



Exploration & Production

GENERAL SPECIFICATION

PIPING VALVES VESSELS

GS PVV 402

Standards for exchanger accessories and equipment
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01	11/03	Change of Group name and logo
00	02/03	First issue
Rev.	Date	Notes

**List of Standards Drawings (SD)**

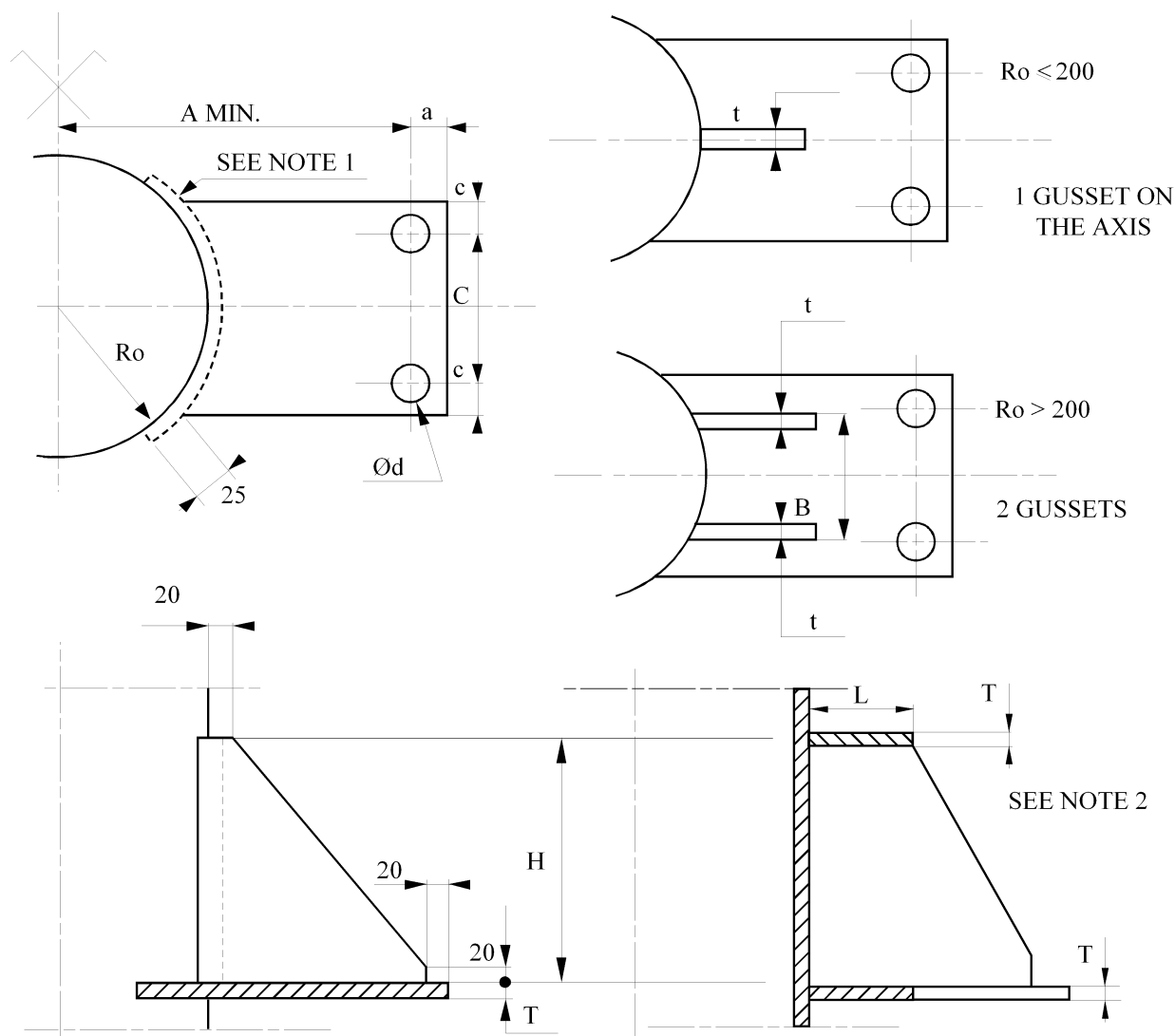
Reference	Title
SD PVV 401	Supports for vertical exchangers
SD PVV 402	Supports for horizontal exchangers
SD PVV 403	Shims for supports of horizontal exchangers
SD PVV 404	Welding of nozzles
SD PVV 405	Bosses
SD PVV 406	Plugs
SD PVV 407	Lifting arrangements
SD PVV 408	Shell and tube exchanger Nameplate
SD PVV 409	Shell and tube exchanger Nameplate
SD PVV 410	Grounding plate
SD PVV 411	Location of grounds
SD PVV 412	Separation stops
SD PVV 413	Plate type exchanger Nameplate
SD PVV 414	Double tube exchanger Nameplate
SD PVV 415	Air cooler Nameplate

Standard Drawings	SD PVV 401
Supports for vertical exchangers	Rev.: 01
	Date: 11/03

This standard applies to all vertical shell and tube exchangers having an outside diameter of not more than 1524 mm (60") and a tube length of not more than 7315 mm.

Each exchanger shall have at least two opposed supports, located on the same axis.

Exchangers designed for a vacuum and for which R_o exceeds 460 mm shall have four supports, placed 90° apart.



Dimension A may be increased if:

- It is necessary to do so to facilitate installation
- The insulation thickness requires it (the anchor bolts must always be outside the insulation).



Standard Drawings	SD PVV 401
Supports for vertical exchangers	Rev.: 01
	Date: 11/03

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Ro	T	t	O d	A MIN.	a	B*	C	c	L	H*
Ro ≤ 200	12	10	23	Ro + 100	45	-	1.6 Ro*	40	50	0.65 (A + 100)
200 < Ro ≤ 300	16	12	23	Ro + 130	50	0.4 Ro	B + 2 c	50	60	
300 < Ro ≤ 380	20	16	23	Ro + 130	60	0.6 Ro	B + 2 c	50	80	
380 < Ro ≤ 460	24	18	27	Ro + 130	60	0.6 Ro	B + 2 c	60	80	0.60 (A + 100)
460 < Ro ≤ 570	30	20	27	Ro + 130	60	0.6 Ro	B + 2 c	60	100	
Ro > 570	30	24	27	Ro + 130	60	0.7 Ro	B + 2 c	60	120	0.55 (A + 100)

* rounded off to the next higher round dimension

Note 1: If the thickness of the shell is less than t, provide a backing equal in thickness to the shell.

Note 2: For a shell designed for a vacuum, provide 2 complete girdles of width L and thickness T.



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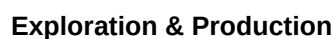
Standard Drawings	SD PVV 402
Supports for horizontal exchangers	Rev.: 01
	Date: 11/03

This standard applies to all horizontal exchangers within the following limits:

- Exchangers of which the tube length does not exceed 7315 mm
- Exchangers of which the nominal diameter does not exceed 1524 mm (60 inches)
- TEMA type K reboilers of which the body diameter does not exceed 2540 mm (100 inches), provided that the nominal diameter of the channel does not exceed 1524 mm (60 inches).

Each exchanger shall have two supports, separated, in so far as possible, by a distance close to half the total length of the exchanger.

One of the supports shall be placed in such a way as to avoid a substantial overhang of the channel.



Standard Drawings	SD PVV 402
Supports for horizontal exchangers	Rev.: 01
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Shells made of PIPE 16" or rolled plate, $R_o \leq 200$

$B = R_o \sqrt{3}$ rounded up to next higher round value
 $H = R_o + 230$ mm rounded up to next higher round value
 $A = R_o + 130$ mm rounded up to next higher round value

Shells $200 < R_o \leq 305$

$B = R_o \sqrt{3}$ rounded up to next higher round value
 $H = R_o + 240$ mm rounded up to next higher round value
 $A = R_o + 140$ mm rounded up to next higher round value
 R_o = outside radius of shell

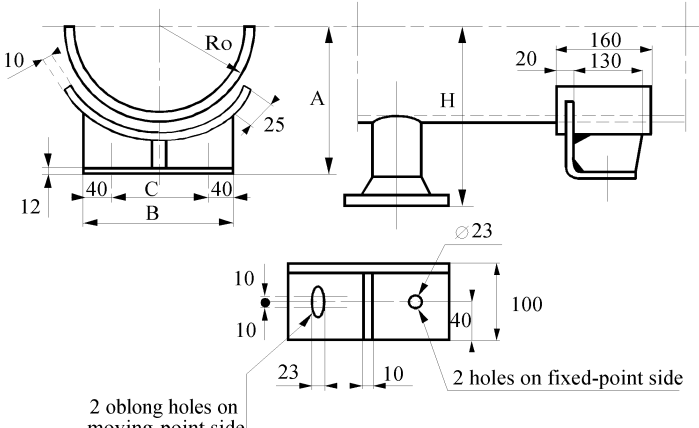
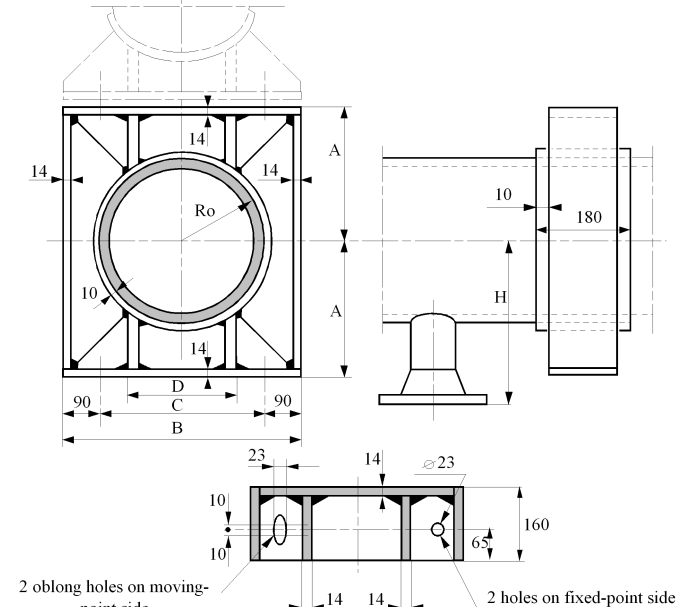
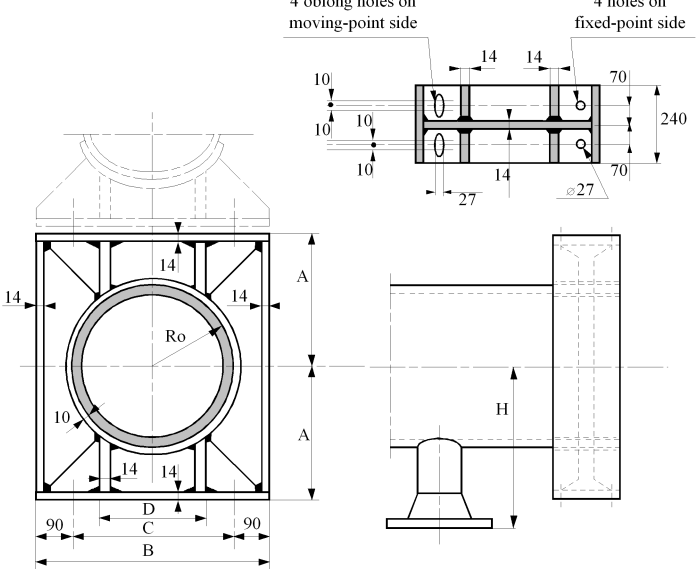
Shells $305 < R_o \leq 385$

$B = R_o \sqrt{3}$ rounded up to next higher round value
 $H = R_o + 260$ mm rounded up to next higher round value
 $A = R_o + 160$ mm rounded up to next higher round value
 R_o = outside radius of shell

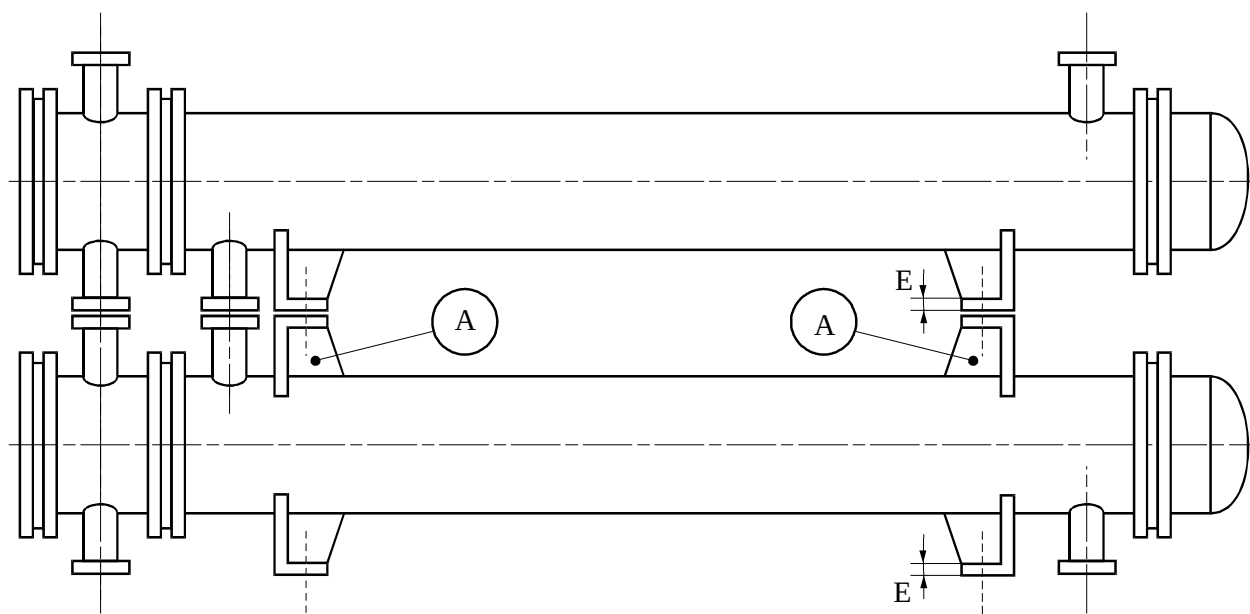
Shells $R_o > 385$

$B = R_o \sqrt{3}$ rounded up to next higher round value
 $H = R_o + 280$ mm rounded up to next higher round value
 $A = R_o + 180$ mm rounded up to next higher round value
 R_o = outside radius of shell

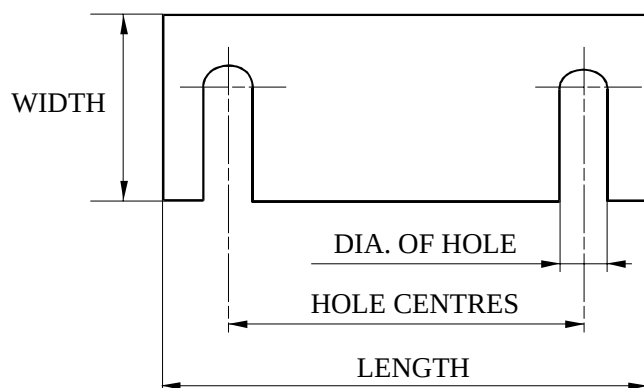
Standard Drawings	SD PVV 402
Supports for horizontal exchangers	Rev.: 01
	Date: 11/03

 2 oblong holes on moving-point side 2 holes on fixed-point side	<u>Shells made of PIPE ≤ 16" or rolled plate, Ro ≤ 200</u> $B = Ro \sqrt{3}$ rounded up to next higher round value $H = Ro + 230$ mm rounded up to next higher round value $A = H - 10$ mm rounded up to next higher round value <u>Shells 200 < Ro ≤ 305</u> $B = Ro \sqrt{3}$ rounded up to next higher round value $H = Ro + 240$ mm rounded up to next higher round value $A = H - 10$ mm rounded up to next higher round value Ro = outside radius of shell
 2 oblong holes on moving-point side 2 holes on fixed-point side	<u>Shells 305 < Ro ≤ 385</u> $B = 2 Ro + 260$ mm rounded up to next higher round value $H = Ro + 160$ mm rounded up to next higher round value $A = H - 10$ mm rounded up to next higher round value $D = 1.2 Ro$ rounded up to next higher round value Ro = outside radius of shell
 4 oblong holes on moving-point side 4 holes on fixed-point side	<u>Shells Ro > 385</u> $B = 2 Ro + 260$ mm rounded up to next higher round value $H = Ro + 180$ mm rounded up to next higher round value $A = H - 10$ mm rounded up to next higher round value $D = 1.2 Ro$ rounded up to next higher round value Ro = outside radius of shell

Standard Drawings	SD PVV 403
Shims for supports of horizontal exchangers	Rev.: 01
	Date: 11/03



ACCORDING TO SUPPORT DIMENSIONS



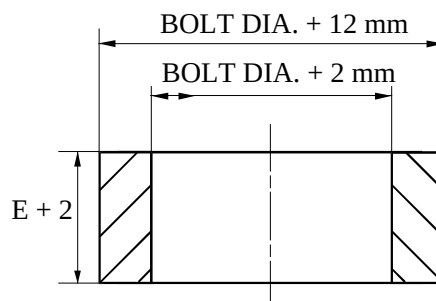
N.B.: Any shells having supports (item A) shall be delivered with sets of shims and attachment bolting: bolts, counter-nuts, washers (Material: A 42)

1 set of shims includes:

- 1 shim 10 mm thick
- 2 shims 5 mm thick
- 2 shims 2 mm thick
- 1 shim 1 mm thick

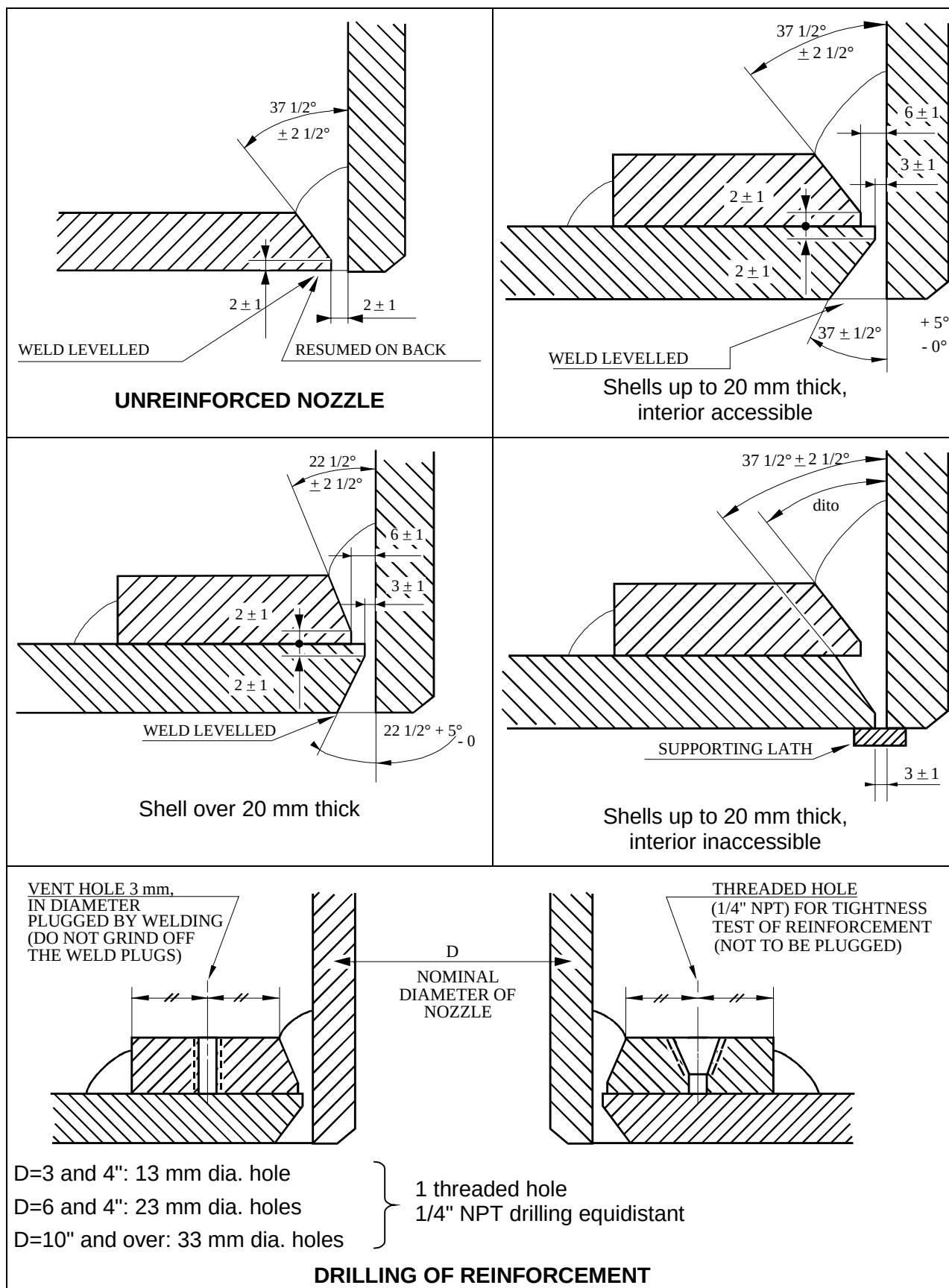
For a total thickness of 25 mm

MATERIAL: Mild steel

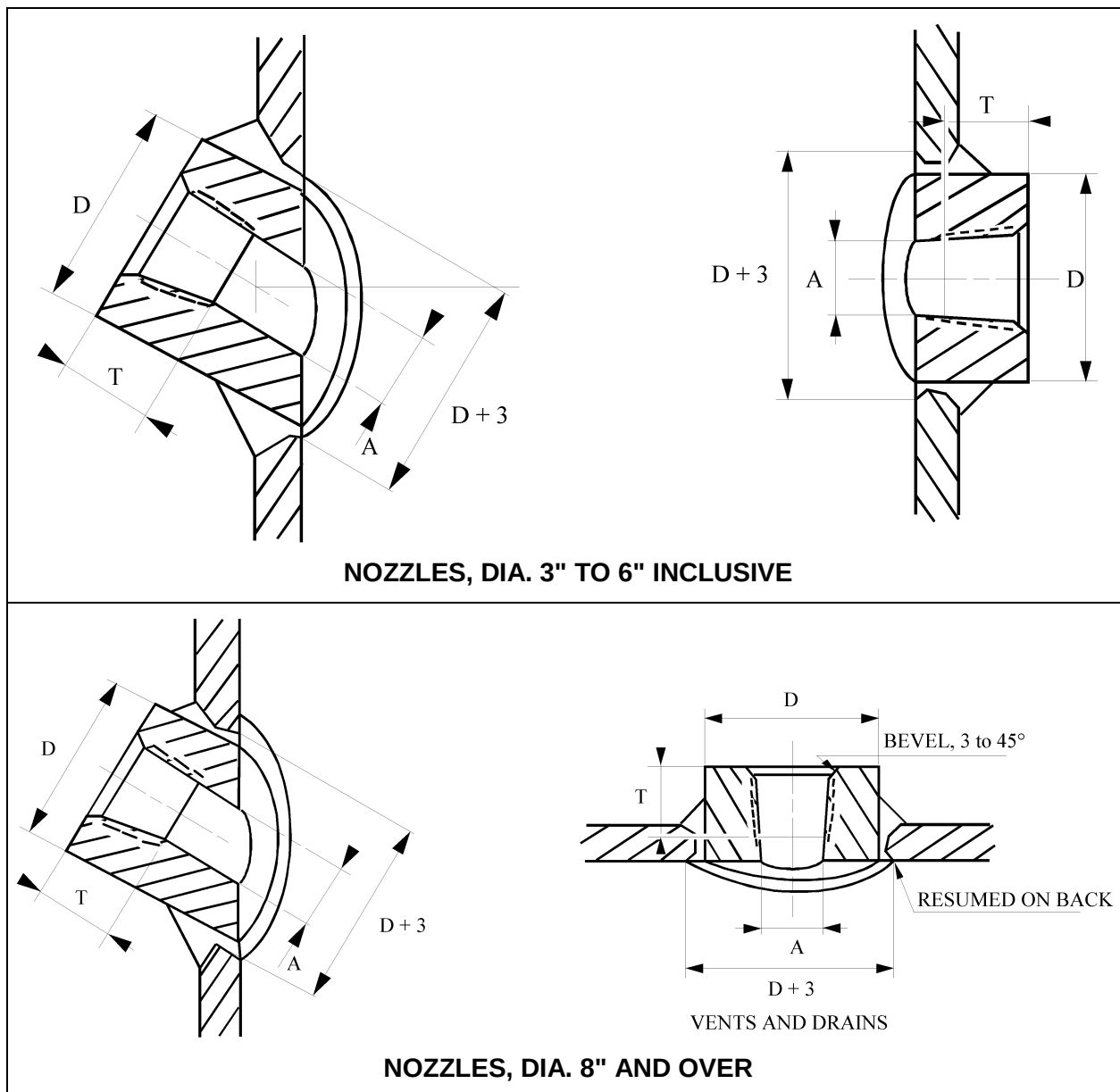


**Spacer for Oblong holes
(at customer's request)**

Standard Drawings	SD PVV 404
Welding of nozzles	Rev.: 01
	Date: 11/03



Standard Drawings	SD PVV 405
Bosses	Rev.: 01
	Date: 11/03





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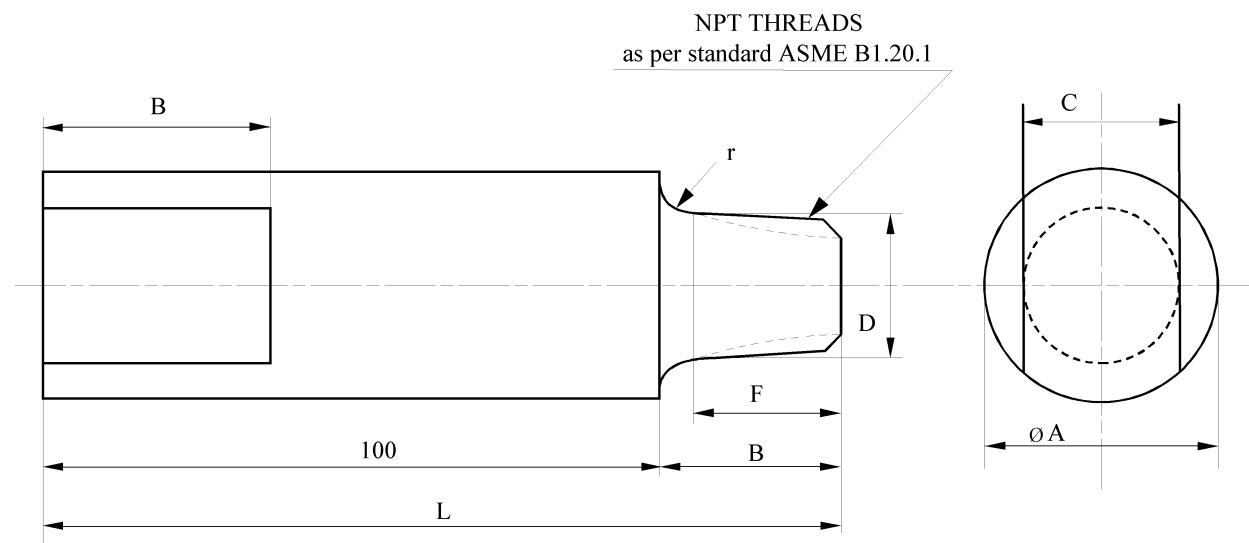
Standard Drawings	SD PVV 405
Bosses	Rev.: 01
	Date: 11/03

Nominal diameter	D OD in mm		T Minimum plugged penetration Length mm	A min. ID in mm	
	3000#	6000#		3000#	6000#
1/8"	19	22	6.93	6.833	5.461
1/4"	19	25.5	10.02	9.246	7.671
3/8"	22	32	10.33	12.522	10.744
1/2"	28.5	38	13.57	15.799	13.868
3/4"	35	44.5	14.05	20.930	18.847
1"	44.5	57	16.79	26.645	24.308
1 1/4"	57	63.5	17.29	35.052	32.461
1 1/2"	63.5	76	17.29	40.894	38.100
2"	76	92	17.70	52.502	49.251



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Standard Drawings	SD PVV 406
Plugs	Rev.: 01
	Date: 11/03



Nominal diameter	Outside diameter D	Total threaded length F	B	Ø A	L	C
1/8"	10.287	9.967	13	14	113	8
1/4"	13.716	15.103	20	17	120	10
3/8"	17.145	15.255	20	21	120	12
1/2"	21.336	19.850	25	26	125	16
3/4"	26.670	20.155	25	32	125	18
1"	33.401	25.006	30	38	130	22
1 1/4"	42.164	25.616	30	46	130	26
1 1/2"	48.260	26.040	30	54	130	32
2"	60.325	26.878	30	67	130	38



Standard Drawings	SD PVV 407
Lifting arrangements	Rev.: 01
	Date: 11/03

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- I - The arrangements shown on sheets 2 and 3 are intended for the handling and lifting of each separate element only, and not of the fully-constituted vessel.
- II - Each removable element shall include the arrangement or arrangements stipulated by this standard if its weight is 25 kg or more.
- III - Any elements that are to be installed on hinges shall also be fitted with the handling arrangements stipulated by this standard.
- IV - The fixed-side tube sheets of all removable bundles shall include, in addition to the arrangements stipulated by this standard, 1 or 2 tap holes for eyebolts, intended for the handling of these elements in the shop before assembly of the bundles, except in case III of SD PVV 412.

Note 1: Each of the lugs provided on the fixed-side tube sheet must be dimensioned for the extraction of the empty bundle.

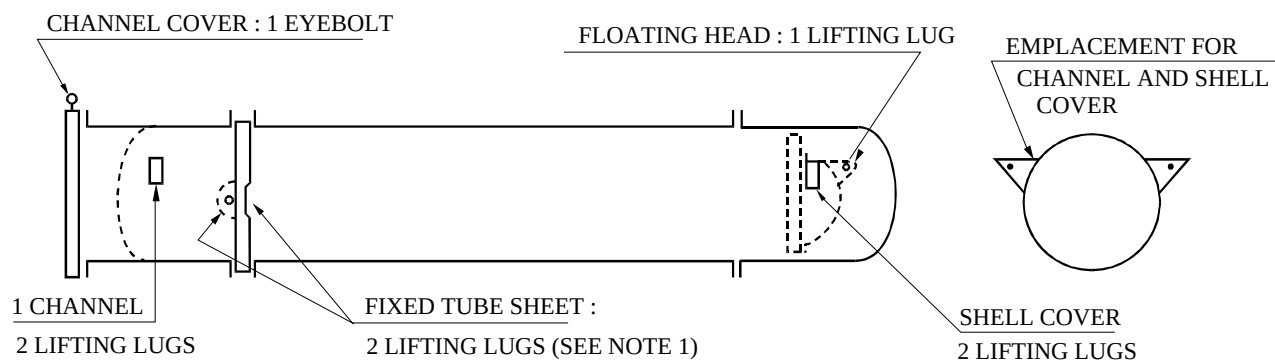
Note 2: Each of the lugs provided on the fixed-side tube sheet must be dimensioned for the extraction of the bundle filled with the circulating fluid of the tube side, when the bundle cannot be drained (U tube, for example).

Standard Drawings	SD PVV 407
Lifting arrangements	Rev.: 01
	Date: 11/03

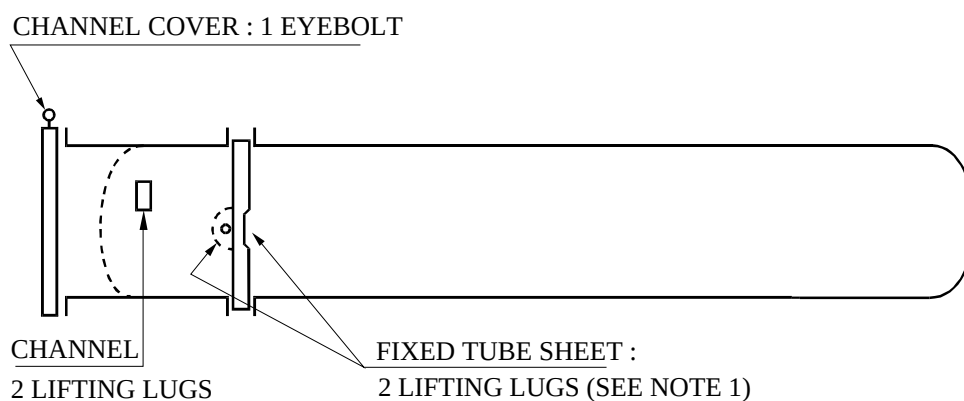
HORIZONTAL EXCHANGERS

1. REMOVABLE BUNDLES

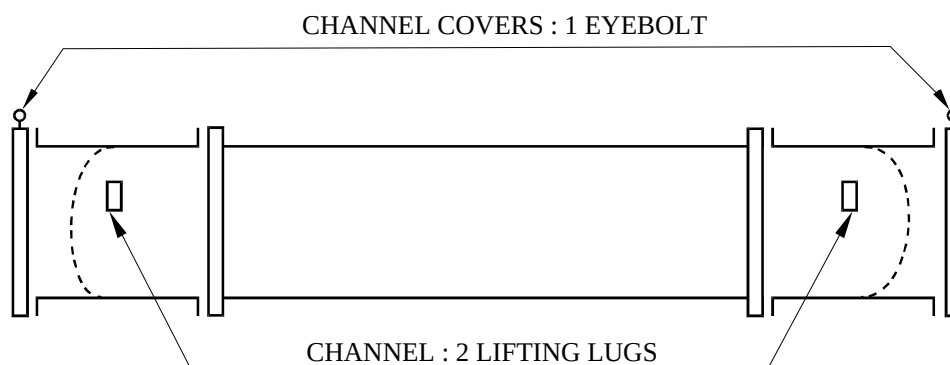
1.1 With floating heads



1.2 "U" Tubes



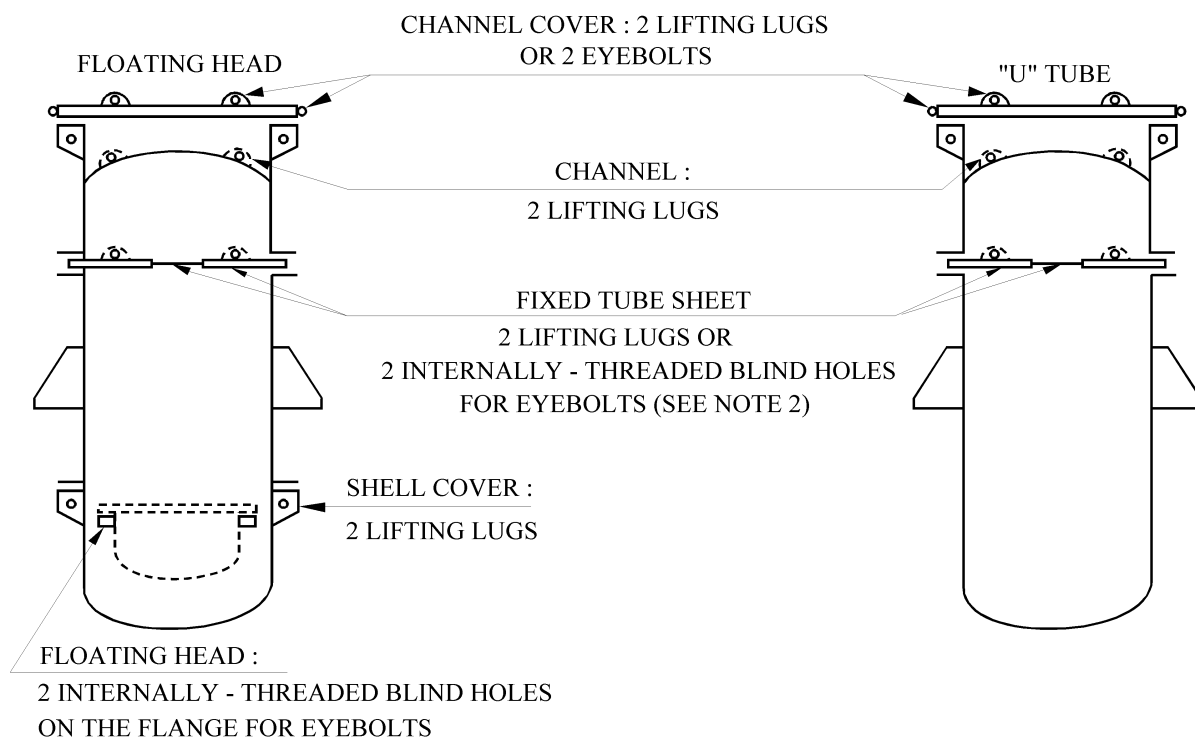
2. FIXED TUBE SHEET



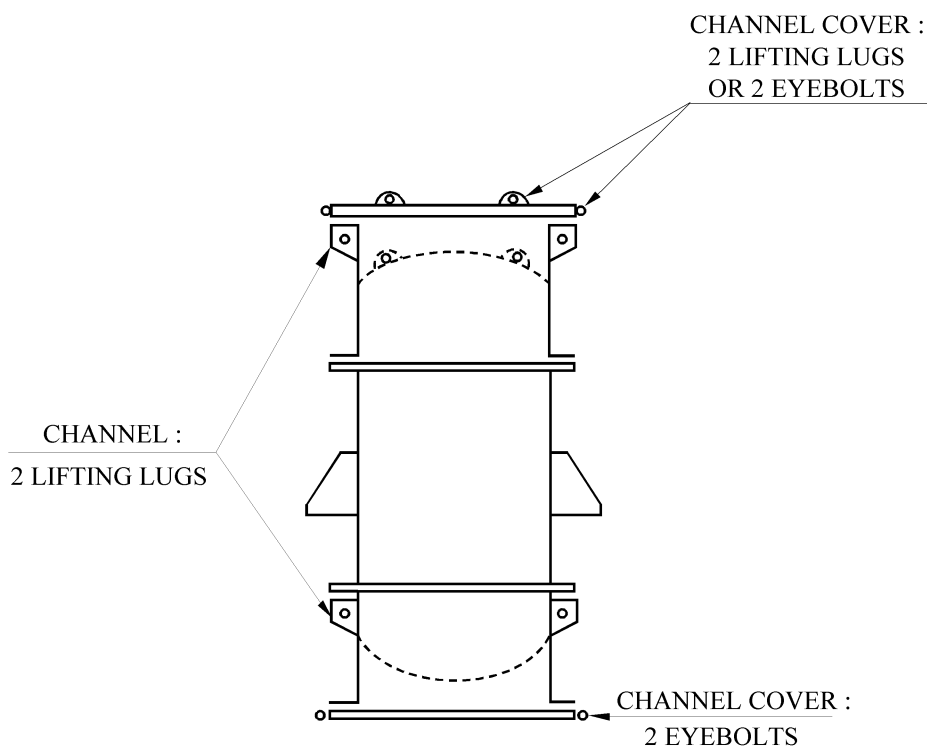
Standard Drawings	SD PVV 407
Lifting arrangements	Rev.: 01
	Date: 11/03

VERTICAL EXCHANGERS

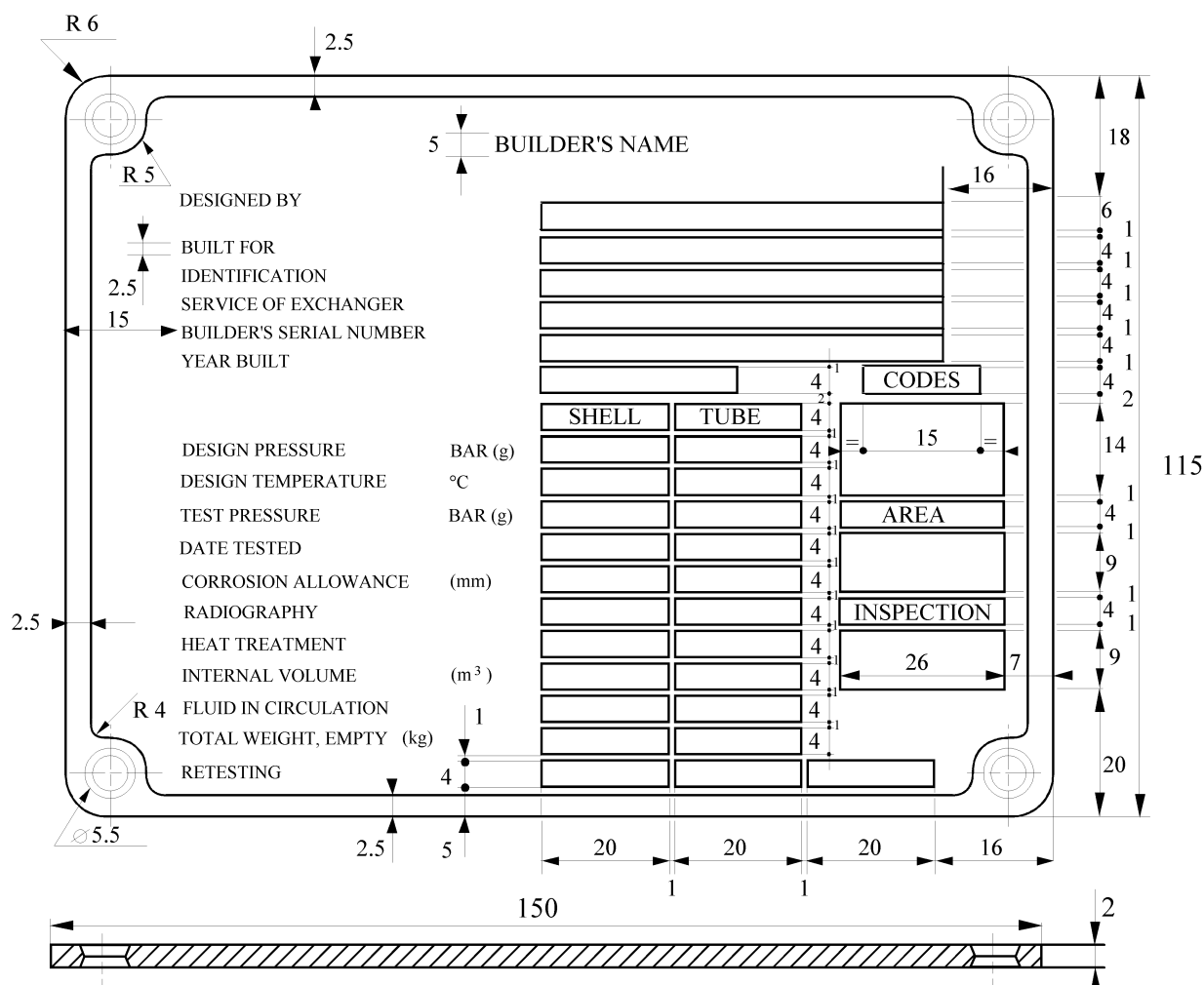
1. REMOVABLE BUNDLES



2. FIXED TUBE SHEETS



Standard Drawings	SD PVV 408
Shell and tube exchanger Nameplate	Rev.: 01
	Date: 11/03



MATERIAL: 18/8 stainless steel, 2 mm thick.

Notes:

1. The edges and all letters shall have polished raised faces, relief approx. 0.5 mm. Black background.
2. This standard plate is shown for guidance. The builder may substitute for it his existing nameplate, provided that it includes all the information given by the standard plate.



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Standard Drawings	SD PVV 409
Shell and tube exchanger Nameplate	Rev.: 01
	Date: 11/03

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BUILDER'S NAME

DESIGNED BY

BUILT FOR

SERIAL NO.

IDENTIFICATION

DESIGN PRESSURE

HEAT TREATMENT

RADIOGRAPHY

TEST PRESSURE

DATE

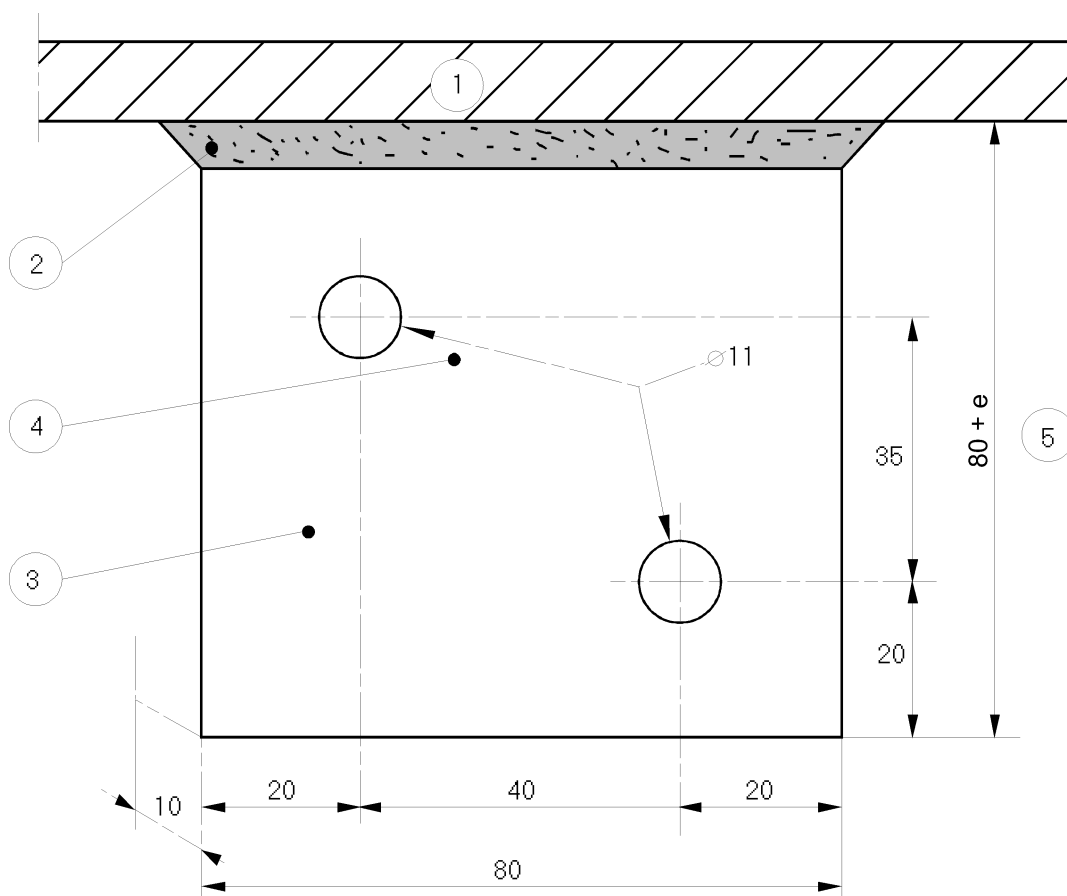
TYPE OF FLUID

120

MATERIAL: 18/8 stainless steel, 2 mm thick

COMPOSITION: Border, text, and spaces in relief, polished, on black background. The information in the spaces shall be engraved to a depth of at least 0.2 mm

Standard Drawings	SD PVV 410
Grounding plate	Rev.: 01
	Date: 11/03

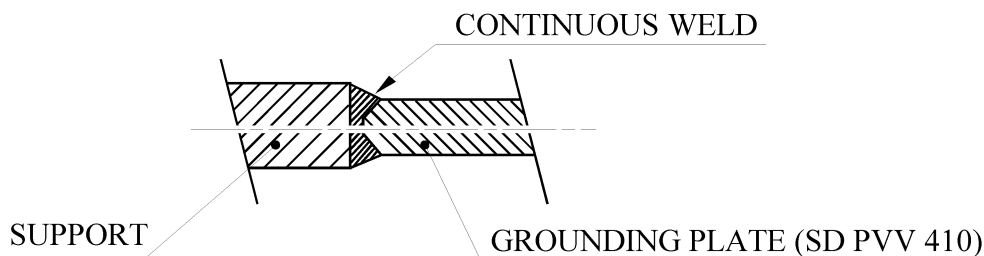


LEGEND

1. Vessel
2. Weld
3. Earthing plate (same material as for vessel)
4. Contact faces (tinned treated)
5. e = thickness of fire proofing or insulation if any

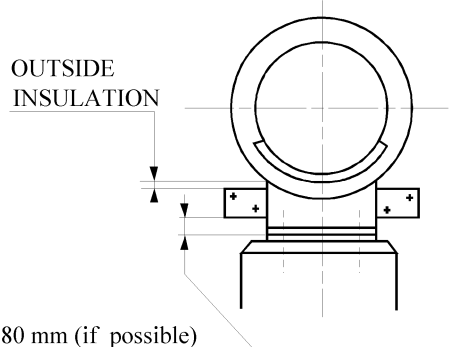
Standard Drawings	SD PVV 411
Locations of grounds	Rev.: 01
	Date: 11/03

DETAIL OF WELDING OF GROUNDING PLATE

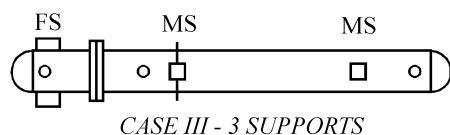
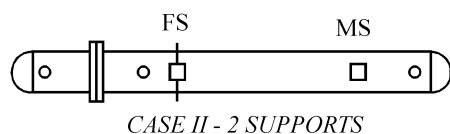
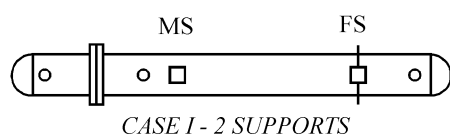


LOCATIONS OF GROUNDING PLATES

HORIZONTAL EXCHANGER

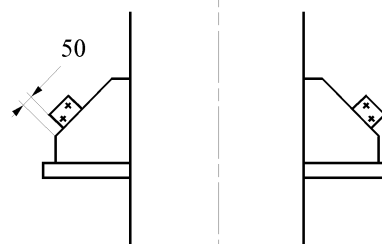


PLACE ONE GROUNDING PLATE ON THE SIDE OF EACH SUPPORT

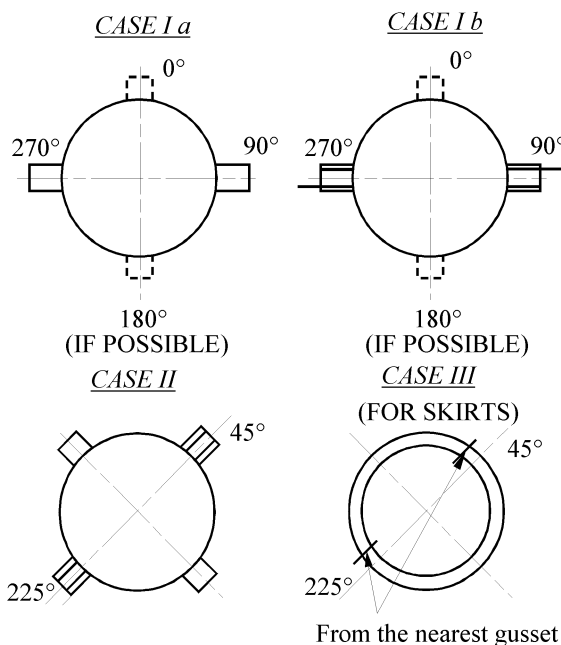


DIFFERENT SUPPORT POSITION CASES

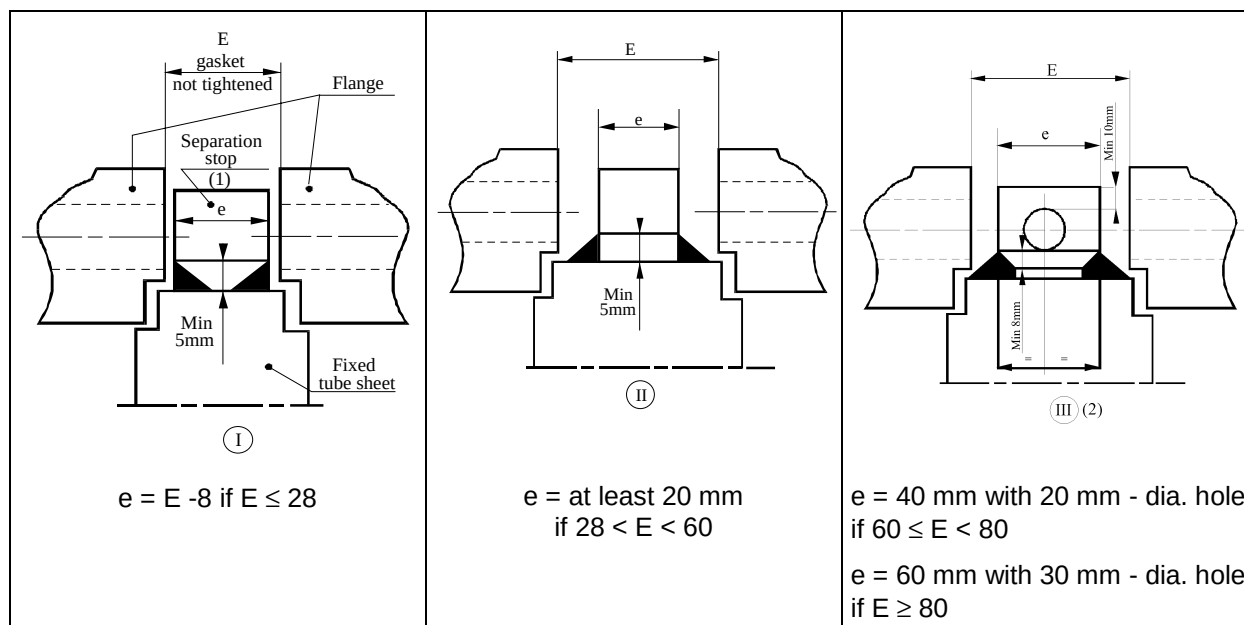
VERTICAL EXCHANGER



WELD TWO GROUNDING PLATES, INSTALLED ON 2 OPPOSED SUPPORTS



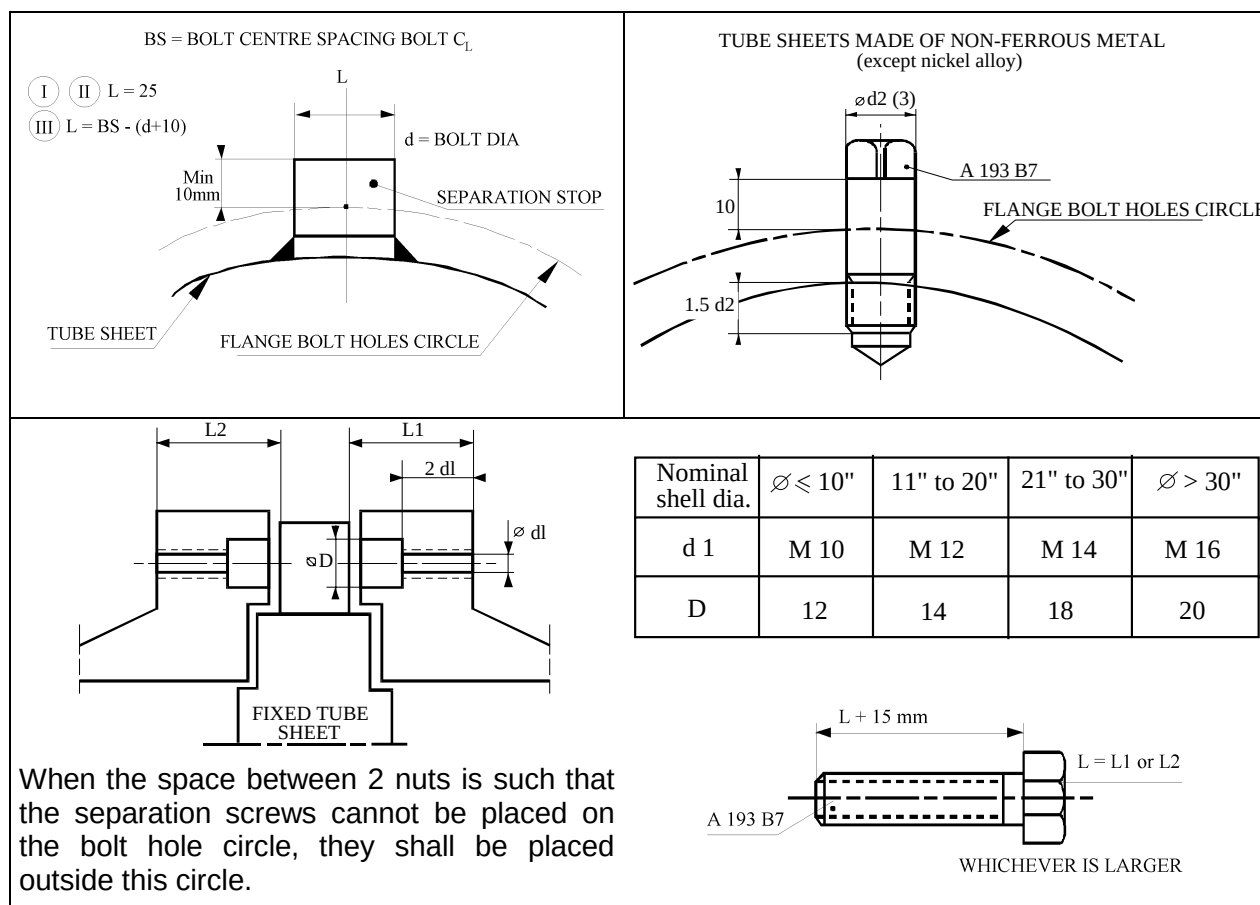
Standard Drawings	SD PVV 412
Separation stops	Rev.: 01
	Date: 11/03

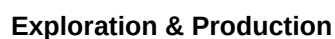


(1) The stops shall be positioned on the horizontal centre line between 2 studs.

(2) In case III no eyebolt shall be provided on the tube sheet.

(3) $d2 = E - 8$ if $E \leq 35$ for $E > 35, d2 = 27$



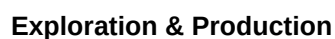


Standard Drawings

Plate type exchanger Nameplate



1. The edges and all letters shall have polished raised faces, relief approx. 0.5 mm. Black background.
2. This standard plate is shown for guidance. The builder may substitute for it his existing nameplate, provided that it includes all the information given by the standard plate.



Double tube exchanger Nameplate



1. The edges and all letters shall have polished raised faces, relief approx. 0.5 mm. Black background.
2. This standard plate is shown for guidance. The builder may substitute for it his existing nameplate, provided that it includes all the information given by the standard plate.



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Standard Drawings	SD PVV 415
Air cooler Nameplate	Rev.: 01
	Date: 11/03

The drawing shows a rectangular nameplate with rounded corners and four mounting holes. The dimensions are 90 mm in height and 120 mm in width. The layout of the fields is as follows:

- BUILDER'S NAME**: A large rectangular field at the top.
- DESIGNED BY**: A rectangular field.
- BUILT FOR**: A rectangular field.
- SERIAL NO.**: A rectangular field.
- IDENTIFICATION**: A rectangular field.
- DESIGN PRESSURE**: A rectangular field followed by the text "BAR (g)".
- HEAT TREATMENT**: A rectangular field.
- RADIOGRAPHY**: A rectangular field.
- TEST PRESSURE**: A rectangular field followed by the text "BAR (g)".
- DATE**: A rectangular field.
- TYPE OF FLUID**: A rectangular field.

MATERIAL: 18/8 stainless steel, 2 mm thick.

COMPOSITION: Border, text, and spaces in relief, polished, on black background. The information in the spaces shall be engraved to a depth of at least 0.2 mm.