

Pfaunder DIN BE Reactors

A solid design which can take a lot

The DIN-BE reactors are used everywhere in the world and are considered a measure for security, reliability and an economic operation. This series includes our large reactors with the thick-walled jacket and a rated capacity starting with 1.600 litres. There are good reasons for the industry to opt in favour of Pfaunder reactors when it comes to DIN-reactors.

A reliable operation and service life

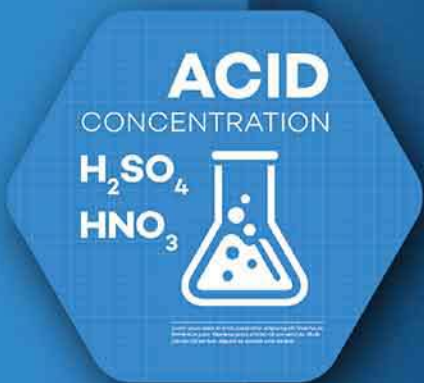
Our Pfaunder enamel WWG offers an excellent resistance when subjected to corrosive and mechanical/abrasive strains. This results into a long service life.

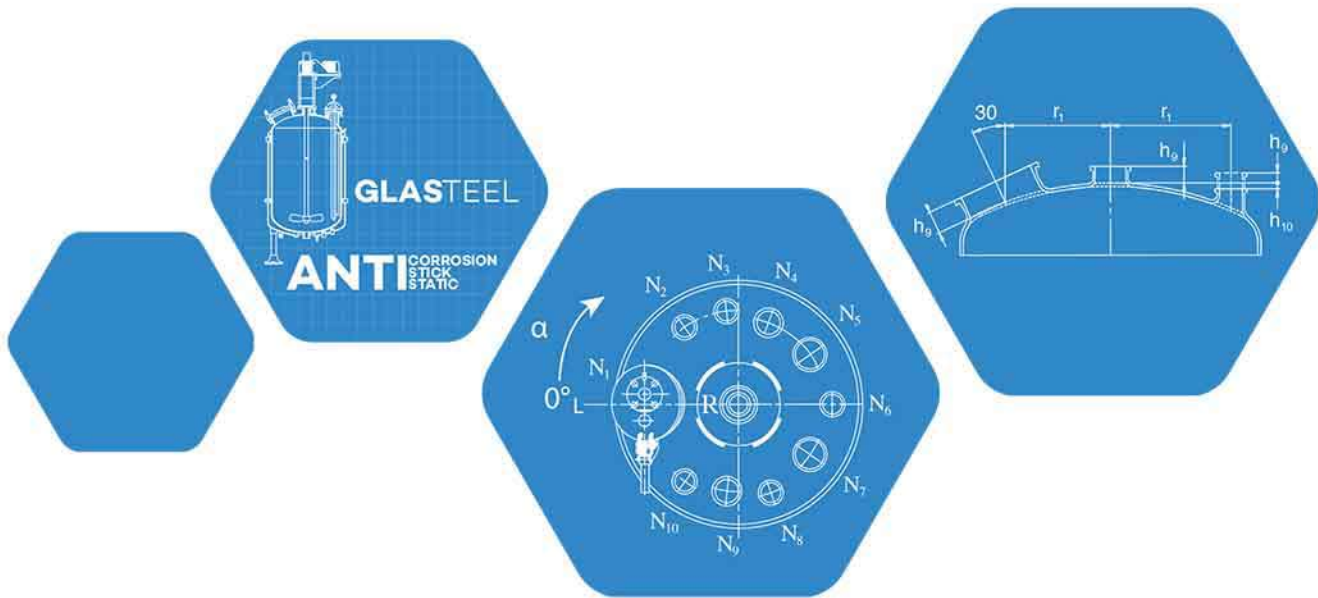
The lengths of the sealed surfaces have been reduced to a minimum since the manhole is the largest opening. This increases safety of operation. In addition, there is more room for more and larger nozzles.

More flexibility and more efficiency in agitation

Cryo-Lock® completes the range of Pfaunder DIN-BE-reactors. Using this fully enamelled agitating system which offers many variations it is possible to achieve an optimum adaptation to process requirements. From an economic point of view you will gain in two respects. The sequence of production and the quality of products can be optimised. A quick change of turbines saves additional time.







BE
10.000

Reactor specifications

Nominal Volume	10000l
Overall capacity	11768l
Overall jacket volume	911l
Heat exchange surface	20,75m ²
Total weight	11170 kg

Baffles/Quatro Pipe

Quatro-Pipe for nozzle	DN300
Immersion depth (ET):	2600 mm
Width of baffle (a_2):	260 mm
Volume below Quatro Pipe/baffle:	1460l

Insulation

Design	d_5	d_6	d_7
Upper insulating ring	2500	2700	-
Upper insulating collar	2500	2700	-
Central insulating ring	2500	2700	-
Lower insulating ring	-	-	550

[mm]

Main dimensions

h_1	h_2	h_3	h_4	h_5
3401	135	3180	1723	680

h_6	h_7	h_8	d_1	d_2
521	86	2510	2400	2500

[mm]

Agitator shafts

Number of honed areas	d_4 [mm]	a_1 [mm]	l_1 [mm]	l_2 [mm]	l_3 [mm]	l_4 [mm]	V_u [l]	V_1 [l]	V_2 [l]	V_3 [l]
1	114,3	251	3670	280	-	-	363	944	-	-
2	114,3	251	3670	280	1350	-	363	944	5557	-
3	114,3	251	3670	280	990	1700	363	944	3998	7073
1	114,3	80	3840	280	-	-	38*	347	-	-

[mm]

* for turbine type CBR and anchor type agitators

Nozzle arrangement

	DN	α°	r_1	h_9	h_{10}
N1	600	0	850	150	-
N2	200	55	925	-	40
N3	200	82,5	925	-	40
N4	300	110	900	-	15
N5	300	145	900	-	15
N6	200	180	925	-	40
N7	300	215	900	-	15
N8	200	250	925	-	40
N9	300	277,5	900	-	15
N10	200	305	925	-	40
L	100	0			
R	250	-	Center	111	
K	150	-	Center	-	

[mm]

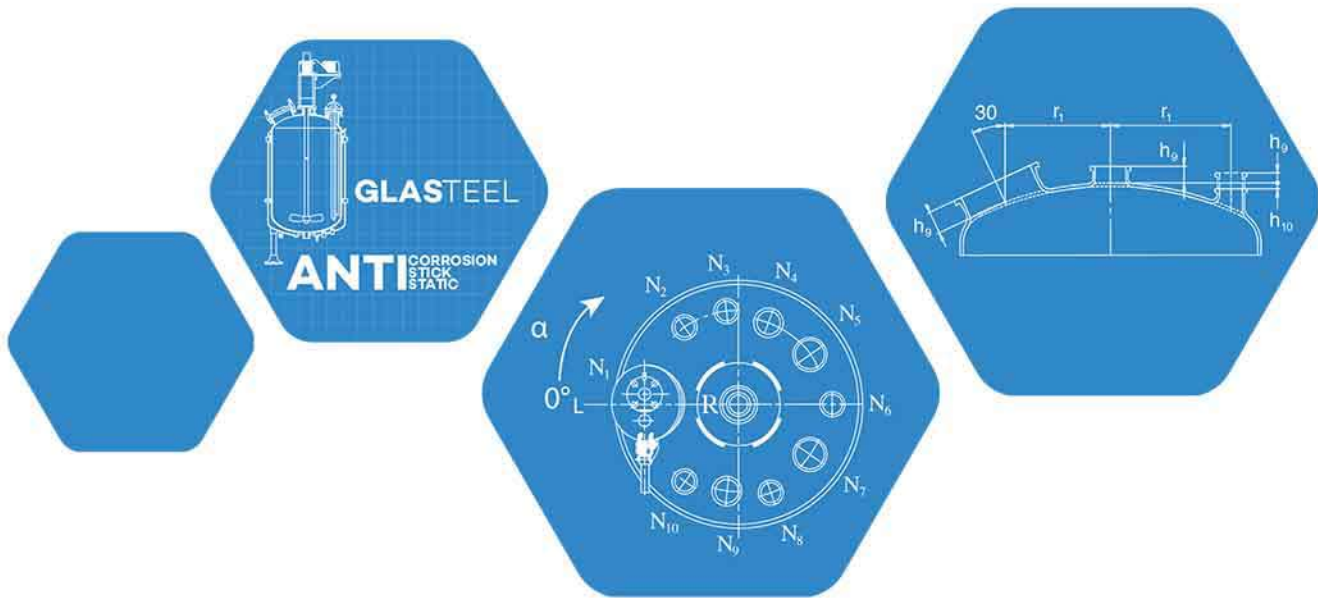
Turbines

Type	d_3	d_4
CBT	1040	114,3
CBR	1040	114,3
TBF	1220	114,3
FBT	1090	114,3
PBT	1090	114,3
RCI	1300	114,3
MSG	1200	114,3
GST	960	114,3
MXT	960	114,3

Protection of honed area made of FEP

[mm]

* K is the bottom outlet nozzle



BE 20.000

Reactor specifications

Nominal Volume	20000l
Overall capacity	22706l
Overall jacket volume	1574l
Heat exchange surface	34,22m ²
Total weight	19230 kg

Baffles/Quatro Pipe

Quatro-Pipe for nozzle	DN300
Immersion depth (ET):	3700 mm
Width of baffle (a_2):	280 mm
Volume below Quatro Pipe/baffle:	2452l

Insulation

Design	d_5	d_6	d_7
Upper insulating ring	2900	3100	-
Upper insulating collar	2900	3100	-
Central insulating ring	2900	3100	-
Lower insulating ring	-	-	550

[mm]

Main dimensions

h_1	h_2	h_3	h_4	h_5
4604	135	4385	1848	680

h_6	h_7	h_8	d_1	d_2
634	84	3625	2800	2900

[mm]

Agitator shafts

Number of honed areas	d_4 [mm]	a_1 [mm]	l_1 [mm]	l_2 [mm]	l_3 [mm]	l_4 [mm]	V_u [l]	V_1 [l]	V_2 [l]	V_3 [l]
1	139,7	252	4870	330	-	-	430	1295	-	-
2	139,7	252	4870	330	1940	-	430	1295	10749	-
3	139,7	252	4870	330	1400	2470	430	1295	7560	13879
1	139,7	80	5040	330	-	-	45°	510	-	-

[mm]

* for turbine type CBR and anchor type agitators

Nozzle arrangement

	DN	α°	r_1	h_9	h_{10}
N1	600	0	1000	150	-
N2	200	55	1100	-	75
N3	200	77,5	1100	-	75
N4	300	110	1000	-	5
N5	400	145	1000	-	5
N6	200	180	1100	-	75
N7	400	215	1000	-	5
N8	200	250	1100	-	75
N9	300	282,5	1000	-	5
N10	200	310	1100	-	75
L	100	0			
R	250	-	Center	111	
K	150	-	Center	-	

[mm]

Turbines

Type	d_3	d_4
CBT	1220	139,7
CBR	1220	139,7
TBF	1420	139,7
FBT	1220	139,7
PBT	1220	139,7
RCI	1500	139,7
MSG	1200	139,7
GST	1120	139,7
MXT	1120	139,7

Protection of honed area made of FEP

[mm]

* K is the bottom outlet nozzle

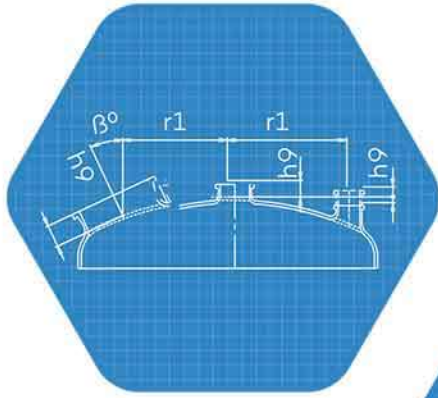


Reactor system BE

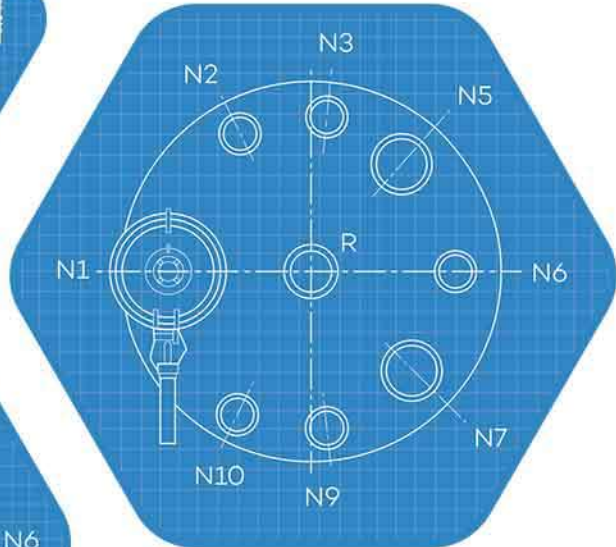
Technical data

TYPE	BE 630	BE 800	BE 1000	BE 1000
			diam. 1400	diam. 1200
Nominal volume	630 l	800 l	1000 l	1000 l
Total volume	861 l	1069 l	1730 l	1474 l
Jacket volume (double jacket)	210 l	250 l	280 l	230 l
Heat exchange surface	4,3 m ²	5,2 m ²	5,5 m ²	4,97 m ²
Operating temperature	-25/+200 °C	-25/+200 °C	-25/+200 °C	-25/+200 °C
adm. operating pressure, reactor	-1/+6 bar	-1/+6 bar	-1/+6 bar	-1/+6 bar
adm. operating pressure, jacket	-1/+6 bar	-1/+6 bar	-1/+6 bar	-1/+6 bar
Total weight approx.	1600 kg	1800 kg	2800 kg	2300 kg
d ₁	1000 mm	1000 mm	1400 mm	1200 mm
d ₂	1100 mm	1100 mm	1500 mm	1300 mm
d ₃	480 mm	480 mm	735 mm	480 mm
σ ₃	180 mm	180 mm	180 mm	180 mm
a	60 mm	60 mm	60 mm	60 mm
Residual quantity	6 l	6 l	15 l	6 l
h ₁	1480 mm	1758 mm	1573 mm	1726 mm
h ₂	90 mm	90 mm	100 mm	90 mm
h ₃	1310 mm	1590 mm	1400 mm	1560 mm
h ₄ max	1202 mm	1202 mm	1210 mm	1202 mm
h ₅	—	—	525 mm	—
h ₆	169 mm	170 mm	236 mm	210 mm
h ₇	90 mm	90 mm	90 mm	90 mm
h ₈	912 mm	1140 mm	776 mm	1012 mm

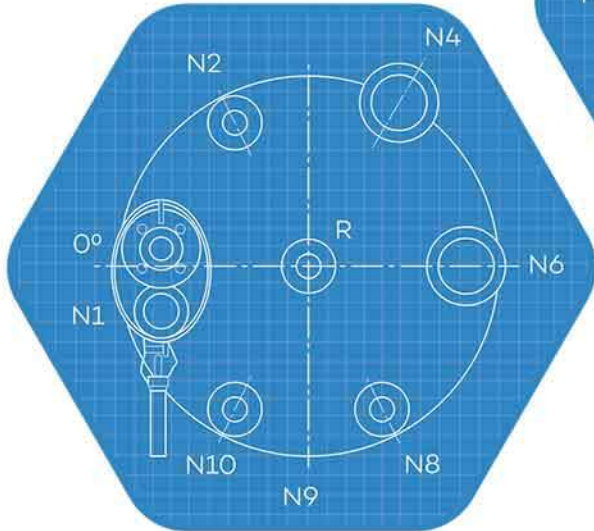
The operating conditions stated in the proposal or in the confirmation of order are binding.



$\beta = 25^\circ$ for BE 1000



Nozzle pattern BE 1000



Nozzle pattern BE 630/800

BE 1000 diam. 1400

	DN	α°	r_1	h_9
N1	500	0	475	125
N2	100	60	575	25
N3	100	95	575	25
N5	200	135	550	50
N6	100	180	575	25
N7	200	225	550	50
N9	100	265	575	25
N10	100	300	575	25
L	100	0		
R	150	—	0	80
K	100	—	0	—

BE 1000 diam. 1200

	DN	α°	r_1	h_9
N1	350 x 450	0	440	125
N2	100	67.5	500	30
N3	100	95	500	30
N5	200	137.5	450	60
N6	100	180	500	30
N7	200	222.5	450	60
N9	100	265	500	30
N10	100	292.5	500	30
L	100	0		
R	125	—	0	70
K	100	—	0	—

BE 630/BE 800

	DN	α°	B	r_1	h_9
N1	320 x 420	0	27	365	143
N2	100	65		380	50
N4	100	120	14	380	90
N6	150	180		380	50
N8	100	240		380	50
N10	100	295		380	50
L	100	0			
R	125	—		0	70
K	100	—		0	—

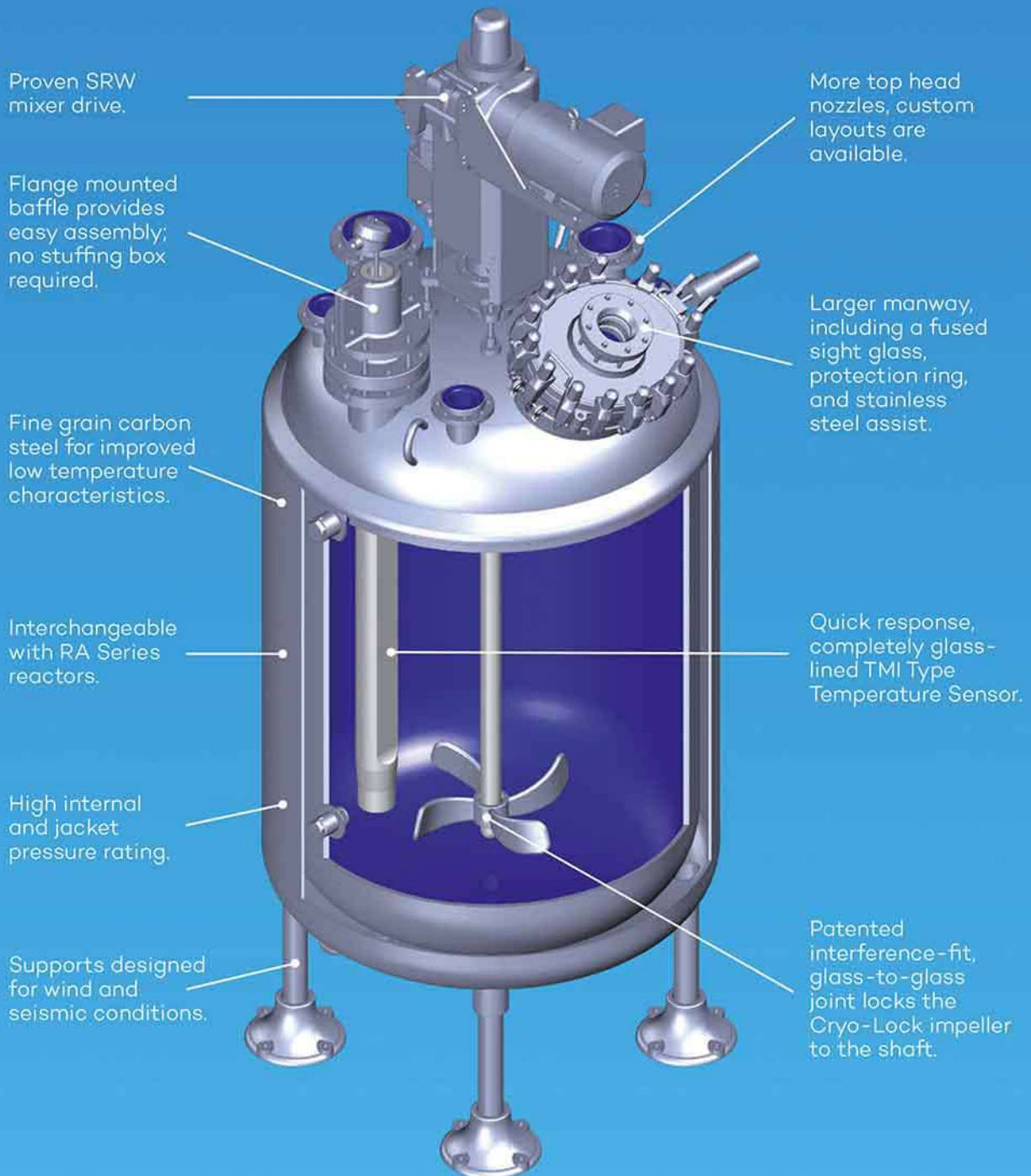
ARYA CHAUB MACHINERY CO., LTD.

RS-Reactor Series

Why Use a Glasteel Reactor

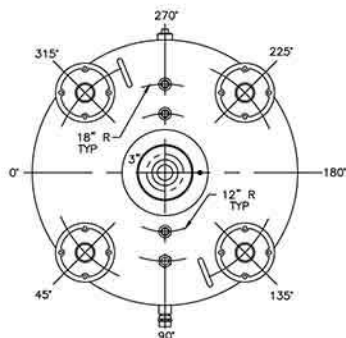
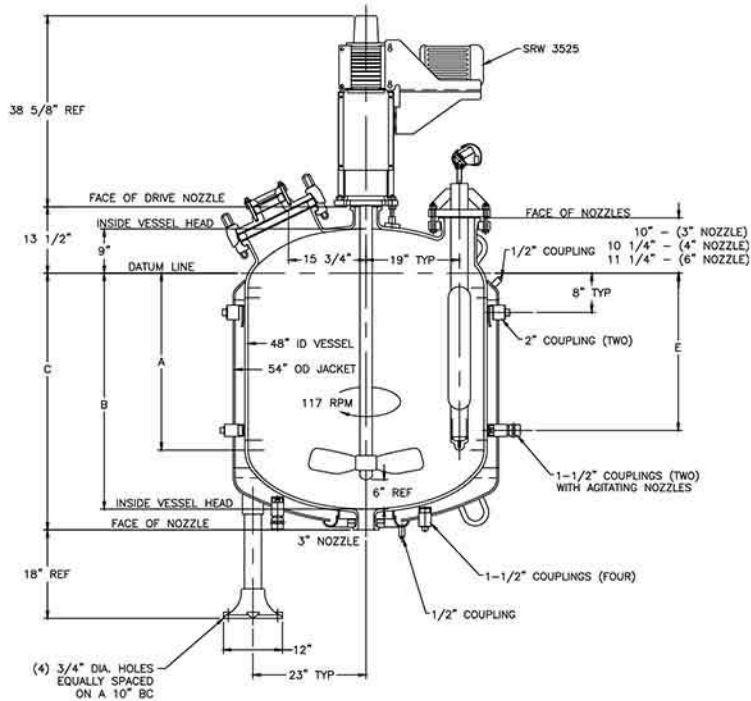
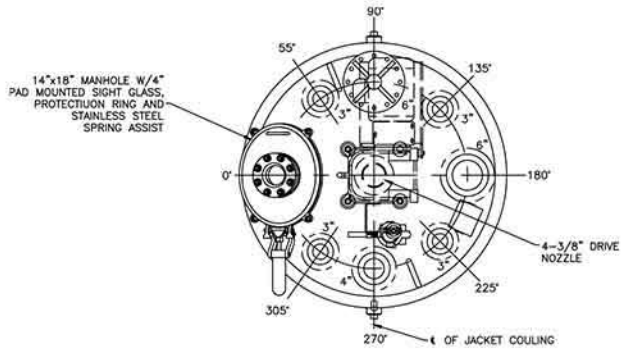
The specially formulated glass lining, fused to a steel substrate, is highly corrosion resistant and chemically inert to nearly all substances. It is the ideal environment for processing ultra-pure products.

Its smooth surface resists adherence by viscous or sticky materials and cleans easily. Glasteel is strong. Fusing glass to steel produces a composite material with the advantages of glass and the strength of steel. It has a high resistance to impact and thermally induced stresses.



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RS48-Series



	300 gal.	500 gal.
Design pressure (psig)		
Internal @ 450 °F	125/FV	125/FV
Jacket @ 450 °F	100/FV	100/FV

Dimensions (inches)

	300 gal.	500 gal.
A	33	58
B	48	73
C	52-1/4	77-1/4
D	122-5/8	147-5/8
E	32	51

Capacity (gallons)

	300 gal.	500 gal.
Working	300	500
Top Head	62.7	62.7
Bottom Head	62.7	62.7
Per Inch of Straight Side	7.8	7.8
To Bottom of Impeller Blade	25	25
To Top of Impeller Blade	62.5	62.5
To Bottom of Baffle	47	47
Jacket	75	110

Heating area (square feet)

	300 gal.	500 gal.
Jacket (total)	53	80
Bottom Head	17.4	17.4
Per Inch of Straight Side	1.1	1.1

Weight (pounds)

	300 gal.	500 gal.
Without Accessories	3,580	4,750
Total - Including Drive, Agitator, Baffle	4,830	6,200
Add for Shipment	150	150

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RS60-Series

	750 gal.	1000 gal.
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Design pressure (psig)

Internal @ 450 °F	125/FV	125/FV
Jacket @ 450 °F	100/FV	100/FV

Dimensions (inches)

A	52	72
B	70	90
C	74-1/4	94-1/4
D	147-3/8	175-5/8
E	33-1/2	47-1/2
F	47-1/2	67-1/2

Capacity (gallons)

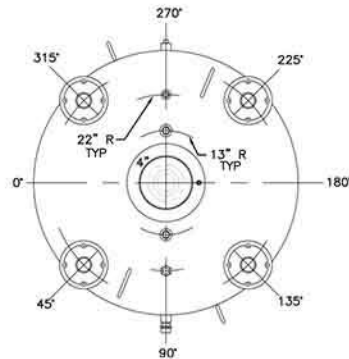
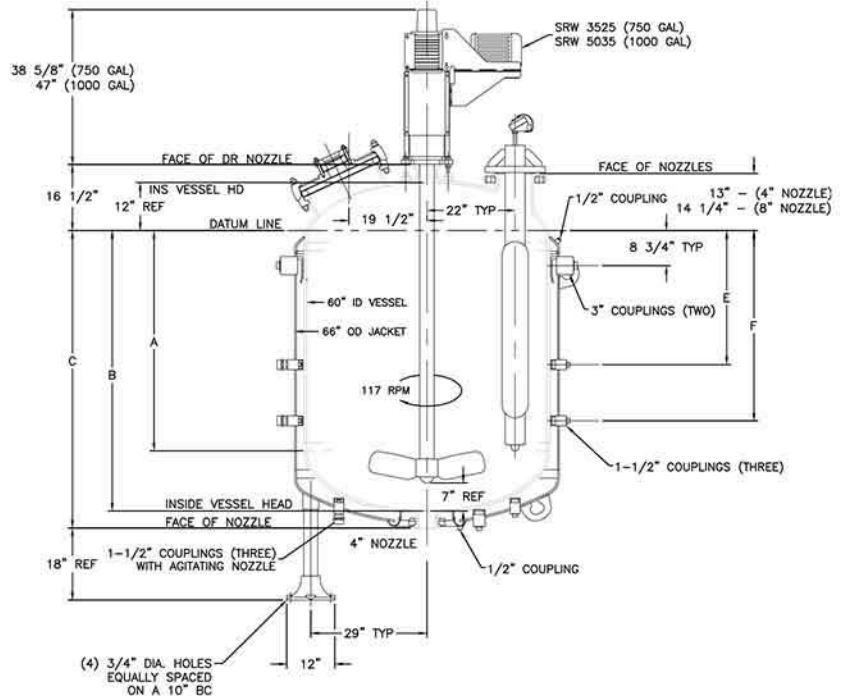
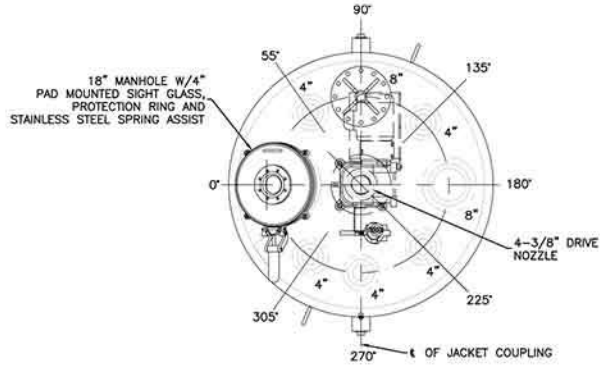
Working	750	1000
Top Head	122.4	122.4
Bottom Head	122.4	122.4
Per Inch of Straight Side	12.2	12.2
To Bottom of Impeller Blade	42	42
To Top of Impeller Blade	122	122
To Bottom of Baffle	75	75
Jacket	141	171

Heating area (square feet)

Jacket (total)	96	122
Bottom Head	27.1	27.1
Per Inch of Straight Side	1.3	1.3

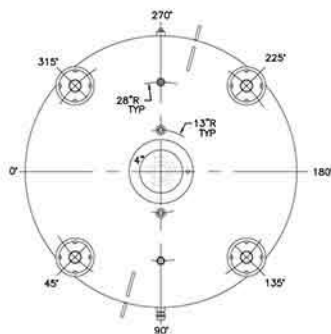
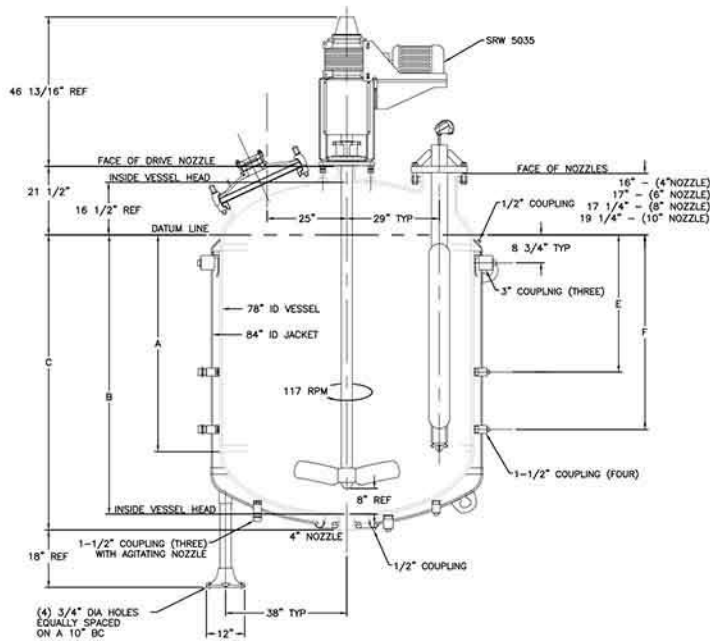
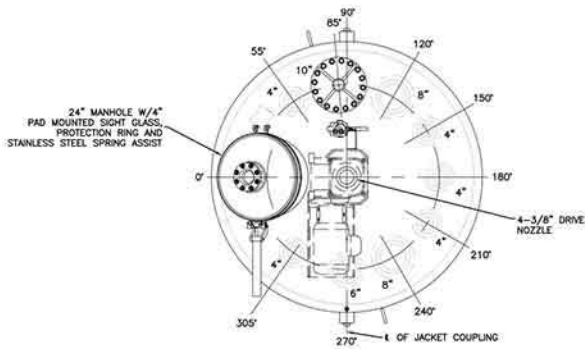
Weight (pounds)

Without Accessories	6,050	7,250
Total - Including Drive, Agitator, Baffle	7,900	9,450
Add for Shipment	200	200



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RS78-Series



	1500 gal.	2000 gal.
Design pressure (psig)		
Internal @ 450 °F	125/FV	125/FV
Jacket @ 450 °F	100/FV	100/FV

Design pressure (psig)

Internal @ 450 °F

Jacket @ 450 °F

	1500 gal.	2000 gal.
Dimensions (inches)		
A	65	84
B	87-1/2	106-1/2
C	92-1/2	111-1/2
D	179	198
E	43	60
F	61	81

Dimensions (inches)

A

B

C

D

E

F

	1500 gal.	2000 gal.
Capacity (gallons)		
Working	1500	2000
Top Head	268.9	268.9
Bottom Head	268.9	268.9
Per Inch of Straight Side	20.7	20.7
To Bottom of Impeller Blade	72	72
To Top of Impeller Blade	205	205
To Bottom of Baffle Jacket	139	139
Jacket	255	301

Capacity (gallons)

Working

Top Head

Bottom Head

Per Inch of Straight Side

To Bottom of Impeller Blade

To Top of Impeller Blade

To Bottom of Baffle Jacket

Jacket

	1500 gal.	2000 gal.
Heating area (square feet)		
Jacket (total)	158	191
Bottom Head	45.8	45.8
Per Inch of Straight Side	1.7	1.7

Heating area (square feet)

Jacket (total)

Bottom Head

Per Inch of Straight Side

	1500 gal.	2000 gal.
Weight (pounds)		
Without Accessories	11,630	13,380
Total - Including Drive, Agitator, Baffle	14,000	15,900
Add for Shipment	450	450

Weight (pounds)

Without Accessories

Total - Including Drive, Agitator, Baffle

Add for Shipment

ARYA CHAUB MACHINERY CO., LTD.



Pharma-line

Sanitary shell & tube heat exchanger

The Pharma-line is a high-quality shell & tube heat exchanger especially developed to meet the high hygienic demands of the pharmaceutical industry. The design of the Pharma-line makes it easy to drain and clean, and there is no risk of cross-contamination associated with conventional heat exchangers. The documentation on a heat exchanger in the pharmaceutical industry is equally important as the hardware so the Pharma-line comes together with a high quality documentation package as standard and most specials are available upon request.

Applications

The Pharma-line is designed to work under highest hygienic conditions in applications such as WFI, PW and heating/cooling of pharmaceutical products.

Design and working principles

The product media flows through a bundle of seamless, electropolished tubes. The service media flows outside the tubes in cross flow. At the end the tubes are fastened by two tube sheets (see Fig. 1) acting as leakage indicators and prevent cross-contamination between the product and the service media.

The Pharma-line can be installed either horizontally or vertically depending on the duty or space. For an easy installation, lifting and mounting devices are welded on the unit. Thermal fatigue caused by large temperature changes is taken up by the U-bend in two-pass units and by a welded-in bellow in straight units.

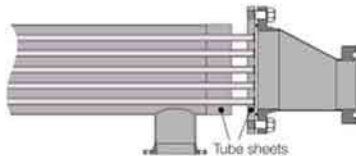


Fig. 1. Double tube sheets prevents cross-contamination between the product and the heating/cooling media.



Special features

- Seamless tubes
- Double tube-sheets to protect against service media leaking into the product
- Completely drainable on product side
- No dead spots in the tubes
- Designed according to FDA and cGMP requirements
- Flexibility in design

Standard range

A standard range of U-tube designed Pharma-line that suit most applications is available.

ARYA CHAUB MACHINERY CO., LTD.

Technical data of standard units

Heat transfer area: 0-5 m²

Design temperature: 180 °C

Design pressure: 10 barg/FV

Materials: 316L and FDA approved gaskets, USP class VI

Connections: Tri-clamp on tube side and flanges on utility side

PV codes: PED and ASME VIII (U-stamp on request)

Welding according to ASME IX and EN-288-3, EN 287-1

Surface finish, product wetted parts: Ra <0.4, 0.5 or 0.8 µm

Insulation available in mineral wool (ASTM C 975)

Standard documentation

- Technical drawing
- List of welders and weld license
- Material certificate
- Liquid penetration test report
- Surface treatment report, dimension control report
- Installation, operation and maintenance manual
- CE-conformity documentation
- Component list
- Pressure test report
- PV documents

Custom-made units

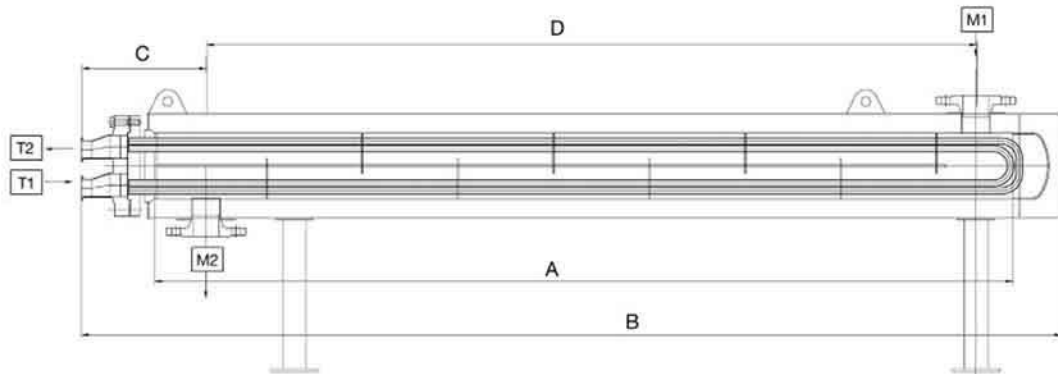
Special designs and more documentation of Pharma-line are available on request.

Standard units, measurements (approximate)

Type	No of U-tubes	Tube OD (mm)	Shell OD (mm)	A (mm)	B (mm)	C (mm)	D (mm)
8-7-1	7	8	88,9	800	1200	190	860
8-7-2	7	8	88,9	1800	2200	190	1860
8-7-3	7	8	88,9	2800	3200	190	2860
8-11-1	11	8	101,6	800	1200	190	860
8-11-2	11	8	101,6	1800	2200	190	1860
8-11-3	11	8	101,6	2800	3200	190	2860
8-19-1	19	8	114,3	800	1200	200	860
8-19-2	19	8	114,3	1800	2200	200	1860
8-19-3	19	8	114,3	2800	3200	200	2860
10-11-1	11	10	114,3	800	1200	200	860
10-11-2	11	10	114,3	1800	2200	200	1860
10-11-3	11	10	114,3	2800	3200	200	2860
10-21-1	21	10	139,7	800	1200	210	860
10-21-2	21	10	139,7	1800	2200	210	1860
10-21-3	21	10	139,7	2800	3200	210	2860
14-9-1	9	14	139,7	800	1200	210	860
14-9-2	9	14	139,7	1800	2200	210	1860
14-9-3	9	14	139,7	2800	3200	210	2860
14-16-1	16	14	168,3	800	1200	220	860
14-16-2	16	14	168,3	1800	2200	220	1860
14-16-3	16	14	168,3	2800	3200	220	2860

Nozzle schedule

Item	Service	Facing	Standard&Dimension
T1	Tube inlet	Tri-Clamp	Free
T2	Tube outlet	Tri-Clamp	Free
M1	Shell inlet	Weld neck flange	Free
M2	Shell outlet	Weld neck flange	Free



PLS00060EN 0710

Alfa Laval reserves the right to change specifications without prior notification.

How to contact Alfa Laval

Contact details for all countries are continually updated on our website. Please visit www.alfalaval.com to access the information direct.

ARYA CHAUB MACHINERY CO., LTD.

Photo of Reactor:

1.HF20000 20m3 (80% new)



ARYA CHAUB MACHINERY CO., LTD.

3.Photo of Condenser:40m2 equip with 20m3 reactor



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