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#### 5.1.1 General

The material of manifold shall be suitable for the service intended. Usually, carbon steel or stainless steel is recommended.

Carbon steel is typically used to construct oil tanker cargo or bunker manifolds. It may also be used to construct some types of chemical tanker manifolds.

Stainless steel is typically used to construct chemical tanker manifolds.

Code of materials shall be in accordance with [Table 3](#).

#### 5.1.2 Mechanical properties

Minimum mechanical properties for manifold shall comply with [Table 4](#). Impact testing to the requirements stated in ASME B31.3 should be carried out.

#### 5.1.3 Material of other fittings

Other fittings such as bolts, nuts and gaskets shall be in accordance with [Table 5](#). See Figure A.1 for details on the structure of gasket and Table A.1 for details on the size of gasket.

**Table 3 — Code of material**

Material	Code
Carbon steel	MS
Stainless steel	SST

**Table 4 — Mechanical properties**

Carbon steel			Stainless steel		
Ultimate strength MPa	Yield strength MPa	Service temperature °C	Ultimate strength MPa	Yield strength MPa	Elongation, min. %
415	240	29	515	205	35

Maximum carbon content by mass should be not more than 0,23 %.

**Table 5 — Material of other fittings**

Name of parts	Material	
	Name	Grade Standard
Bolt	Carbon steel	ISO 898—1; Grade 4.8
	Stainless steel	ISO 3506—1; A250
Nut	Carbon steel	ISO 898—1; Grade 4
	Stainless steel	ISO 3506—1; A250
Gasket	Nitrile-butadiene rubber (NBR), Fluoro rubber (FPM) or Polytetrafluoroethylene (PTFE)	—

## 5.2 Flange facing

The presentation flanges should be kept vertical and have flat faces. Gasket contact surfaces shall be machined and finished with continuous spiral groove, in accordance with ASME B16.5.

## 5.3 Lifting lug

The location of lifting lug shall be in accordance with [Figure 2](#) and [Figure 3](#), near the manifold centre of balance. Refer to [Figure B.1](#) for lifting lug dimensions.

## 5.4 Blind flange

The manifold is to be divided principal and reserve. Each principal manifold should be provided with a removable blind flange fitted with handles, but the reserve manifold blind flange is not required. Refer to the blind flange dimensions specified in [Annex E](#).

## 5.5 Welding

Welding connection is allowed for flange and short length of pipe. Welding shall be carried out in accordance with full penetration welding standards.