

3 Clips for cold insulation rated down to -140°C

All dimensions in mm

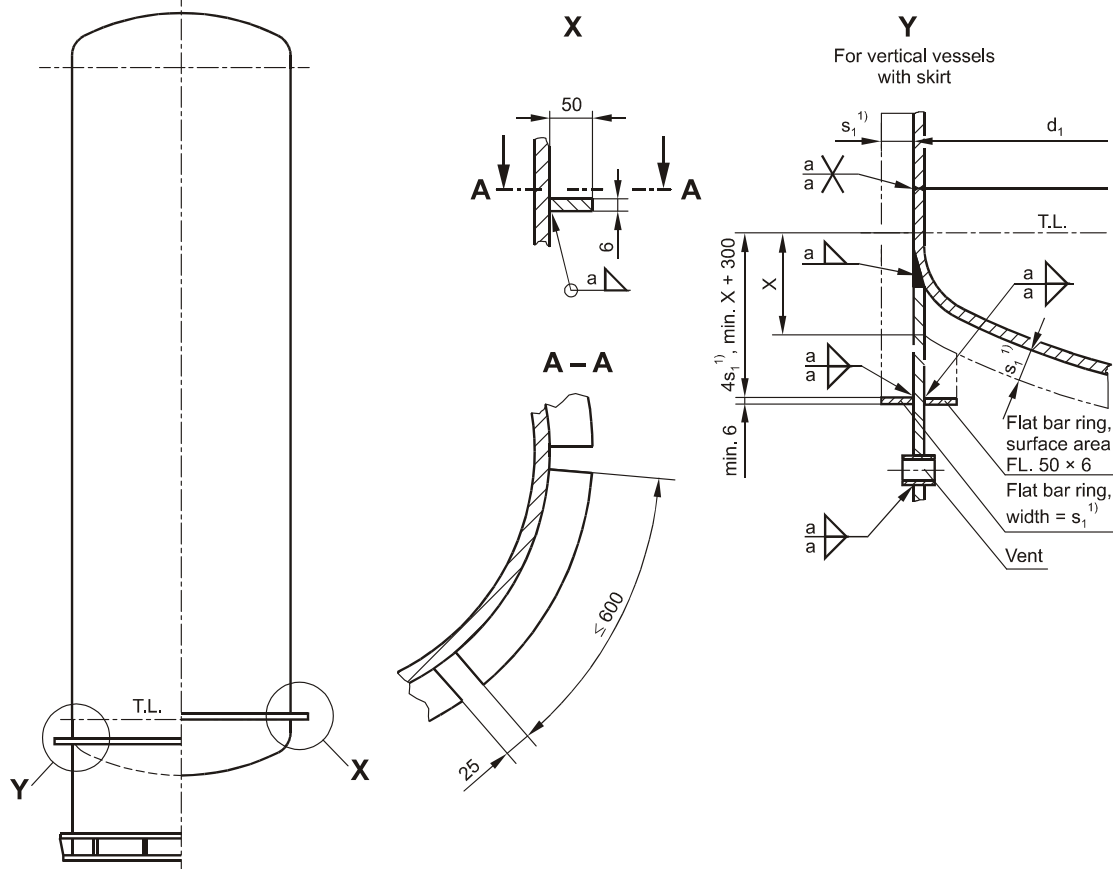


Figure 2.

4 Requirements**4.1 Design**

Clips shall be attached to the shell by circumferential fillet welds ($a = 3 \text{ mm}$).

Clips and rings shall not be welded onto longitudinal and circumferential welds. Rings across longitudinal welds shall be cut out appropriately.

Clips and rings shall not be welded at the same level as nozzles, openings and platform supports.

Partly insulated vessels shall be equipped with a circumferential 6 mm thick flat bar ring at the upper end (width = insulation thickness).

4.2 Materials

Clips welded to the vessel shall be made of the same material as the vessel. Clips welded to other components of the vessel, such as the skirt, shall be made of the same material as the component.

[Modified on: 29/08/2008]

Dimensions in mm

1 Scope

This Uhde standard applies to ladder clips in accordance with Uhde standard UN 4001-02 Part1 (M) and to segmented platform clips in accordance with Uhde standard UN 4001-01 (M) i.e. clips to be provided on steel vessels.

2 Ladder clips

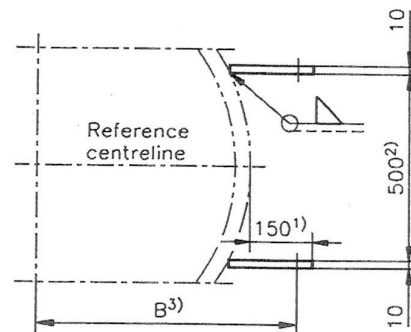
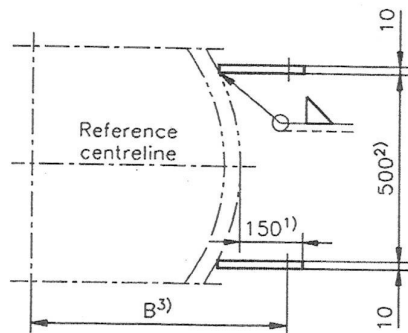
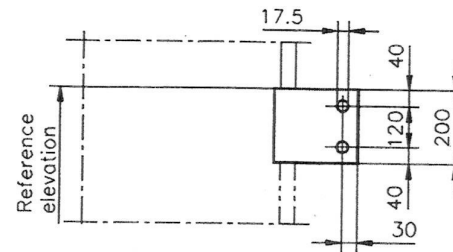
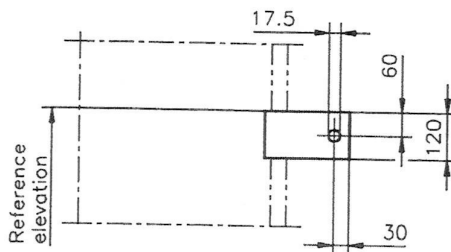


Figure 1. Clips, type A, loose point

Figure 2. Clips, type B, fixed point

- 1) Up to an insulation thickness of 100 mm, otherwise insulation thickness +50 mm. This dimension refers to the nominal diameter of the vessel. If the diameter varies (e. g. offset wall thickness), the dimension has to be enlarged or reduced accordingly.
- 2) Clips welded to cold-insulation vessels shall be spaced at intervals of 550 mm.
- 3) For dimension B, refer to the vessel drawing.

3 Platform clips

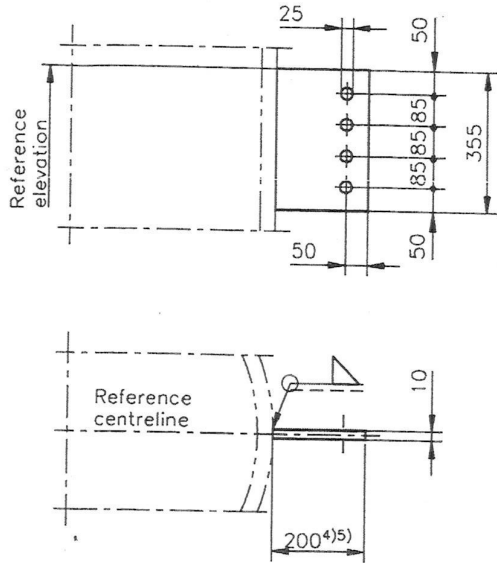


Figure 3. Clip, type 1D, welded to vessels without insulation or with heat insulation

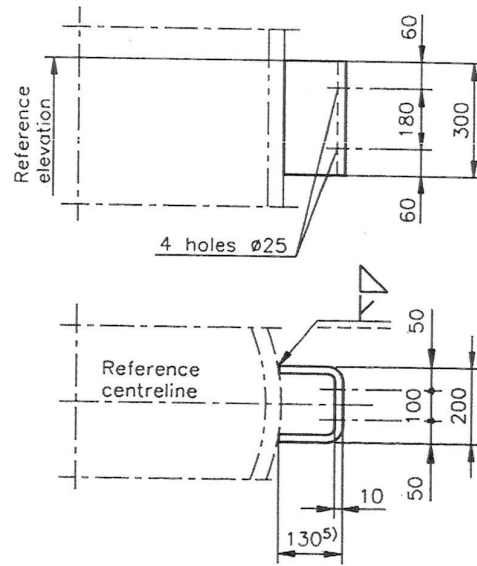


Figure 4. Clip, type 1E, welded to vessels with cold insulation

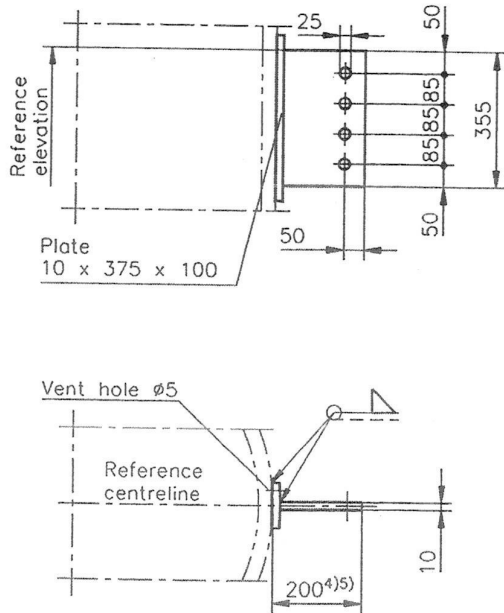


Figure 5. Clip, type 2D, welded to vessels without insulation or with heat insulation

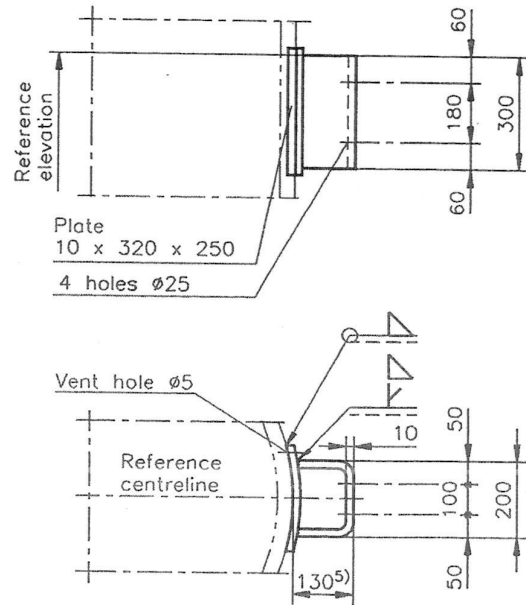


Figure 6. Clip, type 2E, welded to vessels with cold insulation

4) Up to an insulation thickness of 50 mm, otherwise insulation thickness +150 mm.

5) This dimension refers to the nominal diameter of the vessels. If the diameter varies (e. g. offset wall thickness), the dimension has to be enlarged or reduced accordingly.

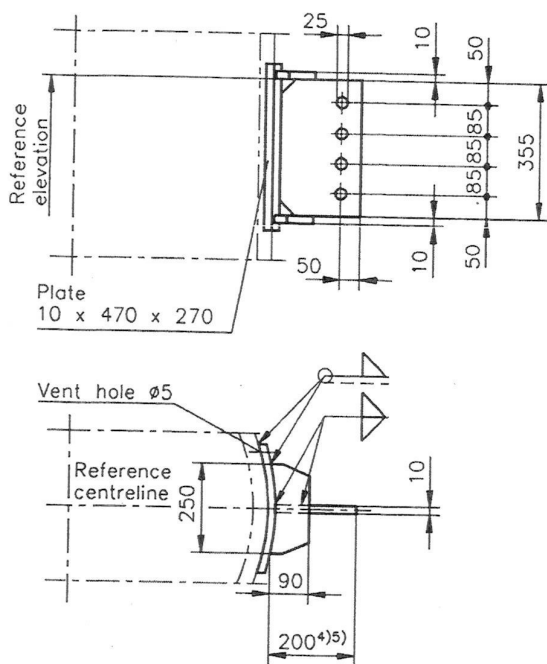


Figure 7. Clip, type 3D, welded to vessels without Insulation or with heat insulation

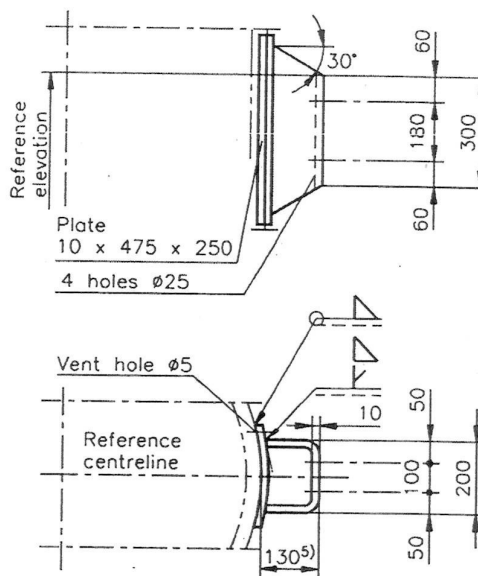


Figure 8. Clip, type 3E, welded to vessels with cold insulation

4 Design

All plates shall be joined by a continuous fillet weld with $a = 0.7 \times \text{min. wall thickness}$.
Clips placed across shell seams shall be notched (refer to Uhde standard UN V416-01 Part1 (M)).

5 Materials

For clip material, refer to Table 1
For vessel material suitable for high – pressure hydrogen service, refer to Uhde standard UN 2000-01 Part1 (M).

Table 1.

Vessel material and operating temperature	Clip material
Carbon steel and low-alloy steel operating temperatures between - 10°C and 250°C	Vessel material or killed steel
Operating temperatures below - 10°C or above 250°C	Vessel material or a suitable low-temperature or a heat-resistant material
High-alloy material	Vessel material for parts welded to vessel

Reference standards

Uhde standards:

- UN V416-01 Part1 (M) Welding; welded joints for vessels and equipment; requirements
- UN 2000-01 Part1 (M) Vessels and equipment; Pressure vessels; general specification
- UN 4001-01 (M) Steel structures; segmented platforms
- UN 4001-02 Part1 (M) Steel structures; vertical stationary ladders of steel

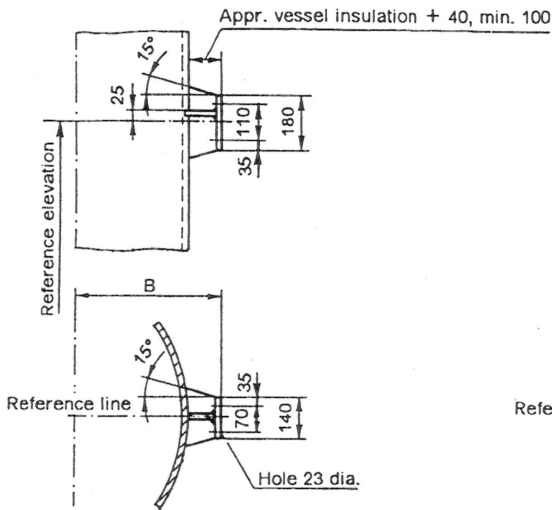
4) See page 2.

5) See page 2.

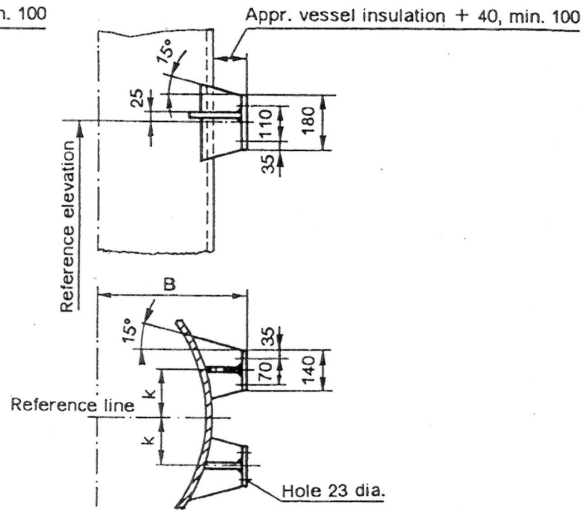
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Dimensions in mm

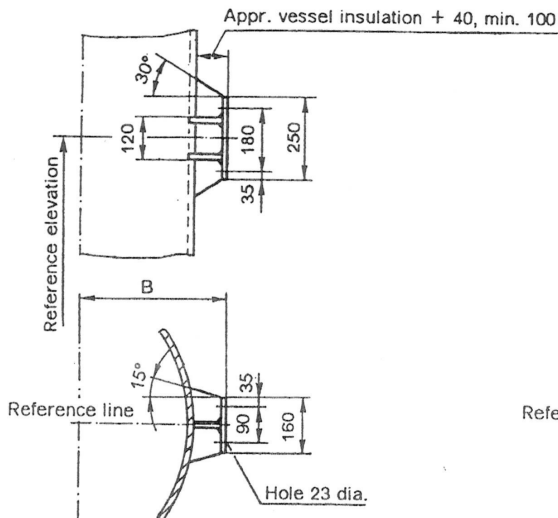
Type 1C



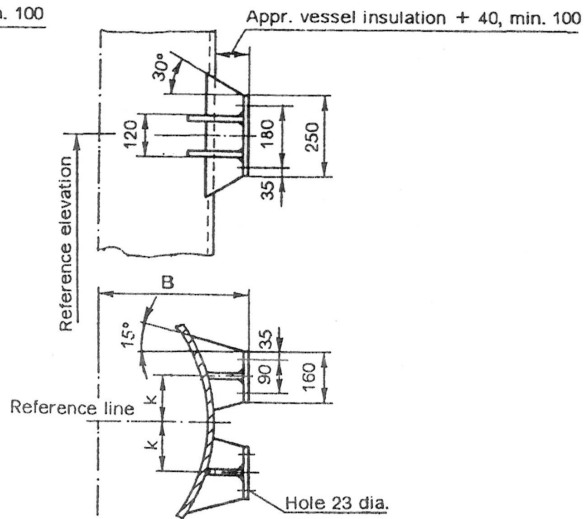
Type 2C



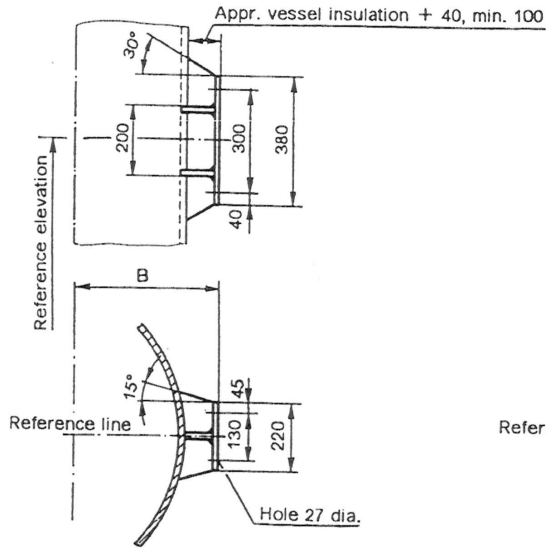
Type 3C



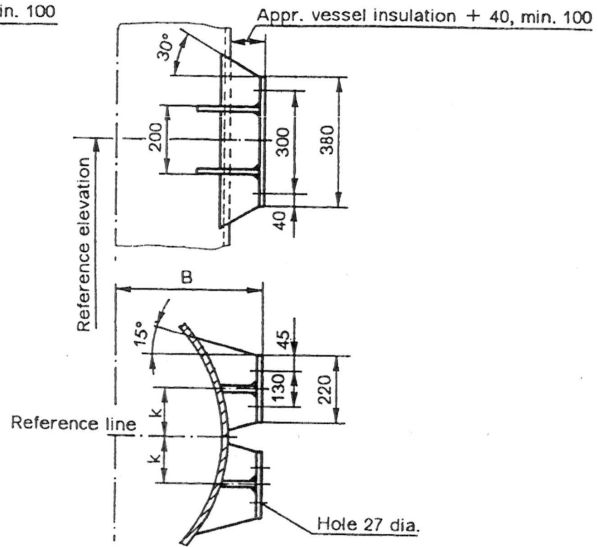
Type 4C



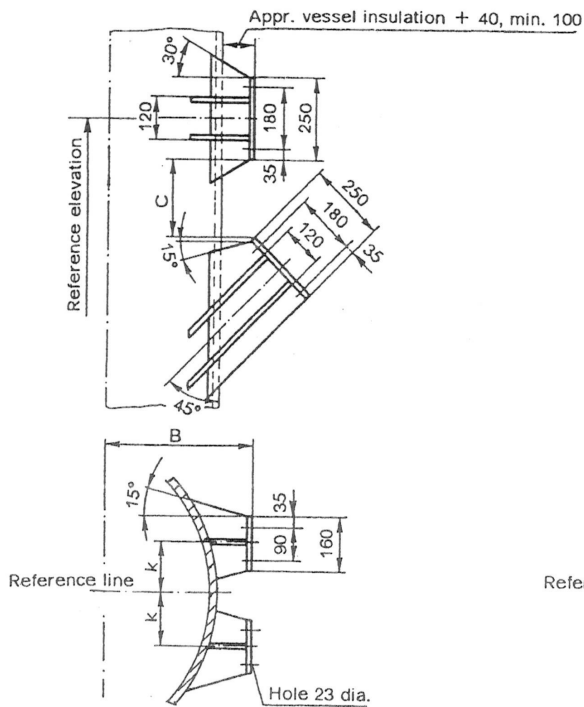
Type 5C



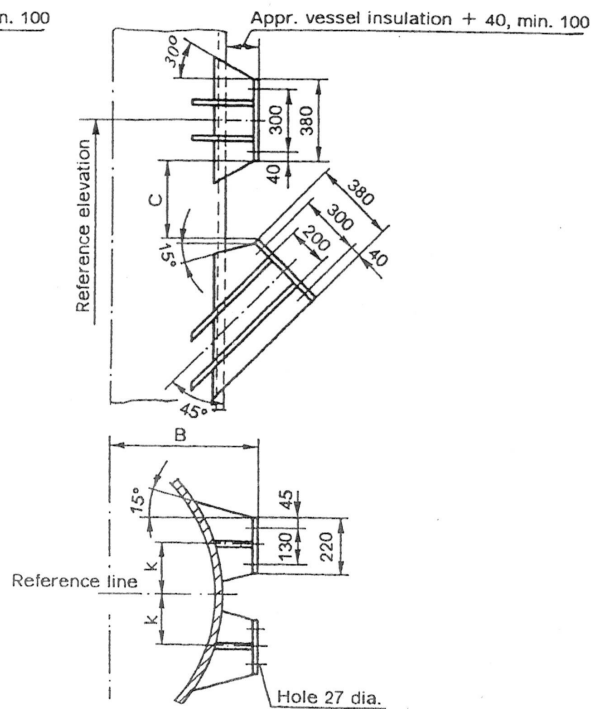
Type 6C



Type 7C



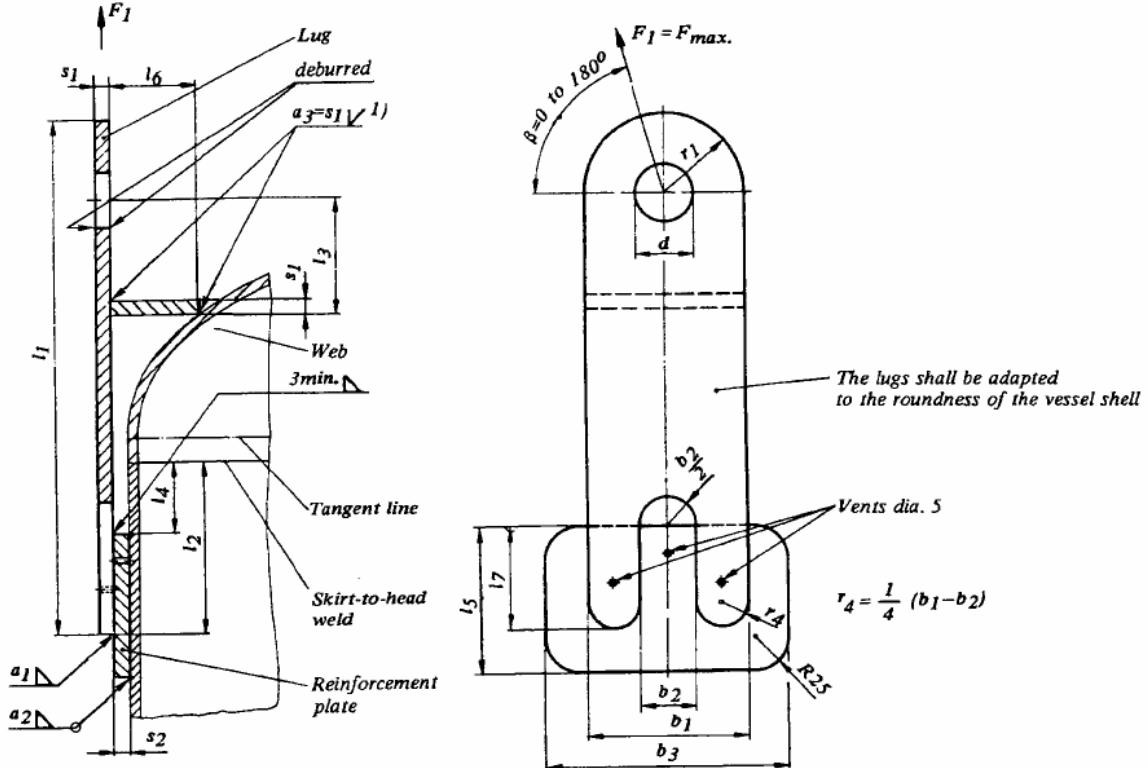
Type 8C



[Modified On: 29/08/2008]

Dimensions in mm

1 Lifting Lugs



$a_2 = 0.7 \times$ smaller thickness of the vessel shell or s_2

1) The welds shall be arranged in such manner that the entire cross-section of the web is attached to the vessel wall. Weld craters are inadmissible.

Figure 1

Admissible force per lug 1) F_1 (kN)	a_1	b_1	b_2	d	l_1	l_2	l_3	l_4	l_5	b_3	l_6	l_7	r_1	s_1	s_2
	min.							≥ 30	min.		max.				
20	5.0	110	40	38	Depending on shape of head		80		100	160	60	70	55	10	10
41	6.0	142	50	38		90	130	194	68	100	71	15	15		
83	7.5	210	70	50		110	180	265	90	150	105	15	15		
133	10.0	260	90	62		160	230	320	110	200	130	20	20		
208	12.5	310	100	74		200	260	375	120	230	155	25	25		
370	15.0	310	100	74		185	230	380	90	195	155	40	40		
750	22.0	400	150	100		250	290	484	120	250	200	50	50		
1160	27.0	500	180	130		320	340	594	150	300	250	70	70		
1500	32.0	610	200	150		370	400	714	180	350	305	80	80		

1) An impact factor of 1.2 is considered.

Table 1

The load per lug shall be based on force F_1 at an angle of $\beta = 0^\circ$ to 180° in direction of lug according to figure 1. The admissible forces are approximate values. The manufacturer shall submit stress analysis documents reflecting the required dimensions and loads for the vessel or item of equipment.

Materials: Killed carbon steel. If vessel is of high-alloy steel, the web and reinforcement plate shall be of the same material.

2 Lifting Lugs

Type A without reinforcement plate

Type B with reinforcement plate

Reinforcement plates are required in the following cases:

- | | |
|---|--|
| <ul style="list-style-type: none"> a) Vessels with a wall thickness of <6mm b) Vessels of fine grained steels c) Vessels of austenitic steels | <ul style="list-style-type: none"> d) Vessels susceptible to denting e) Vessels with brittle linings such as ebonite, enamel, ceramic lining, etc. |
|---|--|

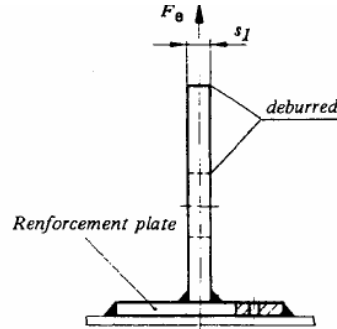
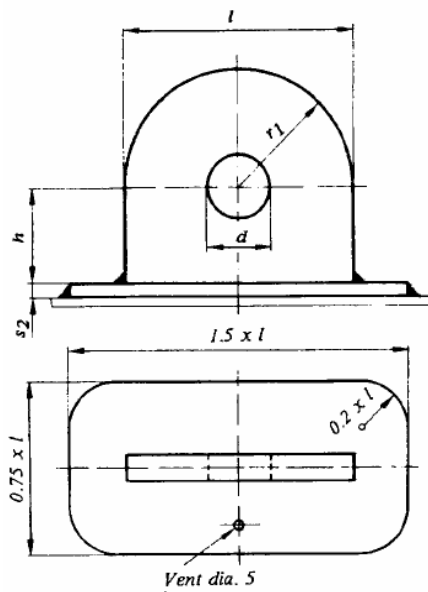


Table 2.

Size of lifting lugs	a min.	l	h	r ₁	s ₁	s ₂ min.	d
1	5	110	55	55	10	8	38
2	6	142	60	71	15	8	38
3	7	210	75	105	15	10	50
4	9	260	95	130	20	14	62
5	12	310	115	155	25	16	74

Figure 2

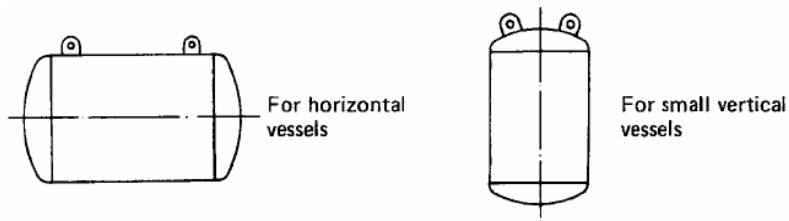


Figure 3 Arrangement

Admissible force F_e for 1 lifting lug	Inclination β	Size of lifting lugs				
		1	2	3	4	5
	0 to 60°	20	41	83	133	208
Admissible overall force F_{ges} for 2 lifting lugs and cross member	0°	40	82	166	266	401
Admissible overall force F_{ges} for 2 lifting lugs	0 to 15°	40	80	160	257	401
	15 to 30°	35	71	144	236	360
	30 to 45°	29	58	117	188	294
	45 to 60°	20	41	83	133	208
Admissible overall force F_{ges} for 3 lifting lugs	0 to 15°	60	120	240	385	603
	15 to 30°	53	107	215	345	540
	30 to 45°	44	88	176	282	441
	45 to 60°	30	62	125	200	312

1) An impact factor of 1.2 is considered.

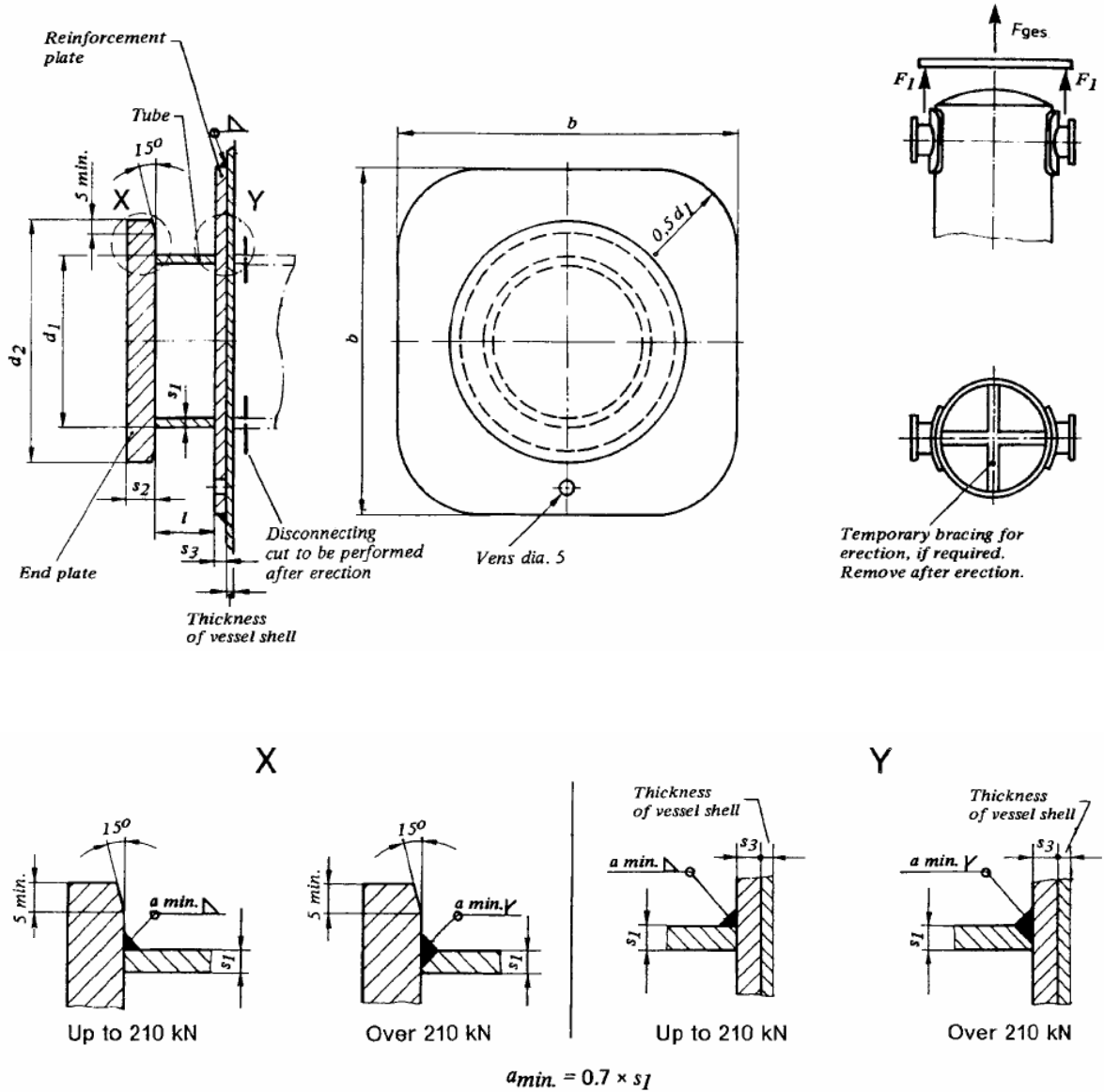
Table 3

Uhde	Vessels and Equipment	UN 2000-07 Part 1 (M)
	LIFTING LUGS AND LIFTING TRUNNIONS for erection of steel vessels	Page 3 of 5

The admissible forces are approximate values and shall only be transmitted in the direction of lug by means of shackles. The manufacturer shall submit stress analysis documents reflecting the required dimensions and loads for the vessel or item of equipment.

Materials: Killed carbon steel. If vessel is of high-alloy steel, the web and reinforcement plate shall be of the same material.

3 Lifting Trunnions



$$a_{min.} = 0.7 \times s_1$$

Figure 4

Table 4.

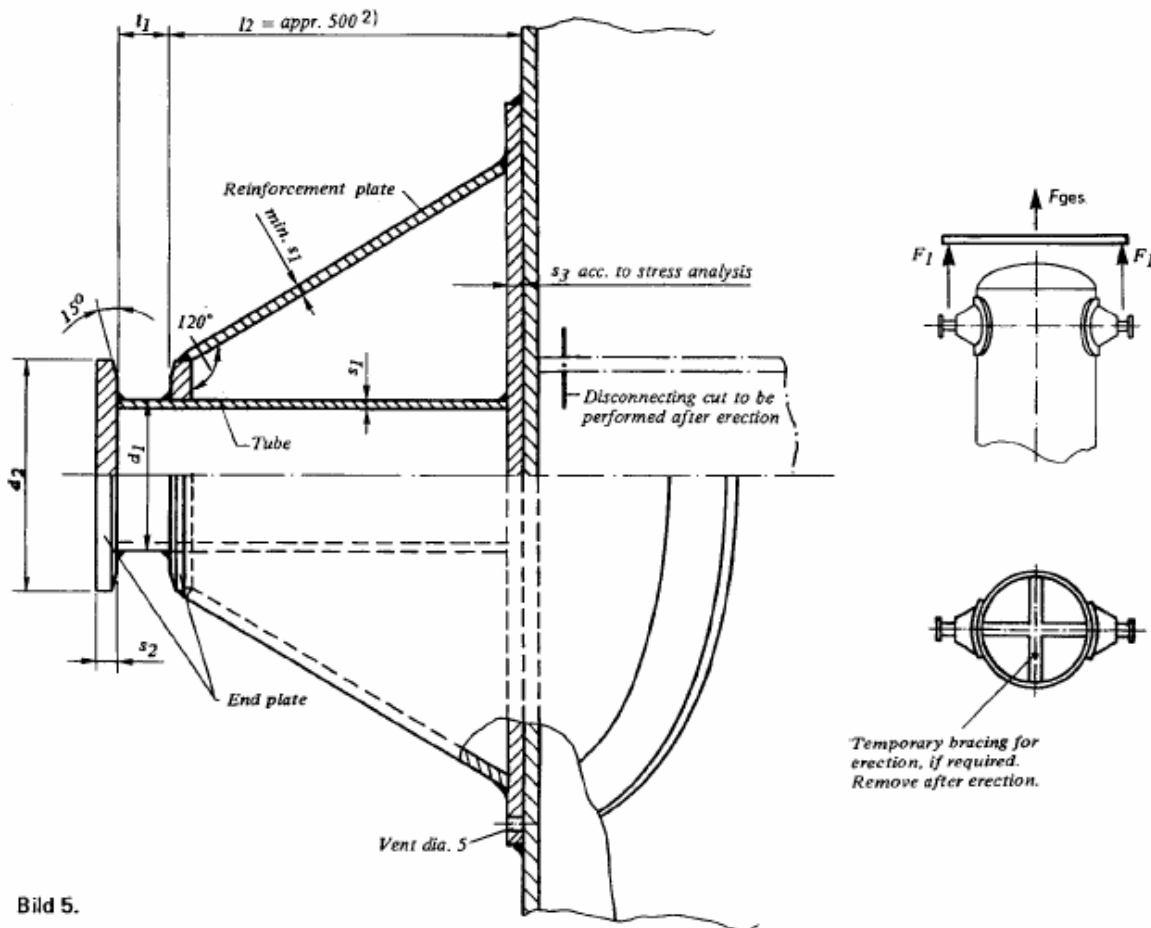
Admissible force per trunnion 1) F_1 kN	Tube			End plate		Reinforcement plate	
	d_1	s_1	l	d_2	s_2	s_3 2)	b
40	114.3	5.6	40	160	20	8	230
105	168.3	5.6	60	240	20	8	340
210	219.1	11.0	80	340	30	14	440
415	273.0	12.5	125	400	30	16	550
625	355.6	14.2	135	480	30	18	710
835	406.4	16.0	135	530	30	20	810

1) An impact factor of 1.2 is considered.
 2) Preferred thickness. s_3 may be thicker if required, but max. 2 x shell thickness.

The admissible forces are approximate values. The manufacturer shall submit stress analysis documents reflecting the required dimensions and loads for the vessel or item of equipment.

Materials: Killed carbon steel. If vessel is of high-alloy steel, the web and reinforcement plate shall be of the same material.

4 Lifting Trunnions, long type



2) l_2 may be smaller but the min. length shall be the length of nozzle or clip above the trunnion plus 50mm

Figure 5

Table 5.

Admissible force per trunnion 1) F_T (kN)	Tube			End plate	
	d_T	s_T	l_T	d_2	s_2
125	168.3	5.6	60	240	20
250	219.1	11.0	80	340	30
500	273.0	12.5	125	400	30
750	355.6	14.2	135	480	30
1000	406.4	16.0	135	530	30

1) An impact factor of 1.2 is considered.

Table 5

The admissible forces are approximate values. The manufacturer shall submit stress analysis documents reflecting the required dimensions and loads for the vessel or item of equipment.

Materials: Killed carbon steel. If vessel is of high-alloy steel, the web and reinforcement plate shall be of the same material.

[Modified On: 29/08/2008]

1 Scope

This Uhde standard applies to the engineering and construction of industrial and chemical plants. It contains requirements for the design of vortex breakers, feed deflectors and ladder rungs mounted on steel vessels.

2 Units

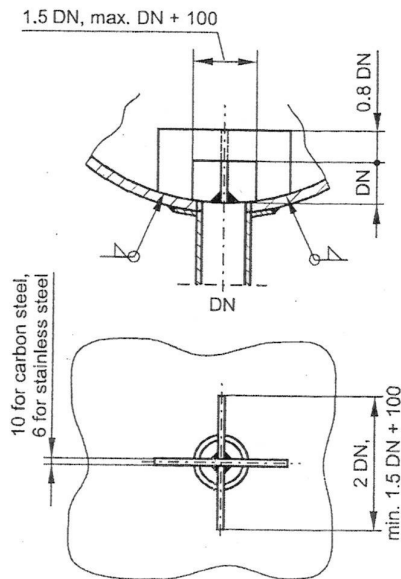
The following units will be used:

Table 1. Units

General	SI units
Dimensions	mm

3 Vortex breakers

Vortex breakers, type A



Vortex breakers, type B

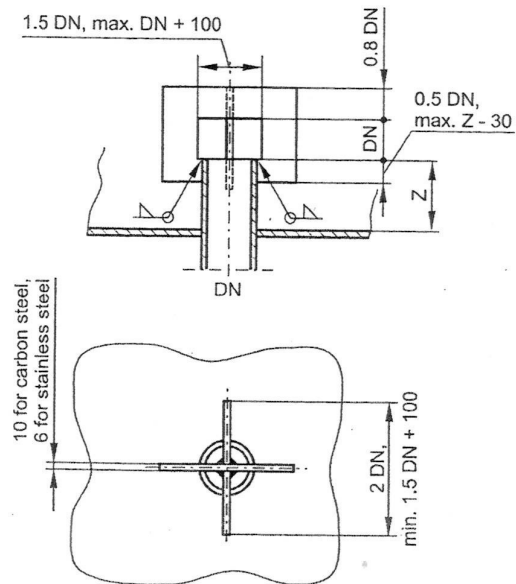


Figure 1. Vortex breakers, types A and B

Unless otherwise stated in the technical specification, dimension Z for type B shall be rated according to Table 2.

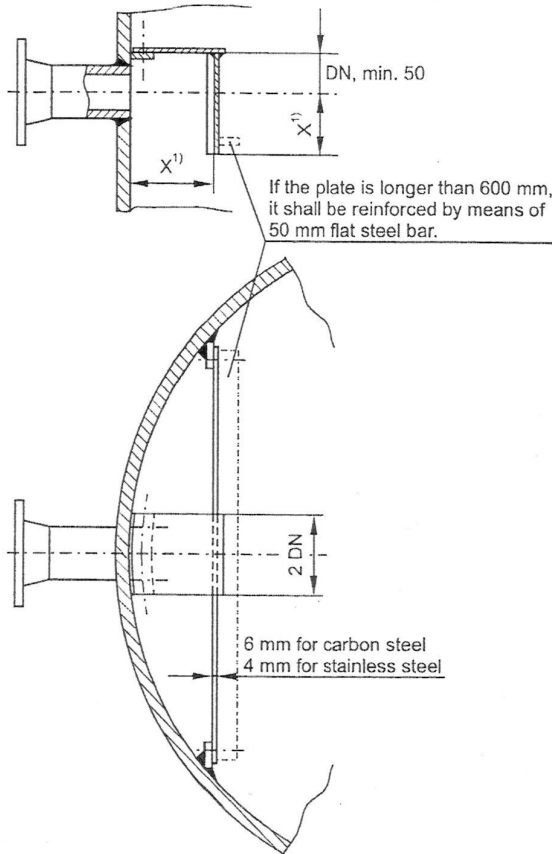
Table 2. Dimension Z for type B

Vessel diameter	< 1050	≥ 1050 < 1500	≥ 1500 < 2000	≥ 2000 < 2300	≥ 2300 < 2900	≥ 2900
Dimension Z	100	120	140	160	180	200

4 Feed deflectors

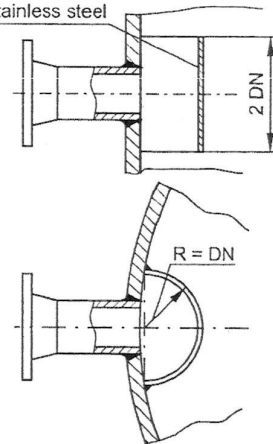
Feed deflectors, type A (baffle plate)

Internals to be installed and removed via a manhole. For dimensions not specified, refer to the equipment drawing.



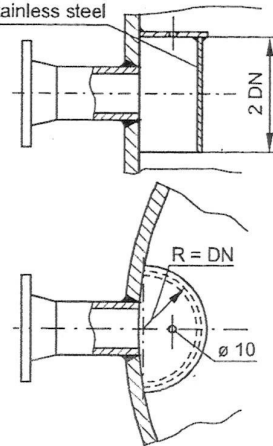
Feed deflectors, type C

6 mm for carbon steel
4 mm for stainless steel



Feed deflectors, type D

6 mm for carbon steel
4 mm for stainless steel



Feed deflectors, type B (baffle plate)

Same as type A, but upper side completely covered with sheet metal. Hole diameter 10 mm.

Figure 2. Feed deflectors, types A-D

1) To be specified according to the bottom dimensions.

5 Ladder rungs

Ladder rungs shall be attached to equipment items, the manhole centre of which is positioned at a level higher than 1200 mm above the tangent line of the lower bottom or a base support, according to Figure 3 to ensure easy accessibility.

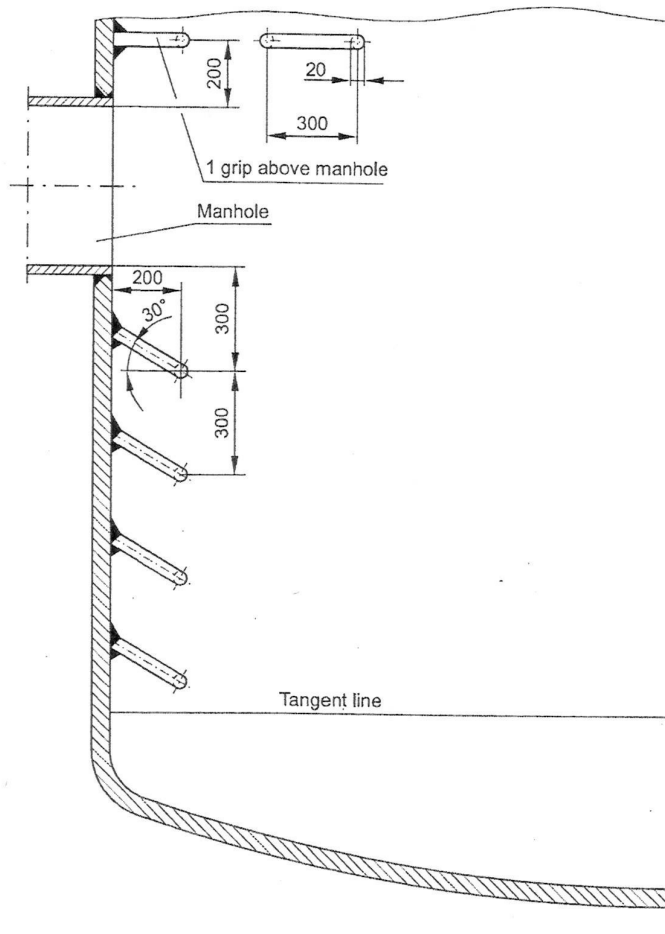


Figure 3. Arrangement of ladder rungs