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

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Foreword

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

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 — 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.

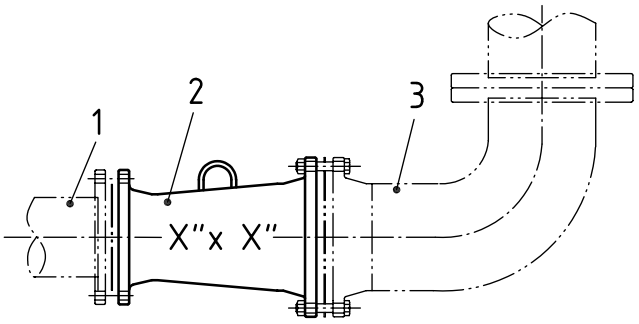
ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— 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

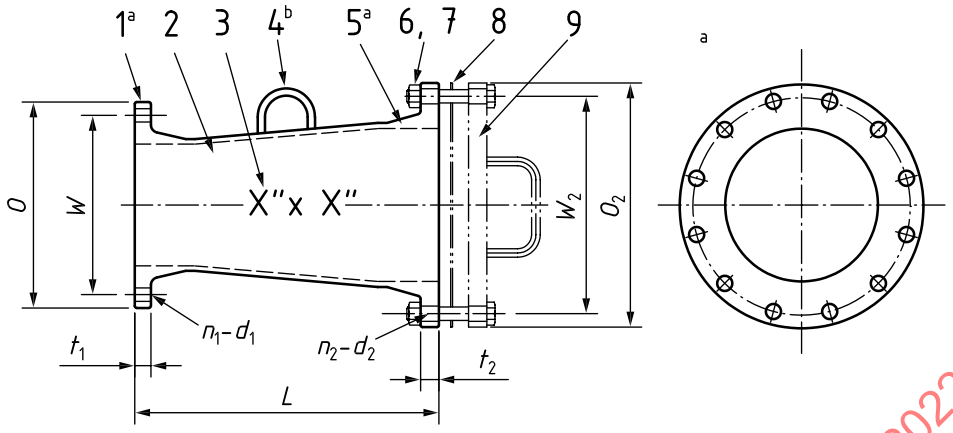
Manifolds shall be classified as belonging to one of the following according to the purpose:

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 Figure D.1)	*W*	diameter of bolt circle
4	lifting lug (see Figure B.1)	*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 Annex A)	b	Execution 2 (arranged near the balance centre of the manifold).
9	blind flange (see Annex E)		

NOTE The figure is given as an example.

Figure 2 — Structure of Type A

Table 1 — Dimensions of Type A

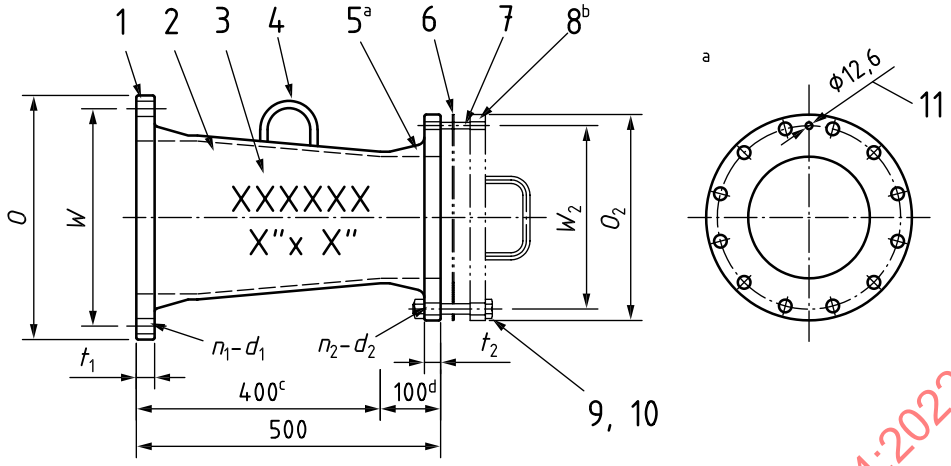
Dimensions in millimetres

Marking [a]	Nominal diameter [b]	Inboard flange					Outboard flange					Short length of pipe thickness [c]	L
		O_1	t_1	Bolt hole			O_2	t_2	Bolt hole				
				W_1	n_1	d_1			W_2	n_2	d_2		
4” x 4”	100 × 100	In accordance with ASME B16.5 class 150 welding neck flanges										8,8 (8,56)	300
4” x 6”	100 × 150											8,8 (8,56)	300
5” x 4”	125 × 100											8,8 (9,53)	300
5” x 5”	125 × 125											10 (9,53)	300
6” x 4”	150 × 100											8,8 (8,56)	300
6” x 6”	150 × 150											11 (10,97)	300
6” x 8”	150 × 200											11 (10,97)	300
8” x 4”	200 × 100											8,8 (8,56)	400
8” x 6”	200 × 150											11 (10,97)	400
8” x 8”	200 × 200											12,5 (8,18)	400
8” x 10”	200 × 250											12,5 (8,18)	400
10” x 4”	250 × 100											8,8(8,56)	400
10” x 6”	250 × 150											11 (10,97)	400
10” x 8”	250 × 200											12,5 (8,18)	400
10” x 10”	250 × 250											10 (9,27)	400
10” x 12”	250 × 300											10 (9,27)	400
12” x 8”	300 × 200											12,5 (8,18)	500
12” x 10”	300 × 250											10 (9,27)	500
12” x 12”	300 × 300											11 (9,52)	500
16” x 8”	400 × 200											12,5 (8,18)	500
16” x 10”	400 × 250											10 (9,27)	500
16” x 12”	400 × 300											10 (9,52)	500
16” x 16”	400 × 400											12,5 (9,52)	500
20” x 12”	500 × 300											10 (9,52)	500
20” x 16”	500 × 400											12,5 (9,52)	500
20” x 20”	500 × 500											11 (9,52)	500
24” x 12”	600 × 300											10 (9,52)	500
24” x 16”	600 × 400											12,5 (9,52)	500
24” x 20”	600 × 500											11 (9,52)	500
26” x 12”	650 × 300											10 (9,52)	500
26” x 16”	650 × 400											12,5 (9,52)	500
26” x 20”	650 × 500											11 (9,52)	500

[a] The left number in the marking column represents the inboard flange size, in inches. The right number represents the outboard flange size, in inches.

[b] Nominal diameter of inboard and outboard flanges, respectively, in millimetres.

[c] 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	*d*	diameter of bolt hole
3	marking (see Figure D.1)	*W*	diameter of bolt circle
4	lifting lug (see Figure B.1)	*n*	number of bolts
5	outboard flange	*t*	thickness of flange
6	gasket (see Annex A)	*o*	outside diameter of flange
7	stud at outboard flange (see Figure C.1)	a	Execution (alignment of flange bolt holes).
8	blind flange (see Annex E)	b	Paint yellow on exterior surfaces.
9	bolt	c	Paint yellow at the length.
10	nut	d	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 [a]	Nominal diameter [b]	Inboard flange					Outboard flange					Short length of pipe thickness [c]
		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 × 150	In accordance with ASME B16.5 class 150 welding neck flanges										11(10,97)
8” x 8”	200 × 200											12,5 (8,18)
10” x 8”	250 × 200											12,5 (8,18)
10” x 10”	250 × 250											10(9,27)
12” x 8”	300 × 200											12,5 (8,18)
12” x 10”	300 × 250											10(9,27)
12” x 12”	300 × 300											10(9,52)
16” x 12”	400 × 300											10(9,52)
16” x 16”	400 × 400											12,5 (9,52)
20” x 12”	500 × 300											10(9,52)
20” x 16”	500 × 400											12,5 (9,52)

[a] The left number in the marking column represents the inboard flange size, in inches. The right number represents the outboard flange size, in inches.

[b] Nominal diameter of inboard and outboard flanges, respectively, in millimetres.

[c] The thickness in the table has been selected according to ISO 4200, and the thickness in brackets is the minimum recommended thickness.

5 Technical requirements

5.1 Materials

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.

5.6 Dimensional tolerance

The allowable tolerance for length of manifold is ±6 mm.

5.7 Geometric tolerance

The surface of flanges shall be vertical to the axis of the manifold connection. The allowable tolerance is no more than ±0°30′.

The allowable tolerance for offset between flange axes shall be 5 mm.

5.8 Appearance

The surface of the manifold shall be smooth, with no sharp edges, cracks or impressions.

All edges of the external surface of the manifold shall be rounded to approximately R1,0 mm.

Welding consumables are to be suitable to carbon steel or stainless steel accordingly.

6 Designation

The designation of the manifold shall be punched on the edge of outboard flange and shall contain the following minimum information:

a) the code number of this document: ISO 24224;

b) type of manifold;

c) nominal diameter;

d) code of material.

EXAMPLE The designation of a manifold Type A, DN150 for inboard flange, DN200 for outboard flange, material carbon steel, would be:

ISO 24224: Type A 150 × 200 MS

7 Inspection

7.1 General

The manifold shall be inspected for compliance by the manufacturer.

Inspection items shall include but not be limited to: bill of materials, size and appearance.

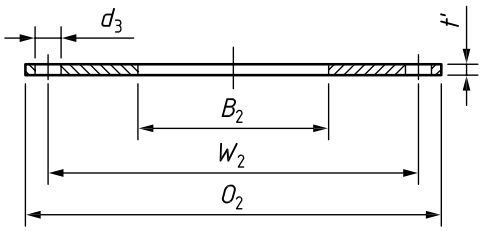
7.2 Hydrostatic test

The manifold shall be subjected to a hydrostatic test under pressure 1,5 MPa. The test should remain under pressure for minimum 5 min. There should be no visual leaks.

Annex A
(informative)

Gasket

Dimensions in millimetres



NOTE Select suitable gasket thickness (t') as needed based on gasket type.

Figure A.1 — Structure of gasket

Table A.1 — Size of gasket

Dimensions in millimetres

Nominal diameter	Inner diameter of flange B_2	Diameter of bolt hold d_2	Diameter of bolt circle W_2	Outside diameter O_2
100	In accordance with ASME B16.5 class 150 welding neck flanges			
150				
200				
250				
300				
400				
500				
NOTE $d_3 = d_2+1$.				

Annex B
(informative)

Lifting lug

Dimensions in millimetres

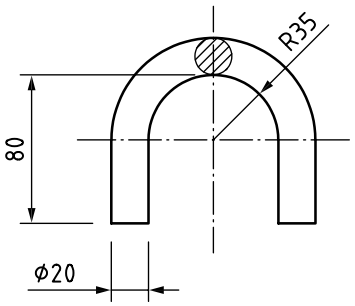


Figure B.1 — lifting lug of manifold

Annex C
(informative)

Stud

Dimensions in millimetres

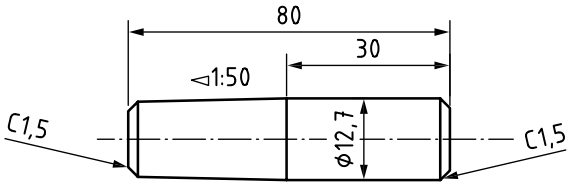


Figure C.1 — Example size of stud

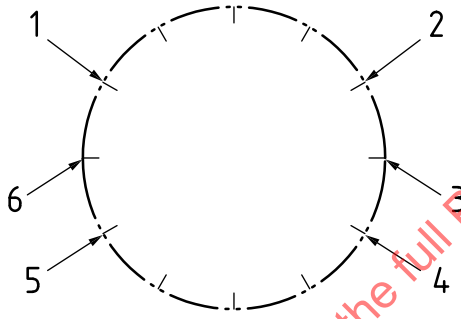
Annex D
(informative)

Marking

D.1 Marking

D.1.1 The marking may be painted by laser or equivalent with the characters ≥50 mm.

D.1.2 The location of the marking shall be classified by type (see Figure D.1).



Key

1 VAPOUR (Type B manifold, 10 o'clock position)
2 VAPOUR (Type B manifold, 2 o'clock position)
3 X" x X" (Type A manifold, 3 o'clock position)
4 X" x X" (Type A manifold, 4 o'clock position)
5 X" x X" (Type B manifold, 8 o'clock position)
6 X" x X" (Type B manifold, 9 o'clock position)

NOTE Key numbers 1 and 2 are required markings; others are optional.

Figure D.1 — Layout of marking