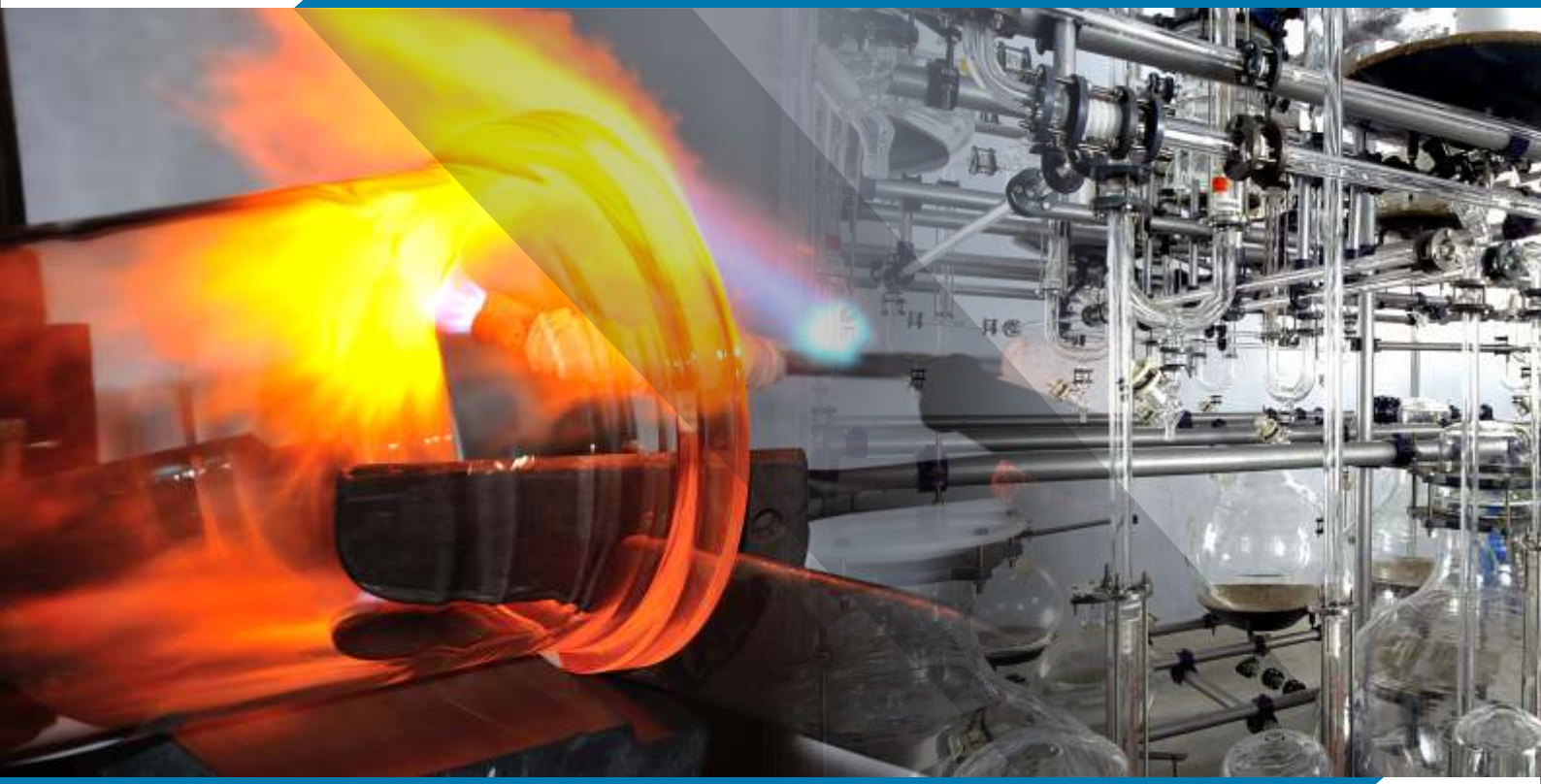
We can't think without glass

Industrial Glassware & Instruments



www.ssscientific.in

PRODUCT CATALOGUE

S.S. SCIENTIFIC INDUSTRIES PVT. LTD.

AN ISO 9001 : 2015 CERTIFIED COMPANY

About Us

S.S. Scientific Industries Pvt. Ltd. was Established in the year of 2008 by young & Dynamic businessman Mr. Manoj Agrawal. The Company to deal in design manufacturer & supplier of industrial Borosilicate 3.3 Glass Equipments & Process system, Custom made pilot plants, PTFE lined Equipments, Instruments and fitting as per Indian & international Standards . Equipments & systems required for Industries such as Agrochemicals, Fine chemicals, Bulk Drugs & Pharmaceuticals, Dyes & Intermediates etc.

The Company has an excellent support of Craftsmanship which ensures about the best quality Components right from the raw materials like Borosilicate glass & PTFE, till the equipments & systems Supplied.

Quality Assurance:

Preventing mistakes or defects in manufactured Products and avoiding Problems when delivering materials & services to the customers.

Vision :

The Growth of our company will be built on our solid foundation.

Mission :

Low Cost Producer, Outstanding customer service.

Goal :

Driving Customer Success, Performing together & Respecting Each Other.

MESSAGE OF MD & TEAM

We can't think without glass

Manoj G. Agrawal
(Managing Director)

Dear Customers, it is my pleasure to present our updated catalogue briefing about the products range. S.S. Scientific Industries Pvt. Ltd. was incorporated in the year 2008.I am glad to inform you that, we have been achieving sales target & progress every year. To provide the good quality products & systems in reasonable price. My vision to growth our company will be built on our solid foundation. Our attention to provide the best quality products, faster delivery and outstanding customer service to our esteemed customers

Chittaranjan Nayak (Director)

Mr. Chittaranjan Nayak is a Diploma in Mechanical Engineering& Post Diploma in Plastics Mould Design with rich experience of 19 years in Sales & Marketing department. He started his career in 2000 as a Sales & Service Engineer and has worked as senior post in Marketing & Sales Department. He has good exposure on how to introduce and Sale and develops for a new Product in Target Market. Presently working as a Director and is a part of the management team of the company. He has a vision to make S.S. Scientific Industries Pvt. Limited to be a leading manufacture & supplier of Industrial Glass equipment & System with various instruments in the India & Abroad.

Umesh Ajmeri (Head-Technical)

Mr. Umesh Ajmeri having rich experience of 30 years with responsibilities in Technical field in Industrial Glass Units. He started his career in the year 1989 As a Fitter-Industrial Glass. He has vast experiences in the same field. As a Head-Technical is responsible for the overall leadership for Technical Department. His concern for the customer's needed and dedicated efforts in developing the new products. He is always in coordination with Technical team and guiding them for better results.

Sudhir Mahapatra (Sr. Manager-Mktg. & Sales)

Mr. Sudhir Mahapatra started career in Industrial Glass industries as a Fitter in the year 2002. He worked very hard under the guidance of the management in various departments. He is having experience of 17 years in the same field. He is currently working as a Sr. Manager-Mktg. & Sales department for all over India. Mr. Sudhir has good experience in Shell & Tube type Heat Exchanger. His technical and qualitative capabilities have proved to be a valuable for the organization.

SSS
We can't think without glass

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CATALOGUE COMPONENTS & REFERENCES

We can't think without glass

BOROSILICATE GLASS

Borosilicate glass represents unmatched standardized glass for construction of plant and piping in the chemical, dyestuff, food pharmaceutical, petrochemical industries. Its steadily growing use is due to many advantages over conventional materials.

- Outstanding corrosion resistence
- Smooth pore free surface
- Transparency
- Catalytic intertness.
- No effect on taste and odour
- Physiological intertness.

Borosilicate glass is chosen for its unique chemical and physical properties. Borosilicate glass can be considered as being composed of Oxides, Silica (SIO_2) Magnesia (MgO) and Lead oxide (PbO) are the principle modifiers/fluxes.

The chemical and physical properties of any glass depends on a varying degree on chemical composition of glass.

CHEMICAL COMPOSITION

The composition of borosilicate glass used for chemical plants has following approximate composition.

SiO_2 - 80.6%	B_2O_2 - 12.5%
Na_2O - 4.2%	Al_2O_3 - 2.2%

RESISTANCE TO CHEMICAL

Borosilicate glass is inert to almost all materials except Hydroflouric acid (HF) Phosphoric acid(H_3PO_4) and hot strong caustic solutions. Of these. Hydroflouric acid has the most serious effect, even when it is present in PPM (parts per million) in solutions. Where as phosphoric acid and caustic solutions cause no problems when cold but at elevated temperature corrosion occurs. In case of caustic solutions, upto 30% concentration can be handled safely at ambient temperature.

Under actual operating conditions, the effect of turbulence, and traces of other chemicals in the solution may increase or decrease the rate of attack. So it is not possible to give exact figures for corrosion by caustic solutions.

PHYSICAL AND THERMAL PROPERTIES

Linear coefficient of thermal expansion

The coefficient of thermal expansion of borosilicate glass over the temperature 0-300^{0}C is 3.3 x 10^{-6}/^{0}C. This is very low when compared with other glasses and metals. That is why, borosilicate glass is often called low expansion borosilicate glass.

Specific heat

Specific heat between 25^{0}C and 300^{0}C is average to be 0.233Kcal/Kg, ^{0}C

Thermal Conductivity

Thermal conductivity is 1.0 Kcal/hr,m^{0}C. Over the permissible operating temperature range.

Mean Specific Heat

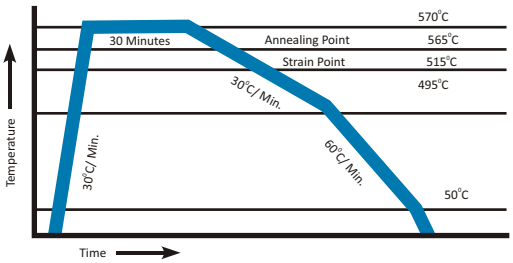
Mean specific heat capacity between 20^{0}C and 200^{0}C is 0.98 KJ/Kg K.

DENSITY

Density of glass at 20^{0}C (J)=2.23g/cc
Modulus of elasticity (E)=6.3 KN/mm^2
Poissions ratio=0.2

ANNEALING

Annealing of glass is the process where the glass is heated and kept for a defined period of time to relive internal stresses. Careful cooling under controlled conditions is essential to ensure that no stresses are reintroduced by chilling/cooling.



RESHAPING

In the below given table, it shows characteristic temperature at a determined viscosity, essential for glass reshape.

Lower cooling temperature	10^{24}poise	515^{0}C
Upper cooling temperature	10^{13}poise	565^{0}C
Softening point	10^{7}poise	795^{0}C
Reshaping point	10^{4}poise	120^{0}C

MECHANICAL PROPERTIES

The lack of ductility of glass prevents the equalization of stresses at local irregularities or flows and the breakage strength varies considerably about a mean value. This latter is found to occur at a tensile strength of about 700kg/cm^{2}In order to allow for the spread of breaking stress, a large factor of safety is applied when determining the wall thickness requirement to allow operation up to values given in the table of working pressure.

OPTICAL PROPERTIES

Borosilicate glass show no appreciable absorption in the visible region of spectrum and therefore appears clear and colorless.

In photo chemical processes, the transparency of ultra violet is of particular importance. It follows from the transmittance of material in uv region that photo chemical reactions such as Chlorination & Sulpho Chlorination can be performed in it.

DIMENSIONS, WEIGHTS AND SPECIFICATIONS

In this catalogue, dimensions, weights and other specifications are taken more or less in accordance with Corning. This is to keep the flexibility of maximum interchange ability. However, some difference are unavoidable due to local manufacturing conditions. All the odd dimensions are rounded off.

All the dimensions and weights are approximate. The specifications given in the catalogue are intended to present a general description of the items. Since manufacturing of glass equipment involves all manual operations, certain tolerances are obvious and permissible while passing the items through quality control.

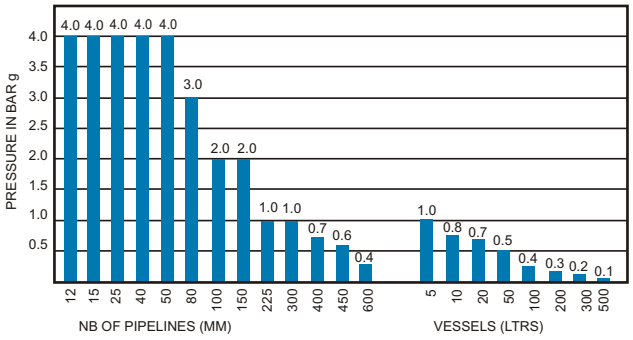
PERMISSIBLE OPERATING CONDITIONS

Working Pressure For Glass Pipelines & Vessels

The permissible internal operation pressure depends upon the nominal diameter of the glass components and on working temperature.

In case of unit with various combination like vessels, filters, heat exchangers, the over all permissible internal gauge pressure is always governed by the component with the lowest permissible operating gauge pressure all components are suitable for full vacuum.

Bar is a measure of absolute pressure. The figure given for maximum recommended working pressure represents pressure above atmospheric



Note : 1 Bar = 1.0193 kg.

Working Temperature

Borosilicate glass retains its mechanical strength and will deform only at temperature which approach its strain point. The practical upper limit for operating temperature is much lower and is controlled by the temperature differentials in the glass which depends on the relative temperature of the contents of the equipment and the external surroundings. Provided borosilicate glass is not subject to rapid change in temperature, creating undue thermal shock, it can be operated safely at temperatures upto 250°C

It must be realised that in complete plants, composed not only of borosilicate glass, but also include other materials such as PTFE. The recommended max. operating temperature is 200°C. Operating temperatures may have to be modified so as to compensate for the effects of other factors such as pressure, thermal cycling, rapid heating & cooling etc.

The degree of thermal shock (usually defined as sudden chilling or heating) which it can withstand depends on many factors such as stresses due to operating conditions, stresses imposed in supporting the equipment, the wall thickness of the glass. It is therefore undesirable to give sudden temperature changes. But up to 120°C can be accommodated.

As sub zero temperature, the tensile strength of borosilicate glass tends to increase and equipment can be used safely at temperatures as low as -50°C for XTRONG and components.

ELECTRICAL CHARACTERISTICS

Glass being a poor electrical conductor, surface, conductivity is insignificant and varies with the quantity of water absorbed on glass surface. The specific conductivity is 10^{9} ohm/cm at temperature of 200°C. The dielectric coefficient varies with current frequency.

COMPOSITE MATERIALS

The last two decades have seen the new or further developments of particularly corrosion resistant plant construction materials. Typical examples of these are PTFE, tantalum, titanium, graphite and of course, Borosilicate 3.3 Glass.

The combination of different corrosion resistant materials with the utilization of the specific advantages of each permits both safe and economic construction.

Borosilicate glass/PTFE

Borosilicate Glass with PTFE is of particularly decisive importance for construction of glass installation For example. in Seals, Bellows, Stirrers, Pumps, Heat Exchangers, Column Inserts etc.

PTFE is used with Glass because of its excellent mechanical & thermal properties. They have near universal fluid compatibility. Wear life when compared with others is very low. Particularly PTFE is maintenance free and have cryogenic stability with non wetting property.
Service temperature of PTFE is considered as - 50°C to + 200°C

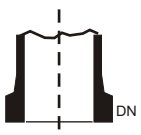
TIGHTENING TORQUE

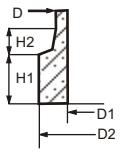
Diameter	Maximum bolt-tightening torque* in Nm for couplings with backing flanges	
DN	Made of Plastic (K)	Made of Iron/steel/ Silumin(S)
12	1	1
15	1	1
25	2.5	2.5
40	2.5	3.5
50	2.5	3.5
80	2.5	3.5
100	3.5	4.5
150	3.5	4.5
225	-	4.5
300	-	4.5
400	-	6.5
450	-	6.5
600	-	11

*The Indicated Tightening torques apply for ungreased bolts and are required only for the maximum operating pressures. They can be reduced.

DIMENSION OF X TRONG END

DN	D	D1	D2	H1	H2	A°	B°
15	23	18	28	9	7	65	9
25	34	27	41	13	8	65	9
40	49	40	56	14	9	65	9
50	62	52	69	16	11	65	9
80	91	79	98	18	12	65	9
100	123	108	132	20	17	65	9
150	166	159	184	22	19	65	9
225	233	229	258	24	26	65	9
300	315	308	340	24	26	65	9
400	425	405	463	25	35	65	9
450	499	455	525	25	50	78	9
600	640	600	684	25	60	65	9





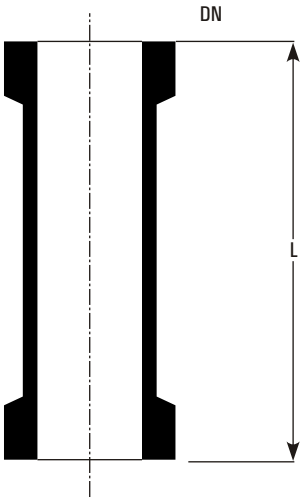
PIPELINE COMPONENTS

PIPELINE
COMPONENTS

PIPE SECTIONS

DN	12	15	25	40	50
L	Cat.Ref.	Cat.Ref.	Cat.Ref.	Cat.Ref.	Cat.Ref.
100	PS 0.5/100	PS 0.7/100	PS 1/100	PS 1.5/100	PS 2/100
150	PS 0.5/150	PS 0.7/150	PS 1/150	PS 1.5/150	PS 2/150
200	PS 0.5/200	PS 0.7/200	PS 1/200	PS 1.5/200	PS 2/200
250	PS 0.5/250	PS 0.7/250	PS 1/250	PS 1.5/250	PS 2/250
300	PS 0.5/300	PS 0.7/300	PS 1/300	PS 1.5/300	PS 2/300
400	PS 0.5/400	PS 0.7/400	PS 1/400	PS 1.5/400	PS 2/400
500	PS 0.5/500	PS 0.7/500	PS 1/500	PS 1.5/500	PS 2/500
600	PS 0.5/600	PS 0.7/600	PS 1/600	PS 1.5/600	PS 2/600
750	PS 0.5/750	PS 0.7/750	PS 1/750	PS 1.5/750	PS 2/750
900	PS 0.5/900	PS 0.7/900	PS 1/900	PS 1.5/900	PS 2/900
1000	PS 0.5/1000	PS 0.7/1000	PS 1/1000	PS 1.5/1000	PS 2/1000

DN	80	100	150
L	Cat.Ref.	Cat.Ref.	Cat.Ref.
150	PS 3/150	PS 4/150	PS 6/150
200	PS 3/200	PS 4/200	PS 6/200
250	PS 3/250	PS 4/250	PS 6/250
300	PS 3/300	PS 4/300	PS 6/300
400	PS 3/400	PS 4/400	PS 6/400
500	PS 3/500	PS 4/500	PS 6/500
600	PS 3/600	PS 4/600	PS 6/600
750	PS 3/750	PS 4/750	PS 6/750
900	PS 3/900	PS 4/900	PS 6/900
1000	PS 3/1000	PS 4/1000	PS 6/1000



DN	225	300	400
L	Cat.Ref.	Cat.Ref.	Cat.Ref.
300	PS 9/300	PS 12/300	PS 16/300
400	PS 9/400	PS 12/400	-
500	PS 9/500	PS 12/500	PS 16/500
600	PS 9/600	PS 12/600	-
750	PS 9/750	PS 12/750	PS 16/750
900	PS 9/900	PS 12/900	-
1000	PS 9/1000	PS 12/1000	PS 16/1000
1200	PS 9/1200	PS 12/1200	PS 16/1200
1500	PS 9/1500	PS 12/1500	PS 16/1500

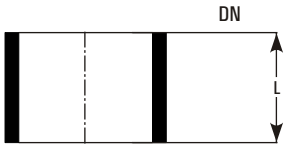
DN	450	600
L	Cat.Ref.	Cat.Ref
300	PS 18/300	-
500	PS 18/500	PS 24/500
750	PS 18/750	-
1000	PS 18/1000	PS 24/1000
1200	PS 18/1200	-
1500	PS 18/1500	PS 24/1500

GLASS SPACERS

Spacers are used to adjustment of small increaments in length.

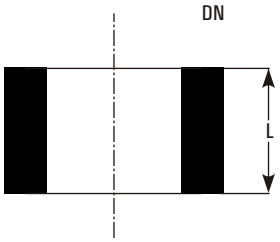
DN	12	15	25	40	50
L	Cat.Ref.	Cat.Ref.	Cat.Ref.	Cat.Ref.	Cat.Ref.
5	SS 0.5/5	SS 0.7/5	SS 1/5	SS 1.5/5	SS 2/5
15	SS 0.5/15	SS 0.7/15	SS 1/15	SS 1.5/15	SS 2/15
25	SS 0.5/25	SS 0.7/25	SS 1/25	SS 1.5/25	SS 2/25

* L= 50 DN or other size available on request.



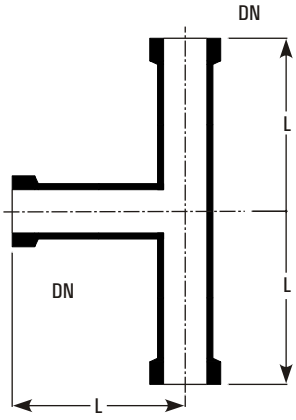
PTFE SPACERS

DN	12	15	25	40	50
L	Cat.Ref.	Cat.Ref.	Cat.Ref.	Cat.Ref.	Cat.Ref.
5	SST 0.5/5	SST 0.7/5	SST 1/5	SST 1.5/5	SST 2/5
10	SST 0.5/10	SST 0.7/10	SST 1/10	SST 1.5/10	SST 2/10
15	SST 0.5/15	SST 0.7/15	SST 1/15	SST 1.5/15	SST 2/15
20	SST 0.5/20	SST 0.7/20	SST 1/20	SST 1.5/20	SST 2/20



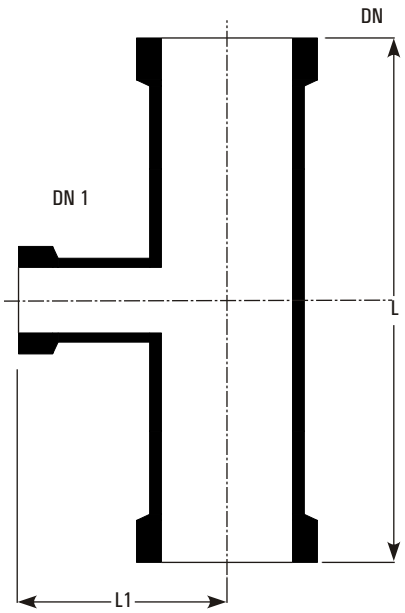
EQUAL TEES

Cat.Ref.	DN	L
PT 0.5	12	50
PT 0.7	15	50
PT 1	25	100
PT 1.5	40	150
PT 2	50	150
PT 3	80	200
PT 4	100	250
PT 6	150	250
PT 9	225	375
PT 12	300	450



UNEQUAL TEES

Cat.Ref.	DN	DN1	L	L1
PTU 1/0.5	25	12	150	75
PTU 1/0.7	25	15	150	75
PTU 1.5/1	40	25	200	75
PTU 2/1	50	25	200	80
PTU 2/1.5	50	40	200	100
PTU 3/1	80	25	250	100
PTU 3/1.5	80	40	250	100
PTU 3/2	80	50	250	115
PTU 4/1	100	25	250	110
PTU 4/1.5	100	40	250	125
PTU 4/2	100	50	250	125
PTU 4/3	100	80	300	150
PTU 6/1	150	25	250	150
PTU 6/1.5	150	40	250	150
PTU 6/2	150	50	250	150
PTU 6/3	150	80	300	175
PTU 6/4	150	100	300	200
PTU 9/1	225	25	300	185
PTU 9/1.5	225	40	300	185
PTU 9/2	225	50	300	185
PTU 9/3	225	80	300	210
PTU 9/4	225	100	450	250
PTU 9/6	225	150	450	275
PTU 12/1	300	25	400	230
PTU 12/1.5	300	40	400	230
PTU 12/2	300	50	400	230
PTU 12/3	300	80	400	275
PTU 12/4	300	100	400	275
PTU 12/6	300	150	450	300
PTU 12/9	300	225	600	300
PTU 16/1.5	400	40	400	275
PTU 16/2	400	50	400	275
PTU 16/3	400	80	400	300
PTU 16/4	400	100	400	300
PTU 16/6	400	150	500	350
PTU 16/9	400	225	800	450
PTU 16/12	400	300	800	450
PTU 18/1.5	450	40	400	300
PTU 18/2	450	50	400	300
PTU 18/3	450	80	400	320
PTU 18/4	450	100	400	320
PTU 18/6	450	150	600	380
PTU 18/9	450	225	800	400
PTU 18/12	450	300	800	400
PTU 24/4	600	100	600	450
PTU 24/6	600	150	600	450
PTU 24/9	600	225	800	525
PTU 24/12	600	300	800	525

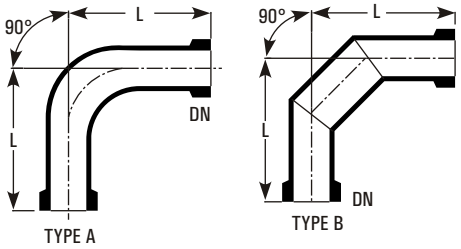


REDUCERS

Cat.Ref.	DN	DN1	L
PR 1/0.5	25	12	100
PR 1/0.7	25	15	100
PR 1.5/1	40	25	100
PR 2/1	50	25	100
PR 2/1.5	50	40	100
PR 3/1	80	25	125
PR 3/1.5	80	40	125
PR 3/2	80	50	125
PR 4/1	100	25	150
PR 4/1.5	100	40	150
PR 4/2	100	50	150
PR 4/3	100	80	150
PR 6/1	150	25	200
PR 6/1.5	150	40	200
PR 6/2	150	50	200
PR 6/3	150	80	200
PR 6/4	150	100	200
PR 9/1	225	25	250
PR 9/1.5	225	40	250
PR 9/2	225	50	250
PR 9/3	225	80	250
PR 9/4	225	100	250
PR 9/6	225	150	250
PR 12/1	300	25	300
PR 12/1.5	300	40	300
PR 12/2	300	50	300
PR 12/3	300	80	300
PR 12/4	300	100	300
PR 12/6	300	150	300
PR 12/9	300	225	300
PR 16/1.5	400	40	350
PR 16/2	400	50	350
PR 16/3	400	80	350
PR 16/4	400	100	350
PR 16/6	400	150	350
PR 16/9	400	225	350
PR 16/12	400	300	350
PR 18/1.5	450	40	375
PR 18/2	450	50	375
PR 18/3	450	80	375
PR 18/4	450	100	375
PR 18/6	450	150	375
PR 18/9	450	225	375
PR 18/12	450	300	375
PR 24/4	600	100	400
PR 24/6	600	150	400
PR 24/9	600	225	425
PR 24/12	600	300	425

BENDS 90°

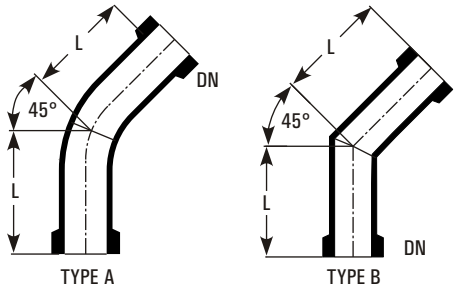
Cat.Ref.	DN	L	TYPE
PB 0.5/90	12	50	A
PB 0.7/90	15	50	A
PB 1/90	25	100	A
PB 1.5/90	40	150	A
PB 2/90	50	150	A
PB 3/90	80	200	B
PB 4/90	100	250	B
PB 6/90	150	250	B
PB 9/90	225	375	B
PB 12/90	300	450	B



* Bends in 80° and 100° are also available with same dimensions.
* Bends DN 400/DN 450/DN 600 on request basis.

BENDS 45°

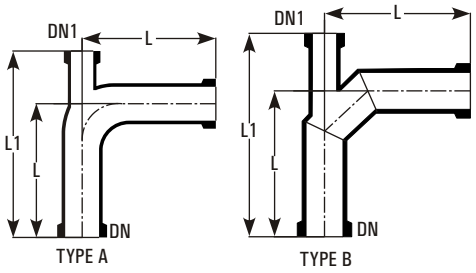
Cat.Ref.	DN	L	TYPE
PB 0.5/45	12	50	A
PB 0.7/45	15	50	A
PB 1/45	25	75	A
PB 1.5/45	40	100	A
PB 2/45	50	100	A
PB 3/45	80	125	B
PB 4/45	100	175	B
PB 6/45	150	250	B
PB 9/45	225	375	B



* Bends in 10° and 30° are also available with same dimensions.

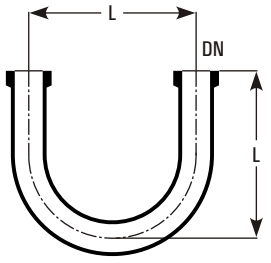
BENDS 90° WITH THERMOMETER BRANCH

Cat.Ref.	DN	DN1	L	L1	TYPE
PBT 1.5	40	25	150	225	A
PBT 2	50	25	150	225	A
PBT 3	80	25	200	275	B
PBT 4	100	25	250	325	B
PBT 6	150	25	250	325	B
PBT 9	225	25	375	490	B
PBT 12	300	25	450	560	B



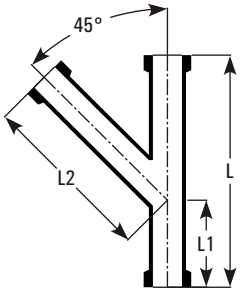
U BENDS

Cat.Ref.	DN	L
PU 0.5	12	75
PU 0.7	15	75
PU 1	25	150
PU 1.5	40	175
PU 2	50	175
PU 3	80	225



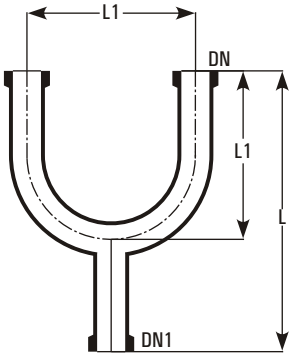
Y BENDS

Cat.Ref.	DN	L	L1	L2
PY 0.5	12	125	50	80
PY 0.7	15	125	50	80
PY 1	25	200	75	150
PY 1.5	40	250	100	175
PY 2	50	300	125	200
PY 3	80	350	150	250
PY 4	100	450	150	350



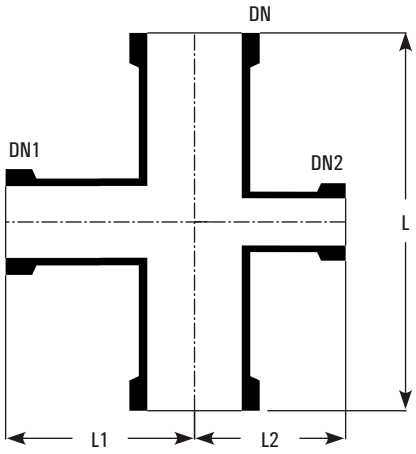
U BENDS WITH BOTTOM OUTLET

Cat.Ref.	DN	DN1	L	L1
PU 00.5	12	12	150	100
PU 01/0.5	25	12	250	150
PU 00.7	15	15	150	100
PU 01/0.7	25	15	250	150
PU 01	25	25	250	150
PU 01.5	40	40	275	175
PU 01.5/1	40	25	275	175
PU 02	50	50	275	175
PU 02/1	50	25	275	175
PU 03/1	80	25	350	225



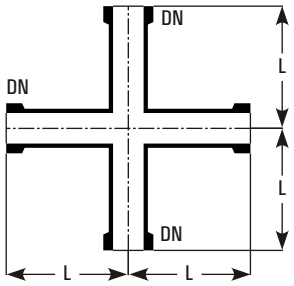
UNEQUAL CROSSES

Cat.Ref.	DN	DN1	DN2	L	L1	L2
PXU 2/1/1	50	25	25	200	80	80
PXU 2/1.5/1	50	40	25	200	100	80
PXU 3/1/1	80	25	25	250	100	100
PXU 3/1.5/1	80	40	25	250	100	100
PXU 3/2/1	80	50	25	250	115	100
PXU 4/1/1	100	25	25	250	110	110
PXU 4/1.5/1	100	40	25	250	125	110
PXU 4/2/1	100	50	25	250	125	110
PXU 4/3/1	100	80	25	300	150	150
PXU 6/1.5/1	150	40	25	250	150	150
PXU 6/2/1	150	50	25	250	150	150
PXU 6/3/2	150	80	50	300	175	150
PXU 6/4/2	150	100	50	300	200	150
PXU 9/1.5/1.5	225	40	40	300	185	185
PXU 9/2/1.5	225	50	40	300	185	185
PXU 9/3/1.5	225	80	40	300	210	185
PXU 9/4/2	225	100	50	450	250	185
PXU 9/6/3	225	150	80	450	275	210
PXU 12/2/1.5	300	50	40	400	230	230
PXU 12/3/1.5	300	80	40	400	275	230
PXU 12/4/1.5	300	100	40	400	275	230
PXU 12/6/2	300	150	50	450	300	230
PXU 12/9/3	300	225	80	600	300	275
PXU 16/1.5/1.5	400	40	40	400	275	275
PXU 16/3/1.5	400	80	40	400	300	275
PXU 16/4/1.5	400	100	40	400	300	275
PXU 16/6/3	400	150	80	500	350	300
PXU 16/9/4	400	225	100	800	450	300
PXU 18/1.5/1.5	450	40	40	400	300	300
PXU 18/3/1.5	450	80	40	400	320	300
PXU 18/4/1.5	450	100	40	400	320	300
PXU 18/6/3	450	150	80	600	380	320
PXU 18/9/4	450	225	100	800	400	320



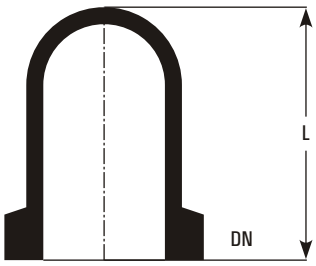
EQUAL CROSSES

Cat.Ref.	DN	L
PX 0.5	12	50
PX 0.7	15	50
PX 1	25	100
PX 1.5	40	150
PX 2	50	150
PX 3	80	200
PX 4	100	250



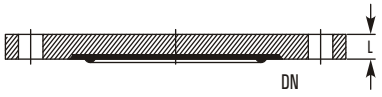
CLOSURES

Cat.Ref.	DN	L
PBE 0.5	12	40
PBE 0.7	15	40
PBE 1	25	50
PBE 1.5	40	75
PBE 2	50	75
PBE 3	80	100
PBE 4	100	125
PBE 6	150	125
PBE 9	225	150
PBE 12	300	150



BLINDS

Cat.Ref.	DN	L
PBF 1	25	8
PBF 1.5	40	8
PBF 2	50	8
PBF 3	80	8
PBF 4	100	8
PBF 6	150	9
PBF 9	225	9
PBF 12	300	9



JACKETED PIPE SECTIONS

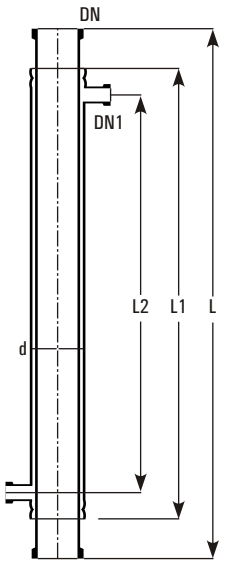
Glass Jackets

For heating of pipe and for controlling the temperature throughout the column, the jacketed pipe sections are provided. Glass jacket is sealed to the pipe section using Viton 'O' ring and other sealing compositions. The seal prevents impermissibly high stresses between two tubes and allows the movement which comes due to thermal expansion. Maximum operating pressure in the jacket :

Size	Operating Pressure
DN 80 - 150	1.0 bar
DN 225 - 300	0.5 bar

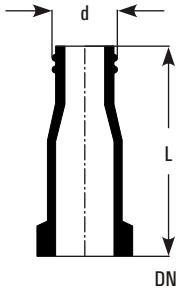
Note : 1 BAR = 1.0193 kg.

Cat.Ref.	DN	L	d	DN1	L1	L2
PSD 3/1000	80	1000	100	25	850	750
PSD 4/1000	100	1000	150	25	850	750
PSD 6/1000	150	1000	225	25	850	700
PSD 9/1000	225	1000	300	25	850	700
PSD 12/1000	300	1000	400	25	850	650



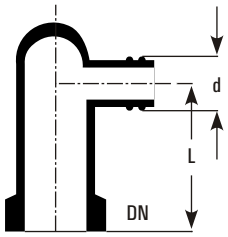
HOSE CONNECTORS (GLASS)

Cat.Ref.	DN	Thread	d	L
PHC 0.5/0.25	12	GL14	13.75	70
PHC 0.7/0.25	15	GL14	13.75	70
PHC 1/1	25	GL25	24.5	90
PHC 1/0.75	25	GL18	17.5	90
PHC 1/0.5	25	GL18	17.5	90
PHC 1/0.25	25	GL14	13.75	90
PHC 1.5/1	40	GL25	24.5	100
PHC 1.5/0.75	40	GL18	17.5	100



BEND HOSE CONNECTORS (GLASS)

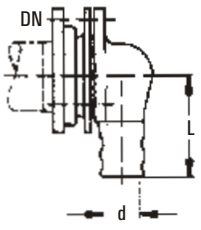
Cat.Ref.	DN	Thread	d	L
PBHC 0.5/0.25	12	GL14	13.75	50
PBHC 0.7/0.25	15	GL14	13.75	50
PBHC 1/1	25	GL25	24.5	60
PBHC 1/0.75	25	GL18	17.5	60
PBHC 1.5/0.75	40	GL18	17.5	75
PBHC 2/0.75	50	GL18	17.5	100



BEND HOSE CONNECTORS (METAL)

Metal/Plastic angled hose connector assembly is available to connect the flexible hose to the condenser. This is provided with a metal flange, a rubber gasket and nut bolt.

Cat. Ref.	DN	d	L
PMC 1/.75	25	22	70



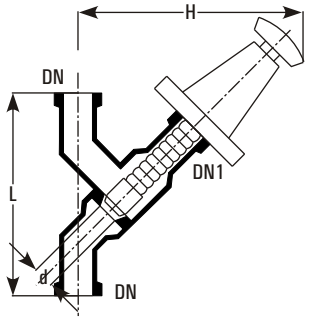
VALVES

VALVES

STRAIGHT THROUGH VALVES

Cat.Ref.	DN	DN1	d	L	H
PV 0.5	12	12	10	125	125
PV 0.7	15	15	10	125	125
PV 1	25	25	18	175	175
PV 1.5/1	40	25	18	225	175
PV 1.5	40	40	26	225	200
PV 2	50	50	38	300	220

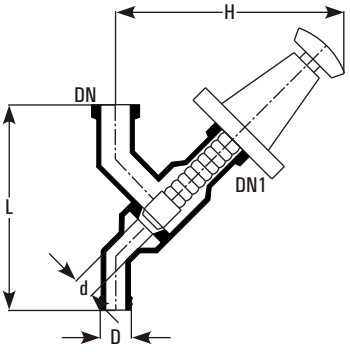
* Spindles are made of PTFE & Bonnet are made of Bakelite.
* Bonnet MOC: ALUMINIUM & SS on require basis.



DRAIN VALVES

Cat.Ref.	DN	DN1	d	L	H	D
PVD 0.5	12	12	10	125	125	22
PVD 0.7	15	15	10	125	125	22
PVD 1	25	25	18	175	175	28
PVD 1.5/1	40	25	18	225	175	28
PVD 1.5	40	40	26	225	200	42
PVD 2	50	50	38	300	220	50

* Spindles are made of PTFE & Bonnet are made of Bakelite.
* Bonnet MOC: ALUMINIUM & SS on require basis.

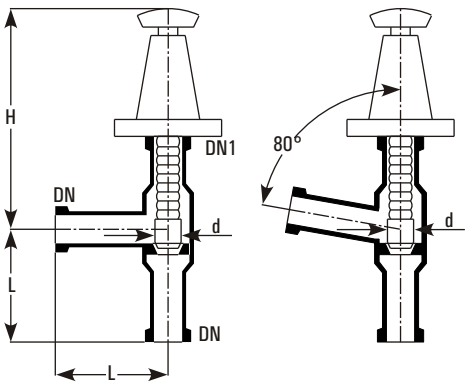


ANGLE VALVES

Cat.Ref.	DN	DN1	d	L	H	Degree
PVE 0.5	12	12	10	50	85	90
PVE 0.7	15	15	10	50	85	90
PVE 1	25	25	18	100	175	90
PVE 1/80	25	25	18	100	175	80
PVE 1.5	40	40	26	150	200	90
PVE 2	50	50	38	150	220	90

* Spindles are made of PTFE & Bonnet are made of Bakelite.
* Bonnet MOC: ALUMINIUM & SS on require basis.

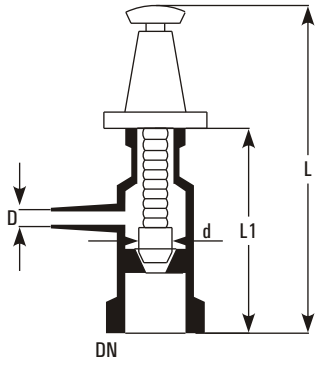
* PVE 1.5 / 80 & PVE 2 / 80



VENT VALVES

Cat.Ref.	DN	D	d	L	L1
PVV 0.5	12	12	10	125	90
PVV 0.7	15	12	10	125	90
PVV 1	25	12	10	150	90
PVV 1.5	40	12	10	150	100

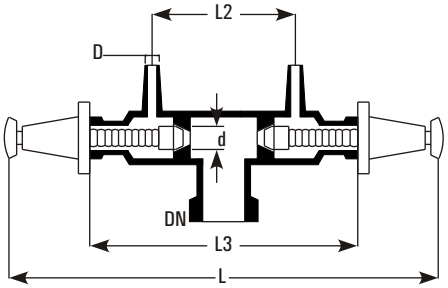
* Spindles are made of PTFE & Bonnet are made of Bakelite.
* Bonnet MOC: ALUMINIUM & SS on require basis.



VENT / VACUUM VALVES

Cat.Ref.	DN	D	d	L	L1	L2	L3
PVW 1/0.7	25	12	10	280	55	85	160
PVW 1.5/0.7	40	12	10	280	65	85	160

* Spindles are made of PTFE & Bonnet are made of Bakelite.
* Bonnet MOC: ALUMINIUM & SS on require basis.

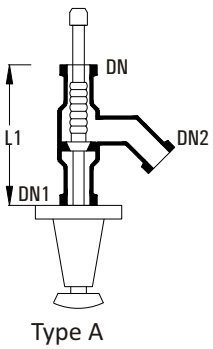


BOTTOM OUTLET VALVES

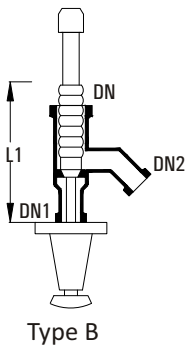
These valves prevent the accumulation of solids or liquid in the bottom outlet of a vessel. This valve can be incorporated in any spherical or cylindrical vessel.

Cat.Ref.	DN	DN1	DN2	L1	Type
BAL 1	25	25	25	150	A
BAL 1.5	40	25	25	150	B
BAL 2	50	25	40	150	B

* Spindles are made of PTFE & Bonnet are made of Bakelite.
* Bonnet MOC: ALUMINIUM & SS on require basis.



Type A



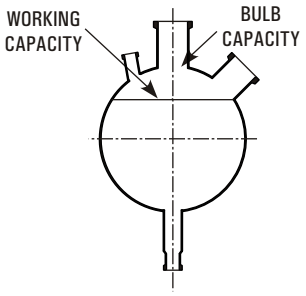
Type B

VESSELS & BATHS

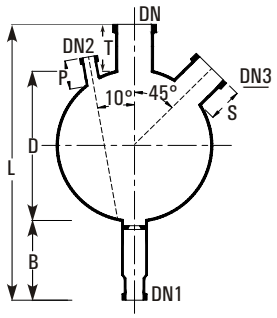
VESSELS
& BATHS

SPHERICAL VESSEL - GENERAL DATA

Nominal Capacity (Ltrs.)	Maximum Pressure (Bar)
5	1
10	0.8
20	0.7
50	0.5
100	0.4
200	0.3
300	0.2
500	0.1

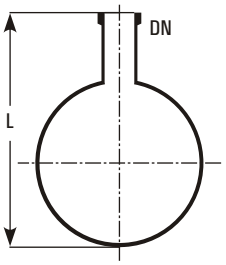


Nominal Capacity (Ltrs.)	L	D	DN	T	DN1	B	DN2	P	DN3	S
5	425	225	50	75	25	125	25	50	40	75
10	575	285	80	90	25	200	25	50	40	75
20	650	350	80	100	25	200	25	50	40	75
50	840	490	100	150	40	200	40	75	100	100
100	950	600	150	150	40	200	40	75	100	100
200	1200	750	225	250	40	200	40	75	100	100
300	1310	860	300	250	50	200	50	75	100	100
500	1450	1000	400	250	50	200	50	75	150	165



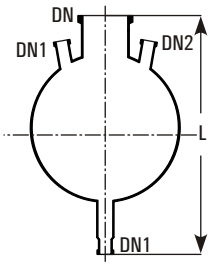
SPHERICAL VESSELS WITH SINGLE NECK

Cat. Ref.	Nominal Capacity	L	DN
VSA 5	5 L	300	50
VSA 10	10 L	375	80
VSA 20	20 L	450	80
VSA 50	50 L	640	100
VSA 100	100 L	750	150
VSA 200	200 L	1000	225
VSA 300	300 L	1110	300
VSA 500	500 L	1250	400



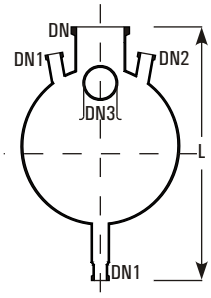
SPHERICAL VESSELS WITH THREE NECK BOTTOM OUTLET

Cat. Ref.	Nominal Capacity	L	DN	DN1	DN2
VSM 5	5 L	425	50	25	25
VSM 10	10 L	575	80	25	25
VSM 20	20 L	650	80	25	25
VSM 50	50 L	840	100	40	40
VSM 100	100 L	950	150	40	40
VSM 200	200 L	1200	225	40	40
VSM 300	300 L	1310	300	50	50
VSM 500	500 L	1450	400	50	50



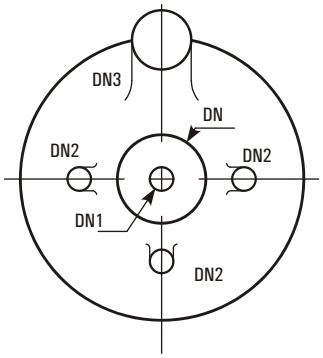
SPHERICAL VESSELS WITH FOUR NECK BOTTOM OUTLET

Cat. Ref.	Nominal Capacity	L	DN	DN1	DN2	DN3
VSPL 5	5 L	425	50	25	25	40
VSPL 10	10 L	575	80	25	25	40
VSPL 20	20 L	650	80	25	25	40
VSPL 50	50 L	840	100	40	40	100
VSPL 100	100 L	950	150	40	40	100
VSPL 200	200 L	1200	225	40	40	100
VSPL 300	300 L	1310	300	50	50	100
VSPL 500	500 L	1450	400	50	50	150



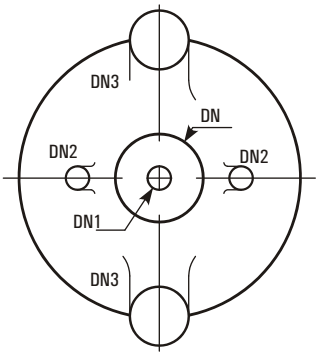
SPHERICAL VESSELS WITH FIVE NECK BOTTOM OUTLET

Cat. Ref.	Nominal Capacity	L	DN	DN1	DN2	DN3
VSL 5	5 L	425	50	25	25	40
VSL 10	10 L	575	80	25	25	40
VSL 20	20 L	650	80	25	25	40
VSL 50	50 L	840	100	40	40	100
VSL 100	100 L	950	150	40	40	100
VSL 200	200 L	1200	225	40	40	100
VSL 300	300 L	1310	300	50	50	100
VSL 500	500 L	1450	400	50	50	150



SPHERICAL VESSELS WITH FIVE NECK BOTTOM OUTLET

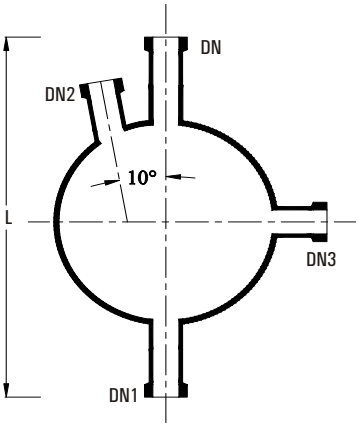
Cat. Ref.	Nominal Capacity	L	DN	DN1	DN2	DN3
VS 5	5 L	425	50	25	25	40
VS 10	10 L	575	80	25	25	40
VS 20	20 L	650	80	25	25	40
VS 50	50 L	840	100	40	40	100
VS 100	100 L	950	150	40	40	100
VS 200	200 L	1200	225	40	40	100
VS 300	300 L	1310	300	50	50	100
VS 500	500 L	1450	400	50	50	150



SPHERICAL VESSELS WITH NOZZLE AT 90°

These vessels are used in Circulatory Boiler System and are to be supported on a vessel holder. More nozzles can be provided on the equator on request for special requirements.

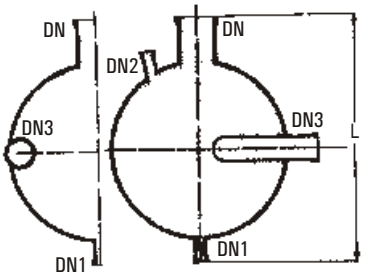
Cat. Ref.	Nominal Capacity	L	DN	DN1	DN2	DN3
VSD 5	5 L	425	50	25	25	40
VSD 10	10 L	500	80	25	25	40
VSD 20	20 L	575	80	25	25	40
VSD 50	50 L	765	100	40	40	100
VSD 100	100 L	875	150	40	40	100
VSD 200	200 L	1125	225	40	40	100
VSD 300	300 L	1235	300	50	50	100
VSD 500	500 L	1375	400	50	50	150



SPHERICAL CYCLONE

Cyclone can be used for the separation of droplets and solids from gases and vapours.
Cyclone is to be supported on a vessel holder. A dip pipe should be used on the top neck.

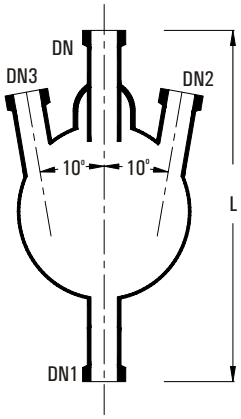
Cat. Ref.	Nominal Capacity	L	DN	DN1	DN2	DN3
VSCY 5	5 L	375	40	25	25	40
VSCY 10	10 L	450	40	25	25	40
VSCY 20	20 L	575	80	25	25	50
VSCY 50	50 L	725	100	40	40	50



SPHERICAL RECEIVER VESSELS

Receivers are provided with builtin drip pipe. These are to be supported on a vessel holding ring.

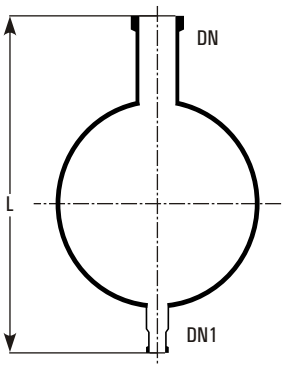
Cat. Ref.	Nominal Capacity	L	DN	DN1	(10°) DN2	(45°) DN3
VR 5	5 L	350	25	25	25	
VR 10	10 L	425	25	25	25	
VR 20	20 L	500	25	25	25	
VR 50	50 L	675	40	25	25	
VRB 5	5 L	350	25	25	25	25
VRB 10	10 L	425	25	25	25	25
VRB 20	20 L	500	25	25	25	25
VRB 50	50 L	675	40	25	25	25



SPHERICAL ADDITION VESSELS

These vessels are provided with a short bottom outlet. These should be supported on a vessel holder or holding ring.

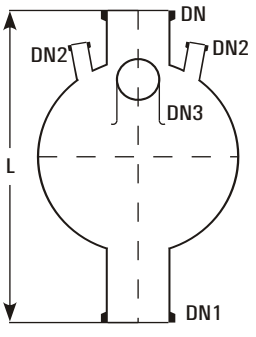
Cat. Ref.	Nominal Capacity	L	DN	DN1
VA 5	5 L	375	50	25
VA 10	10 L	450	80	25
VA 20	20 L	525	80	25
VA 50	50 L	715	100	40
VA 100	100 L	875	150	40
VA 200	200 L	1125	225	40
VA 300	300 L	1235	300	50
VA 500	500 L	1375	400	50



SPHERICAL VESSELS WITH WIDE BOTTOM OUTLET

These vessels are generally used to fit immersion exchangers in the bottom. Special heating mantle or bath should be used if used with.

Cat. Ref.	Nominal Capacity	L	DN	DN1	DN2	DN3
VSR 50	50 L	790	100	100	40	100
VSR 100	100 L	900	150	150	40	100
VSR 200	200 L	1150	225	150	40	100
VSE 50	50 L	840	100	150	40	100
VSE 100	100 L	950	150	225	40	100
VSE 200	200 L	1200	225	225	40	100



VESSELS WITH BOTTOM OUTLET VALVE SEAT

To fit a bottom outlet valve (BAL type) all spherical and cylindrical vessels can be supplied with valve seat in bottom outlet. For this, Add a suffix "/B" to the catalogue reference of a vessel, for e.g. 'VSL50' should be mentioned as 'VSL50/B'.

Notes on use of Spherical vessels.

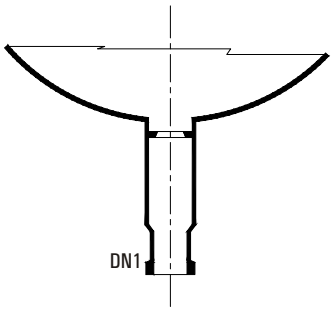
1. Generally, the centre nozzle, referred as DN in all types of vessels, is used for either stirrer fixing or if stirrer is not fixed, for vapour outlet.

2. The bottom outlet, referred as DN1 in all types is used for drain. However, in type VSR & VSE, it is also used for fixing immersion heat exchanger.

3. The small side nozzles, referred as DN2 in all types, are used
   * to fix thermometer pocket or,
   * to fix dip pipe for liquid inlet or,
   * to fix sparger for gas purging or,
   * to fix vacuum control or vent valve or,
   * for solid addition.

4. The bigger side nozzle, referred as Dn3, is used for vapour outlet where stirrer is fixed on centre neck. It can also be used for cleaning in case centre neck is used for vapour outlet.

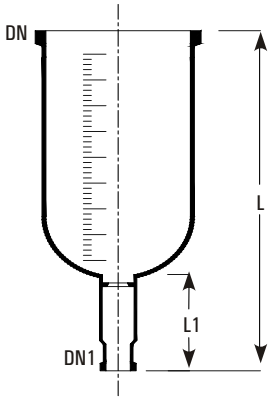
5. Vessels having long bottom outlet, viz VSM, VSPL, VSL, VS etc, can be supported in a heating mantle of heating bath. However, vessels having short bottom outlet, viz VSD, VR, VA etc. are to be supported on a vessel holder only. In case of vessels upto 20L size, vessel holding rings can be used instead of vessel holder.



CYLINDRICAL VESSELS

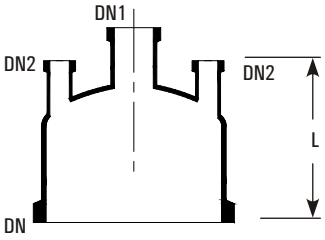
Cylindrical vessels of 50 Litres and above must be supported in a vessel holder.

Cat. Ref.	Nominal Capacity	DN	DN1	L	L1
VZ 5/4	5 L	100	25	850	175
VZ 10/6	10 L	150	25	775	175
VZ 20/9	20 L	225	25	750	175
VZ 20/12	20 L	300	40	575	175
VZ 50/12	50 L	300	40	1000	175
VZ 50/16	50 L	400	40	710	175
VZ 100/16	50 L	400	40	1050	175
VZ 100/18	100 L	450	40	900	175
VZ 150/16	150 L	400	40	1450	175
VZ 150/18	150 L	450	40	1225	175
VZ 200/18	200 L	450	40	1500	175
VZ 300/24	300 L	600	50	1340	175



CYLINDRICAL VESSEL COVERS

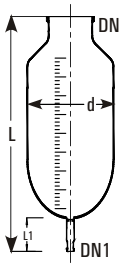
Cat. Ref.	DN	DN1	DN2	L
VZA 4	100	40	2x25	200
VZA 6	150	40	2x40	200
VZA 9	225	50	3x25	250
VZA 12	300	80	3x40	250
VZA 16	400	100	3x40	275
VZA 18	450	100	4x40	275
VZA 24	600	100	4x40	300



KETTLES

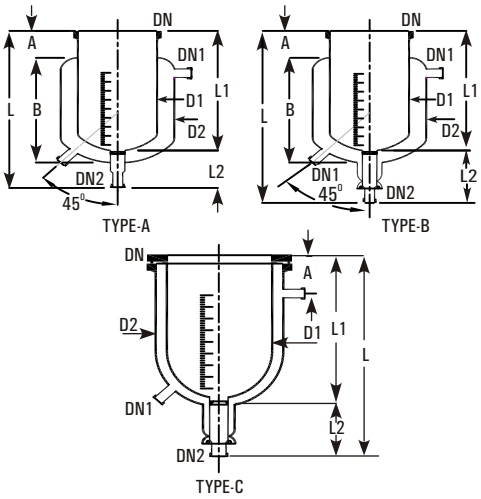
Kettles are similar to cylindrical vessels but having a reduced top neck.

Cat. Ref.	Nominal Capacity	DN	DN1	L	L1	d
KZ 200	200 L	300	40	1400	175	485
KZ 350	350 L	400	50	1500	175	620



JACKETED VESSELS

For special applications, cylindrical vessels can be supplied with a jacket for heating or cooling. Jacket is sealed to the vessel with Viton 'O' ring and other sealing compositions. The seal prevents in impermissible high stresses between vessel and jacket by allowing the movement flexibility between two due to thermal expansion.



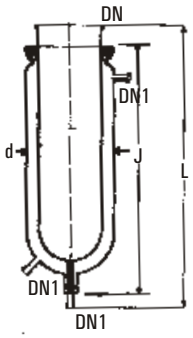
Glass Jacket

Glass Jacket can be used for a maximum operating pressure of 0.5 bar and a maximum operating temperature of 130°C in jacket. The temperature difference between jacket & vessel should not be exceed than120°C

Cat. Ref.	L	L1	L2	A	B	D1	D2	DN	DN1	DN2
VZD 5/6	500	325	125	75	275	165	215	150	25	25
VZD 10/9	575	400	125	90	340	230	280	225	25	25
VZD 20/12	625	450	125	100	385	315	370	300	25	40
VZD 30/12	750	575	175	100	510	315	370	300	25	40
VZD 50/12/14	1050	875	175	-	-	315	365	300	25	40
VZD 50/16/20	825	650	175	-	-	415	500	400	25	40
VZD 100/20/24	955	780	175	-	-	516	600	500	25	40
VZD 200/24/28	1175	1000	175	-	-	615	700	600	25	40

Metal Jacket

This vessel can also be supplied with metal jacket. Metal Jacket can be used in a maximum operating pressure of 2.0 bar and a maximum operation temperature of 150°C.



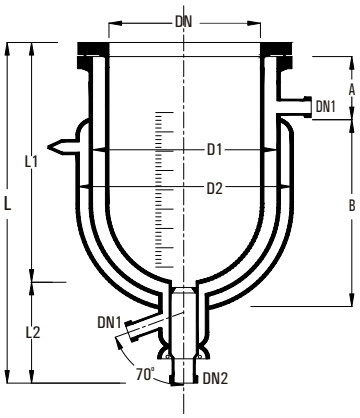
Cat. Ref.	Nominal Capacity	DN	DN1	d	L	J
AVZJ 5/4	5 L	100	25	135	800	650
AVZJ 10/6	10 L	150	25	188	800	650
AVZJ 20/9	20 L	225	25	262	850	700
AVZJ 50/12	50 L	300	40	345	1100	950

JACKETED VESSELS (DOUBLE JACKETED)

S.S. Scientific Industries is presenting detachable "Transparent Double Jacketed Vessel" to maintain the leading position in industry by way of developing new products with higher value towards the mission and to cater the customer via innovation.

Salient Features

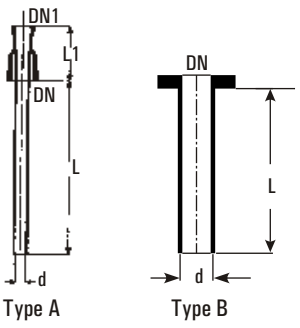
- Made from SCHOTT DURAN
- Vacuum Jacket ensures
- Transparent insulation.
- Minimum heat loss
- Process visibility.
- Minimize frost formation for cryogenics operation.
- Vacuum Jacket & main vessels are detachable ensures
- Ease of cleaning.
- No breakages due to thermal expansion.
- Partial Replacement of any part can be possible reduce the maintenance cost.



Cat. Ref.	L	L1	L2	A	B	D1	D2	DN	DN1	DN2
VZT 5/6/8	620	350	175	75	310	215	275	150	25	25
VZT 10/9/12	700	420	175	90	370	315	390	225	25	25
VZT 20/12/14	675	500	175	125	368	365	423	300	25	40
VZT 50/16/18	825	650	175	200	350	465	523	400	25	40

DIP PIPES

Dip pipes are used as liquid inlet for spherical vessels.

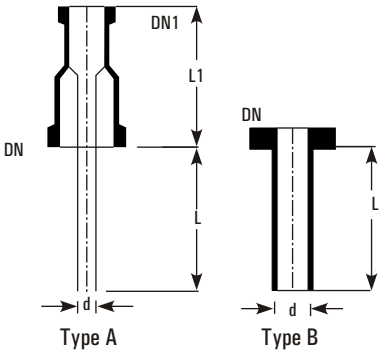


Cat. Ref.	For Vessel	DN	DN1	d	L
DP 20/1	20 L	25	25	12	300
DP 50/1.5	50 L	40	25	19	400
DP 100/1.5	100 L	40	25	19	500
DP 200/1.5	200 L	40	25	19	600

SHORT DIP PIPES

Short dip pipes are used as re-entry tubes for vessels, heat exchangers etc.

Cat.Ref.	DN	DN1	d	L	L1
SDP 1/1	25	25	12	100	100
SDP 1.5/1	40	25	19	100	100
SDP 1.5/1.5	40	40	19	100	100
SDP 2/1	50	25	25	100	100
SDP 2/1.5	50	40	25	100	100
SDP 3/1.5	80	40	37	100	125
SDP 4/1	100	25	25	100	150
SDP 4/2	100	50	50	100	150

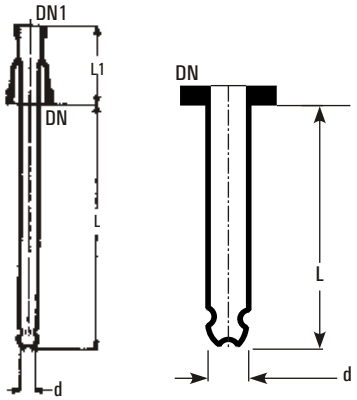


Type A Type B

GAS SPARGERS

Gas spargers are used for gas feed/sparging in the vessels.

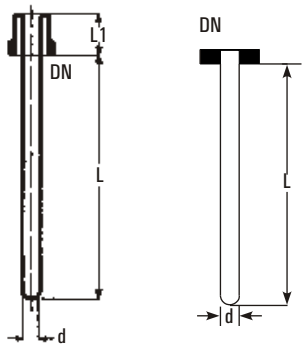
Cat.Ref.	For Vessel	DN	DN1	d	L	No.of Holes
SPG 20/1	20 L	25	25	12	300	5x1mm
SPG 50/1.5	50 L	40	25	19	400	5x1mm
SPG 100/1.5	100 L	40	25	19	500	5x1mm
SPG 200/1.5	200 L	40	25	19	600	5x1mm



Type A Type B

THERMOMETER POCKETS

Cat. Ref.	For Vessel	DN	d	L
TP 20/1	20 L	25	12	300
TP 50/1.5	50 L	40	19	400
TP 100/1.5	100 L	40	19	500
TP 200/1.5	200 L	40	19	600



Type A Type B

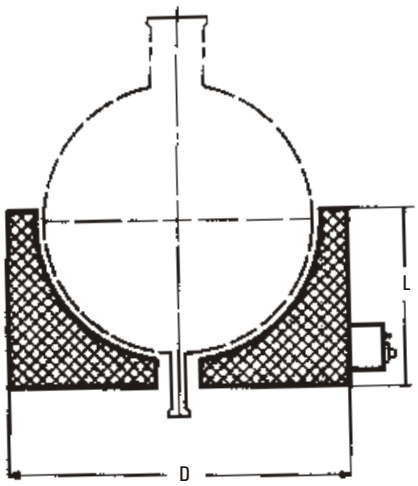
HEATING MANTLES

Heating Mantle is used for electrical heating of cylindrical as well as spherical vessels. Also available in flameproof & non-flame proof models. The flameproof heating mantle is similar to normal mantle but the main difference is in construction of heating elements. Heating elements is flameproof by covering it in magnesium oxide powder & SS metal tube. Heater terminal terminate in flameproof cold junction terminal enclosure. All electrical control like regulator, switch, indicating lamp, relay etc. fitted in flameproof switch enclosure.

S.S. Scientific Industries can also provide flameproof digital temperature indicator cum controller with sensor.

Cat.Ref.	Vessel Size	D	L	Watts	Circuits	Supply Volts
JMD 5	5 L	320	190	750	1	230
JMD 10	10 L	380	220	1200	2	230
JMD 20	20 L	485	285	2000	3	230
JMD 50	50 L	600	345	3700	3	415
JMD 100	100 L	790	470	6000	3	415
JMD 200	200 L	920	530	7500	3	415

* JMD 300 & 500 on require basis.

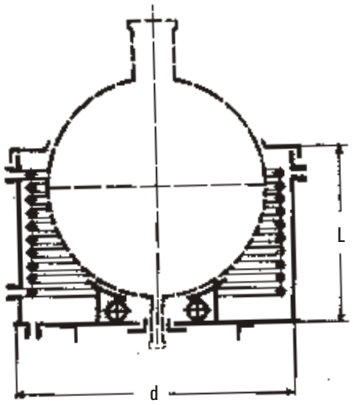


Heating Mantles (Flame proof type)

Cat.Ref.	Vessel Size	D	L	Watts	Circuits	Supply Volts
JMD 5/F	5 L	330	200	600	1	230
JMD 10/F	10 L	440	220	1000	2	230
JMD 20/F	20 L	510	285	2000	3	230
JMD 50/F	50 L	610	350	3600	3	415
JMD 100/F	100 L	790	430	5200	3	415
JMD 200/F	200 L	940	510	8400	3	415

HEATING BATHS

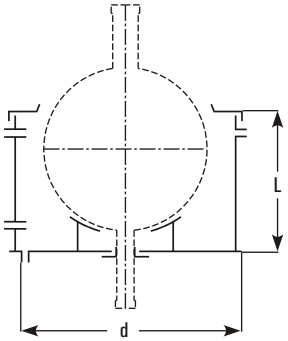
Heating baths are used for electrical or steam heating of glass vessels. Depending upon the temperature requirements, different types of thermic fluids or water can be used as heating media. Heating baths are provided with a pair of encased heaters with controller box, a coil for passing the steam or cooling water, a cushioned vessel holding ring, a bottom outlet sealing arrangement, a lid and threaded socket type intlets and outlets.



Cat.Ref.	Vessel Size	d	L	Watts	HTA Vessel	HTA Coils
SBH 20	20 L	480	340	2x2000	0.25	0.4
SBH 50	50 L	615	415	2x3000	0.5	0.6
SBH 100	100 L	720	535	2x4500	0.7	1
SBH 200	200 L	900	620	2x6000	1	1.5
SBH 300	300 L	1150	735	3x6000	1.85	2.5
SBH 500	500 L	1385	880	4x6000	2.5	4.0

COOLING BATHS

Cooling baths are used for cooling the glass vessel with ice crystals. Cooling Baths are provided with a vessel holding ring, bottom outlet sealing arrangement and a lid.

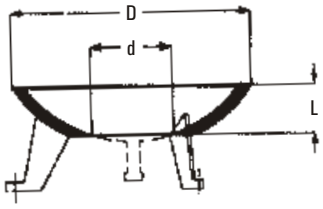


Cat.Ref.	Vessel Size	d	L
BHC 20	20 L	480	340
BHC 50	50 L	615	415
BHC 100	100 L	720	535
BHC 200	200 L	900	620

* BHC 300 & 500 on require basis.

VESSEL HOLDERS

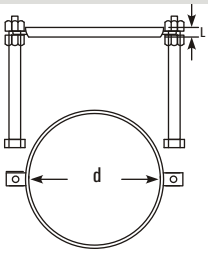
Vessel holders are made of cast aluminum with a plaster lining shaped to fit the vessel. These are to be supported on 3 jacking bolts.



Cat.Ref.	Vessel Size	D	d	L
VSS 10	10 L	265	160	90
VSS 20	20 L	325	230	100
VSS 50	50 L	390	230	100
VSS 100	100 L	410	250	100
VSS 200	200 L	700	400	215

VESSEL HOLDING RINGS

These metal rings are wrapped with asbestos rope and are to be supported on two jacking bolts.



Cat.Ref.	Vessel Size	d	L
VRS 2	2 L	100	15
VRS 5	5 L	150	15
VRS 10	10 L	215	15
VRS 20	20 L	310	15

DECANTORS

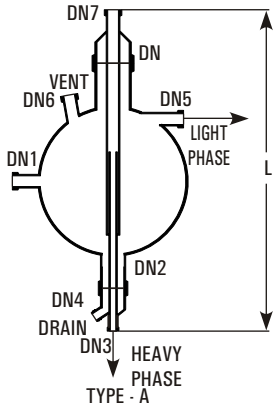
Decantation is a process of separation of two immiscible liquids having different densities. When these liquids allowed to settle forms two distinct layers, heavier at bottom and lighter at top. Decantor which is suitable for continuous decantation.

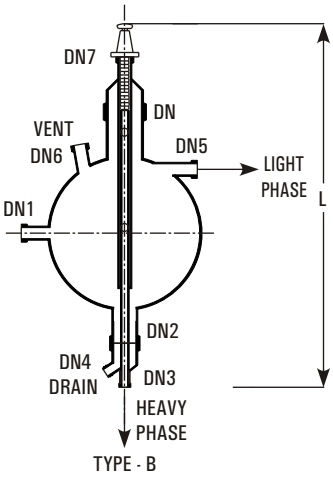
The mixture of liquids is continuously fed in the Decantor at low velocity. This allow sufficient residence time for the formation of separate layers. The light phase liquid is continuously removed from the light phase outlet at the top. The heavy phase liquid enters the dip pipe at lower end and overflow in the discharge pipe and is removed from the bottom.

Decantor provides continuous separation, visual monitoring, and ensure separation even after feed is stopped.

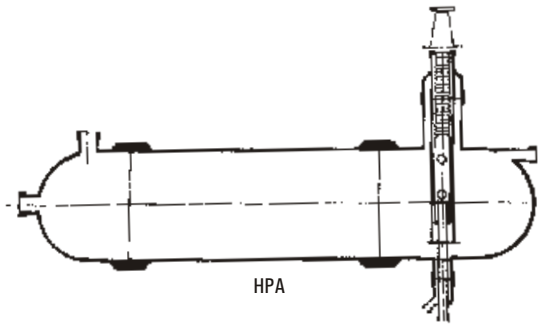
Decantors can be provided with Adjustable overflow valve, (Type B) to adjust the position of interface for different operating situations.

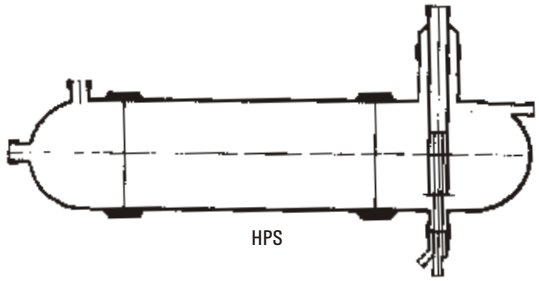
Cat. Ref.	Nominal Capacity	L	DN	Inlet DN1	DN2	Heavy Phase Outlet DN3	Drain DN4	Light Phase Outlet DN5	Vent DN6	DN7	Type
SPS 20	20 L	800	80	25	50	25	25	25	25	50	A
SPS 50	50 L	1025	100	40	50	25	25	40	40	50	A
SPS 100	100 L	1175	150	40	50	25	25	40	40	50	A
SPS 200	200 L	1475	225	40	50	25	25	40	40	50	A
SPA 20	20 L	1000	80	25	50	25	25	25	25	50	B
SPA 50	50 L	1225	100	40	50	25	25	40	40	80	B
SPA 100	100 L	1375	150	40	50	25	25	40	40	80	B
SPA 200	200 L	1675	225	40	50	25	25	40	40	80	B





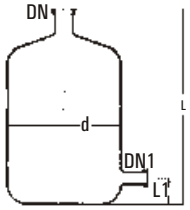
Decantors can also be constructed with horizontal cylindrical vessels (Cat.ref. HPS or HPA) to provide larger separating surface.



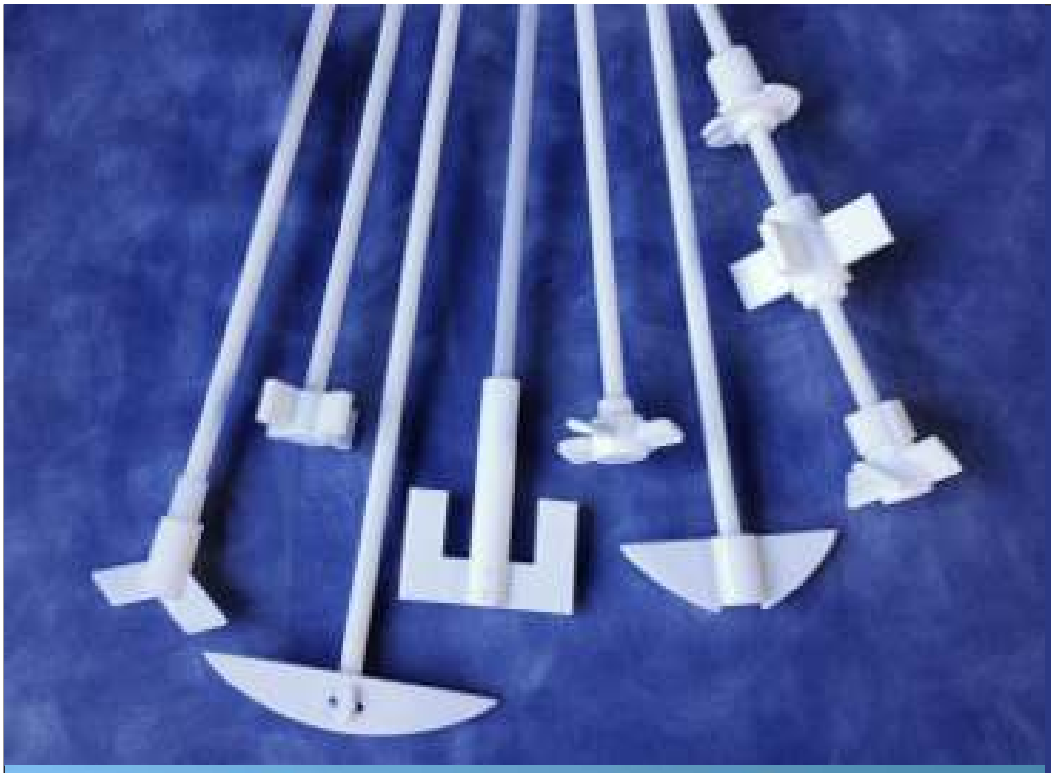


ASPIRATOR BOTTLE

Cat. Ref.	Nominal Capacity	DN	d	DN	L	L1
AB 10	10	40	215	25	410	100
AB 20	20	40	280	25	485	100



STIRRER ASSEMBLY

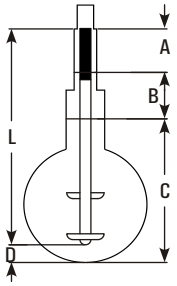


STIRRER ASSEMBLY

STIRRER ASSEMBLY

STIRRER

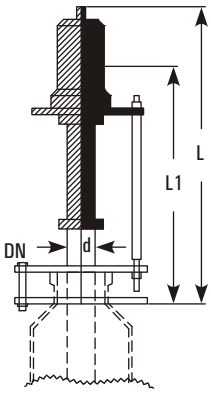
Stirrers are assembled in a vessel using a chuck, seal & a reducer. A typical arrangement of stirrer fitted in a vessel is shown in the diagram.



Size	A	B	C	D	L
20 L	250	150	450	25	825
50 L	300	200	600	50	1050
100 L	300	250	700	50	1200
200 L	300	300	900	50	1450
300 L	300	25	1000	50	1275

CHUCK & SEAL ASSEMBLY

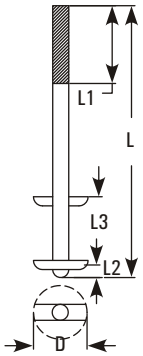
This unit is suitable for use under corrosive conditions. Only glass and PTFE are exposed to process fluids. Bellow seal can be used under vacuum down to 10mm Hg absolute. Mechanical seal can be use under vacuum 1mm Hg absolute or under pressure permitted into glass vessels. Generally a reducer is require to connect the chuck and seal to top neck of the vessel



Cat.Ref. Bellow Seal	Cat.Ref. Mechanical Seal	Vessel	DN	L	L1	d
CSA 1	CSM1	20 L	50	300	250	25
CSA 1.5	CSM1.5	50,100, 200 L	80	360	300	47

STIRRER WITH PTFE BLADES

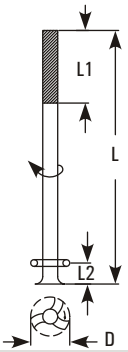
These stirrers are used with liquid of low viscosity.



Cat.Ref.	Vessel	L	L1	L2	L3	d	D
STB 10	10	600	300	15	175	25	100
STB 20	20	825	300	25	200	25	100
STB 50	50	1050	300	25	200	47	150
STB 100	100	1200	300	30	250	47	175
STB 200	200	1450	300	30	325	47	200
STB 300	300	1550	350	30	425	59	275

VORTEX STIRRER

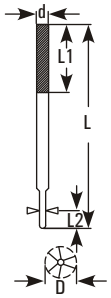
These stirrers are used with liquid of low viscosity containing small solid particles.



Cat.Ref.	Vessel	L	L1	L2	d	D
STV 50	50	1050	300	50	47	95
STV 100	100	1200	300	65	47	140
STV 200	200	1450	300	65	47	190

PROPELLER STIRRER

These stirrers are used with liquid of high viscosity or liquid with big solid particles.



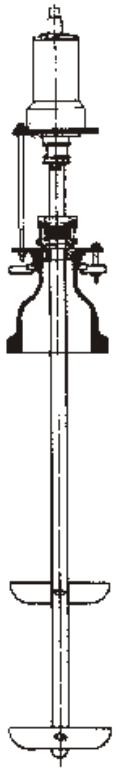
Cat.Ref.	Vessel	L	L1	L2	d	D
STP 50	50	1050	300	50	47	95
STP 100	100	1200	300	65	47	145
STP 200	200	1450	300	65	47	210

STIRRER ASSEMBLY WITH MECHANICAL SEAL

A stirrer is assembled in chuck with mechanical seal and appropriate reducer. This assembly is convenient to install on a vessel. The assembly consist of :

a. Glass stirrer STB/STV/STP
b. Chuck and mechanical seal CSM
c. Reducer PR

Cat. Ref.	For Vessel	Stirrer Used	Chuck & Seal	Reducer Used
STBM 20	20L	STB20	CSA1	PR3/2
STBM 50	50L	STB50	CSA1.5	PR4/3
STBM 100	100L	STB100	CSA1.5	PR6/3
STBM 200	200L	STB200	CSA1.5	PR9/3
STBM 300	300L	STB300	CSA2	PR12/3
STVM 50	50L	STV50	CSA1.5	PR4/3
STVM 100	100L	STV100	CSA1.5	PR6/3
STVM 200	200L	STV200	CSA1.5	PR9/3
STVM 300	300L	STV300	CSA2	PR12/3
STPM 50	50L	STP50	CSA1.5	PR4/3
STPM 100	100L	STP100	CSA1.5	PR6/3
STPM 200	200L	STP200	CSA1.5	PR9/3
STPM 300	300L	STP300	CSA2	PR12/3

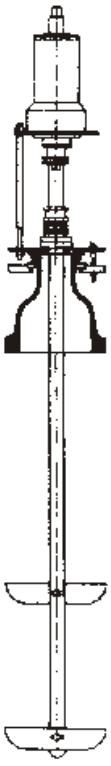


STIRRER ASSEMBLY WITH PTFE BELLOW SEAL

A stirrer is assembled in chuck with bellow seal and appropriate reducer.
This assembly is convenient to install on a vessel.
The assembly consist of :

a. Glass stirrer STB/STV/STP
b. Chuck and seal assembly CSA
c. Reducer PR

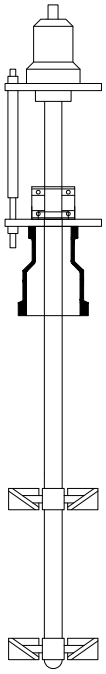
Cat. Ref.	For Vessel	Stirrer Used	Chuck & Seal	Reducer Used
STBA 20	20 L	STB 20	CSA 1	PR3/2
STBA 50	50 L	STB 50	CSA 1.5	PR4/3
STBA 100	100 L	STB 100	CSA 1.5	PR 6/3
STBA 200	200 L	STB 200	CSA 1.5	PR 9/3
STVA 50	50 L	STV 50	CSA 1.5	PR 4/3
STVA 100	100 L	STV 100	CSA 1.5	PR 6/3
STVA 200	200 L	STV 200	CSA 1.5	PR 9/3
STPA 50	50 L	STP 50	CSA 1.5	PR 4/3
STPA 100	100 L	STP 100	CSA 1.5	PR 6/3
STPA 200	200 L	STP 200	CSA 1.5	PR 9/3



STIRRER ASSEMBLY

STIRRER ASSEMBLY PTFE LINED WITH MECHANICAL SEAL

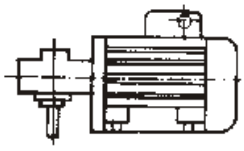
Cat. Ref.	For Vessel	Stirrer Used	Chuck & Seal	Reducer Used
STBM 20/P	20L	SS PTFE LINED	CSA1	PR3/2
STBM 50/P	50L	SS PTFE LINED	CSA1.5	PR4/3
STBM 100/P	100L	SS PTFE LINED	CSA1.5	PR6/3
STBM 200/P	200L	SS PTFE LINED	CSA1.5	PR9/3
STBM 300/P	300L	SS PTFE LINED	CSA2	PR12/3
STVM 50/P	50L	SS PTFE LINED	CSA1.5	PR4/3
STVM 100/P	100L	SS PTFE LINED	CSA1.5	PR6/3
STVM 200/P	200L	SS PTFE LINED	CSA1.5	PR9/3
STVM 300/P	300L	SS PTFE LINED	CSA2	PR12/3
STPM 50/P	50L	SS PTFE LINED	CSA1.5	PR4/3
STPM 100/P	100L	SS PTFE LINED	CSA1.5	PR6/3
STPM 200/P	200L	SS PTFE LINED	CSA1.5	PR9/3
STPM 300/P	300L	SS PTFE LINED	CSA2	PR12/3



STIRRER DRIVE

A 1400 RPM 3 Phase non-flarneproof motor with built-in gear is supplied alongwith a flexible shaft. A motor coupling, to couple the flexible shaft to motor is also provided. Other end of the flexible shaft is to be fitted into the churk

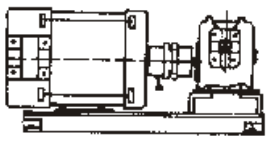
Cat.Ref.	HP	RPM
RSD 0.5	0.5	192



FLAMEPROOF STIRRER DRIVES

A 1400 RPM 3 Phase flameproof motor coupled with reduction gear is supplied along with a flexible shaft. Motor is mounted on a metal base frame, which is designed to install easily with a Glass Assembly.

Cat.Ref.	HP	RPM
FSD 0.5	0.5	192
FSD 1	1	192



VARIABLE SPEED REGULATOR

3 Phase non-flameproof regulator is available un-control the speed of stirrer drive.

FLAME PROOF TYPE SPEED REGULATORS

3 Phase non-flameproof regulators and Flameproof VFD Type regulator are available to control the speed of stirrer drives.

Cat.Ref.	Phase	Type
VFD 0.5	3	VFD

EXPLOSION PROOF STIRRER DRIVE

S.S. Scientific Industries also offer certified motor coupled with bonfiglioli gearbox for better safety and performance.

Cat.Ref.	HP	RPM
FSD 0.5/ C	0.5	192

PTFE STIRRER GUIDES

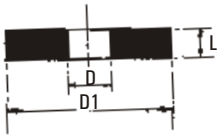
Type A is to be used with industrial fittings and Type B with ground joint fittings.

Cat. Ref.	D	L	Socket size	Type
TSG 2	25	100	DN 50	A
TSG 24	9.5	45	B / 24	B
TSG 34	9.5	55	B / 34	B

PTFE STIRRER SEAL PLATE

This is to be used in chuck and seal assembly.

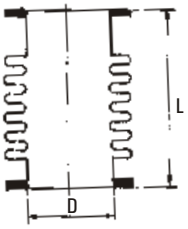
Cat. Ref.	D	D1	L
TSP 1	28	69	8
TSP 1.5	50	98	10



PTFE STIRRER BELLOW

This bellow is use in chuck and seal assembly.

Cat. Ref.	D	L
FBS 1	25	58
FBS 1.5	45	58



HEAT EXCHANGER

COIL TYPE & SHELL & TUBE TYPE

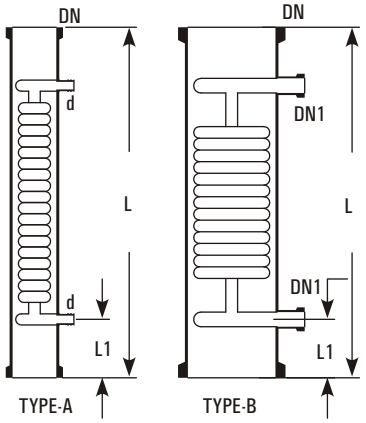
HEAT EXCHANGER

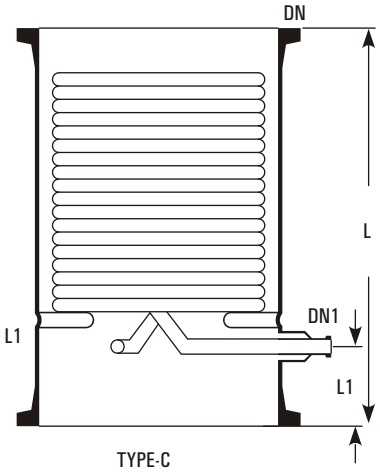
CONDENSERS (COIL TYPE)

Condensers are used for condensation of vapours and cooling of liquids. Condensers are made by fusing number of parallel coils in a glass shell. Coils are made in different diameters using tubes of different bores.

The average co-efficient of heat transfer in coil condenser is considered as-
Condensation 200 - 270 Kcal/m^2,hr,°C appx.
Cooling 100 - 150 Kcal/m^2,hr,°C appx.

Cat. Ref.	DN	d/ DN1	L	L1	Type	Actual H.T.A. m^2	Cross Area Cm^2	Free Coolant Rate Kg/hr.	Max. Jacket Cap. Litre
HE 3/3.5	80	16	600	75	A	0.35	5	1300	2
HE 4/5	100	19	600	75	A	0.50	30	2400	4
HE 4/6	100	19	750	100	A	0.60	30	2400	6
HE 6/10	150	25	600	100	B	1.00	52	2600	9
HE 6/15	150	25	850	100	B	1.50	52	2600	11
HE 9/25	225	25	800	110	B	2.50	125	3300	18
HE 12/25	300	25	600	125	B	2.50	175	5700	25
HE 12/40	300	25	900	125	B	4.00	175	5700	35
HE 16/40	400	25	600	125	B	4.00	450	6200	60
HE 16/50	400	25	700	125	B	5.00	450	6200	70
HE 18/60	450	40	750	150	C	6.00	820	4800	100
HE 18/80	450	40	900	150	C	8.00	820	6200	110
HE 24/120	600	50	1250	300	C	12.00	1520	6200	265





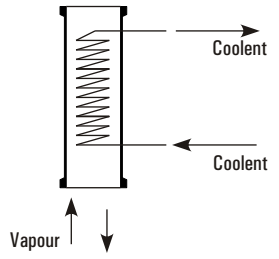
Precautions to be taken in use of condensers

- Vapours should be passed through shell only.
- Maximum pressure of coolant should be 2.7 bars.
- Adequate flow of coolant should be used.
- Steam should not be used in coils.
- Coolant should not be heated to boiling point.
- Coolant control valve should be turned slowly.
- Coolant should be allowed to drain freely.
- Brine can be used in coils in a closed circuit.
- Water main should be connected with flexible hose.
- Ensure no freezing of water remaining in the coils.
- Condensers should be mounted vertically only.
- Condensers can be mounted in series to provide larger surface area.

METHODS OF USE

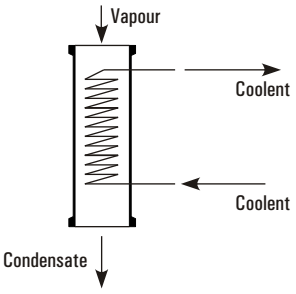
Vapours from bottom

This method is simple to install over a reactor. However this results in condensate returning substantially at its condensing temperature. In this method care must be taken that condensate is not excessive that it can lead to "logging" the coils and create back pressure in the system. Generally a reflux divider is used below the condenser to take out the distillate.



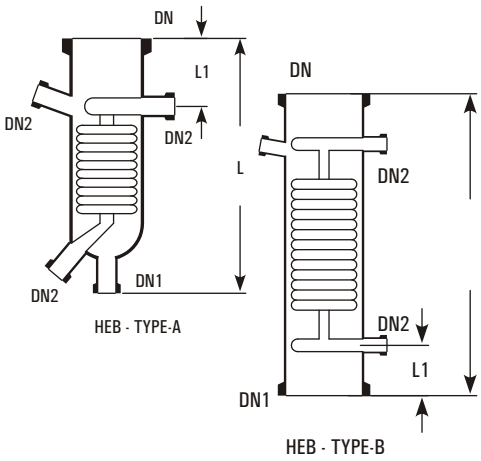
Vapours from top

This method produce a cool condensate using the entire cooling surface area.
This method should be used where the condensate can lead to "logging" of coils.



BOILERS

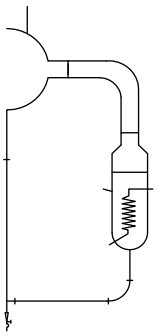
Boilers are used for vaporization of liquids by passing the steam in the coils. Boilers are made by fusing number of parallel coils in a glass shell. In Boilers, coils are designed to provide bigger cross section in the shell side as compared to condensers.
The average heat transfer in Boilers is considered as 350 Kcal/m2,hr,°C at a steam pressure of 3.5 bar.



Cat. Ref.	DN	DN1	DN2	L	L1	Type	Actual H.T.A. m^2	Free Cross Area Cm^2	Jacket Cap. Litre
HEB 4	100	25	25	375	100	A	0.15	40	2
HEB 4/4	100	100	25	400	100	B	0.15	40	3
HEB 6	150	40	25	450	100	A	0.35	50	5
HEB 6/6	150	150	25	500	100	B	0.35	50	7
HEB 9	225	40	25	700	100	A	1.00	150	16
HEB 9/9	225	225	25	700	100	B	1.00	180	20
HEB 12/12	300	300	25	700	125	B	1.30	330	40

Notes on use of Boilers :

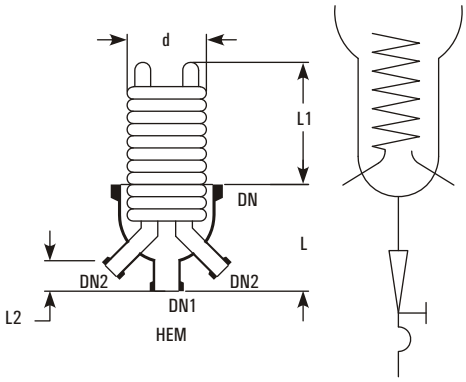
- Steam should be passed in the coils at a maximum pressure of 3.5 bar which is equivalent to a temperature of 147°C.
- For higher temperature (maximum upto 200°C) heat transfer fluids can be passed in the coils. - Cold liquids.
- Cold liquids should be preheated for better results.
- Boilers should bemounted in an external circulatory loop (as shown in figure) and not directat the bottom of flask or column
- Under certain circumstances, boilers can be mounted in series to provide larger heat transfer area.



IMMERSIONS

Immersion heat exchangers are used to control exothermic reaction in glass vessels. They can be used with vessels having wider bottom outlet (type VSR and VSE). These are provided with a central hole through the coil battery so that a special, extended type, stirrer can be fitted which extends to the bottom of heat exchanger and provide through action.

In most applications, cooling water is used in coils (max. pressure 2.7 bar g.), but they can also be used with steam (max. pressure 3.5 bar g.). In latter case the coils must be completely immersed in liquid. Immersions are not recommended for use with products which have a tendency to crystalise.



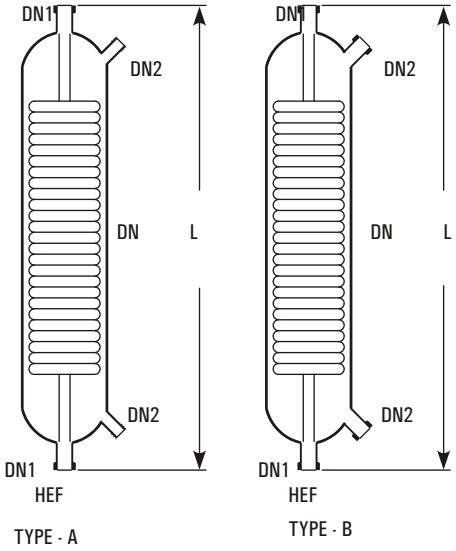
Cat. Ref.	DN	DN1	DN2	L	L1	L2	d	Actual H.T.A. m^2
HEM 6	150	40	25	200	200	75	145	0.4
HEM 9	225	40	25	300	200	75	200	0.6

PRODUCT COOLERS

Product coolers are used for cooling of liquids, typically, for the cooling of distillates from the distillation columns.

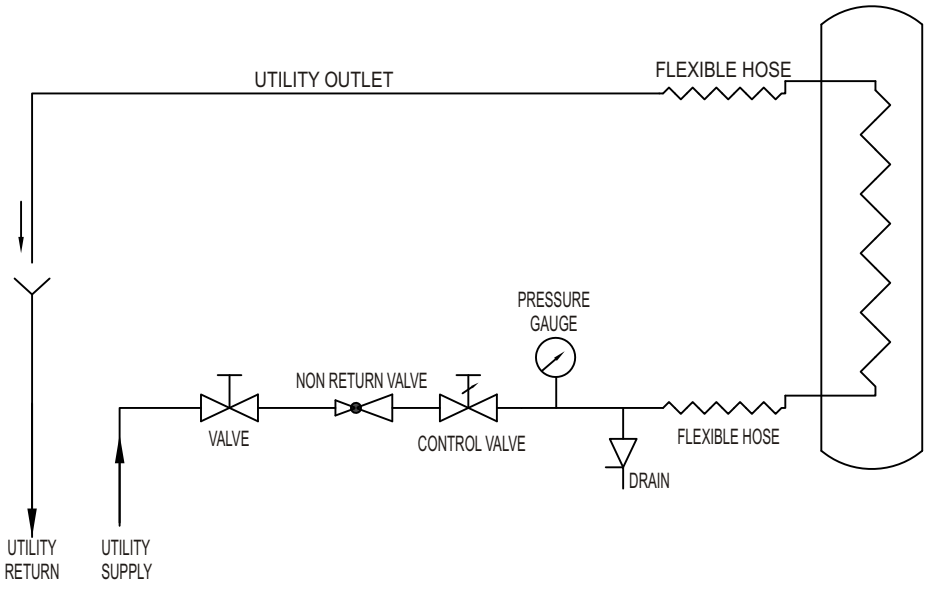
Unlike coil condensers, in product coolers, product travels through the coil battery and coolant through shell. This provides more resident time to the product to be cooled. For direct connection with distillate lines, all the product coolers are provided with 25 DN connections.

Cat.Ref.	DN	DN1	DN2	L	Actual HTA m^2	Type
HEF 1/1	50	25	12	450	0.1	A
HEF 1/2	50	25	12	600	0.2	A
HEF 1/3.5	80	25	16	600	0.35	A
HEF 1/5	100	25	19	600	0.5	A
HEF 1/10	150	25	25	600	0.7	B
HEF 1/15	150	25	25	850	1.25	B



UTILITY CONNECTION FOR CONDENSER

When installing coil type heat exchangers appropriate precautions should be taken. The main points to be taken into account when planning to use these items as coolers are (See also flow chart below).



SHELL & TUBE HEAT EXCHANGER

INTRODUCTION

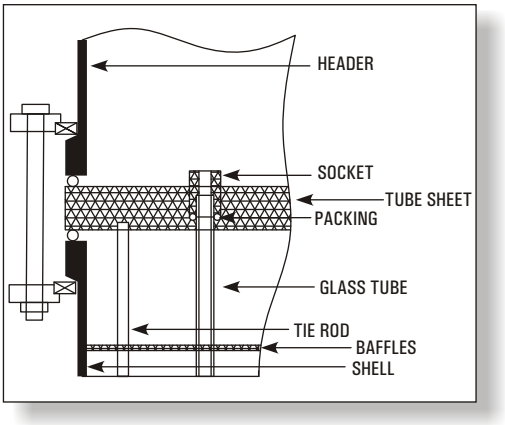
Shell & tube heat exchangers offer large surface area in combination with efficient heat transfer and compactness. These are widely used in industries for various duties like cooling, heating, condensation, evaporation etc. S.S. Scientific are the pioneers in the field of glass shell and tube heat exchangers in India and their product has a wide market acceptability.

SALIENT FEATURES

1. Universal corrosion resistance an excellent alternative to expensive MOCs like graphite, tantalum and other exotic metals.
2. Excellent heat transfer as fouling does not occur on smooth glass surfaces.
3. Flexibility of installation vertical / horizontal.
4. Easy replacement of tubes for repair and cleaning.
5. Available in wide range of HTAs.
6. Ease of installation due to light weight.
7. Economical.
8. Suitable for applications where large HTAs are required in limited space.

ADVANTAGES OVER CONVENTIONAL COIL TYPE HEAT EXCHANGER

(1) The overall heat transfer coefficient in shell and tube heat exchanger is about 3 times higher than in coil type heat exchanger.
(2) The pressure drop in shell and tube heat exchanger is minimal compared to 2-3 kg/cm^2 in coil side of coil type heat exchanger.
(3) For requirement of higher heat transfer areas shell and tube heat exchanger is the only alternative.



CONSTRUCTION FEATURES

The glass tubes are sealed individually into PTFE tube sheet with special PTFE sockets and packing. This unique ferrule type sealing arrangement permits easy replacement and cleaning of tubes. Baffles on shell side ensure improved heat transfer by increased turbulance. Further details of construction can be seen in the diagram.
- Made from SCHOTT DURAN & BOROSILICATE
- Joint less tubes offer better pressure rating.

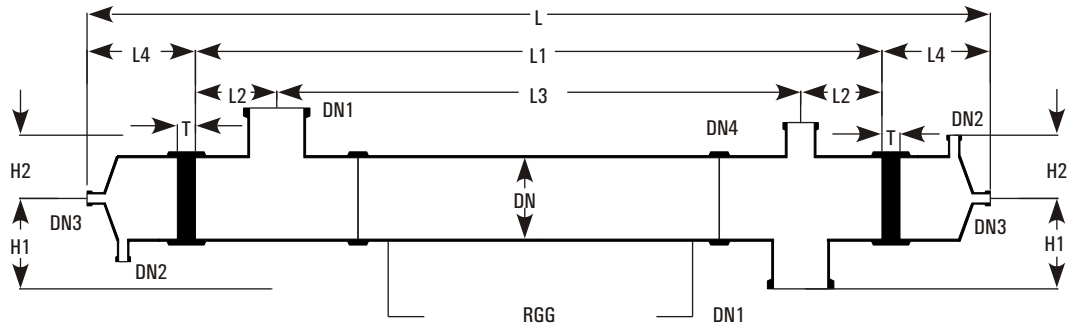
TYPE

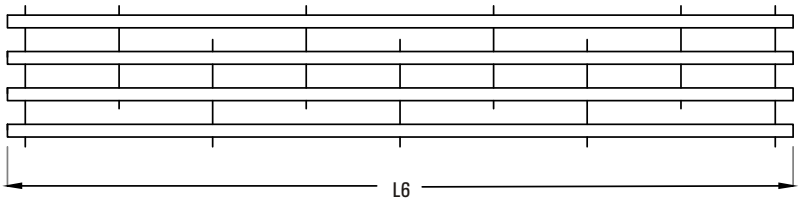
Three basic versions are available :

Material Of Construction				
Model	**Shell**	**Tube**	**Header**	**Duty**
RGG	Glass	Glass	Glass	For heat transfer between two agressive media.
RGM	Glass	Glass	Steel/ FRP	For heat transfer between agressive media in shell & non-aggressive media in tubes.
RMG	Steel/FRP	Glass	Glass	For heat transfer between aggressive media in tubes & non-aggressive media in shell.

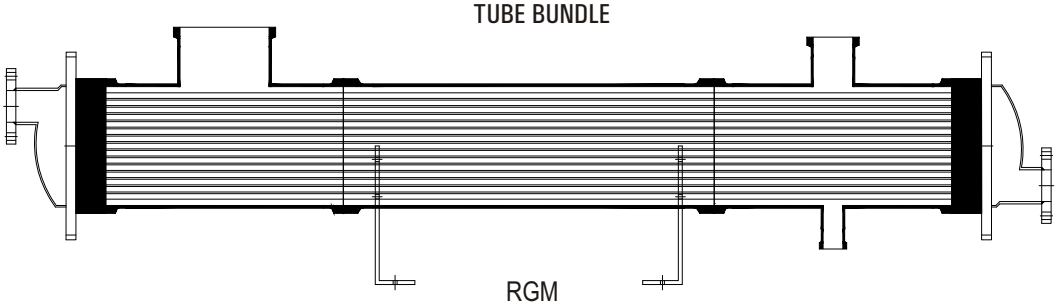
DIMENSIONAL SPECIFICATIONS

Cat. Ref. RGG/RMG	6/3	6/4	6/5	6/6	9/6	9/8	9/10	9/12	12/12	12/16	12/21	12/25
Area (m^2)	3	4	5	6	6	8	10	12	12	16	21	25
DN	150				225				300			
DN1	80				100				150			
DN2	50				80				80			
DN3	25				40				40			
DN4	50				50				50			
H1	175				250				300			
H2	150				200				250			
L	2500	3100	3700	4300	2620	3220	3820	4520	2550	3150	3950	4550
L1	1900	2500	3100	3700	1900	2500	3100	3800	1800	2400	3200	3800
L2	150	150	150	150	225	225	225	225	225	225	225	225
L3	1600	2200	2800	3400	1450	2050	2650	3350	1350	1950	2750	3350
L4	250	250	250	250	300	300	300	300	300	300	300	300
L5	125	125	125	125	175	175	175	175	175	175	175	175
L6	1980	2580	3180	3780	2000	2600	3200	3900	1930	2530	3330	3930
T	50				60				75			
No. of Tubes	37				73				151			
No. of Baffles	11	15	19	23	7	9	13	17	5	7	9	11

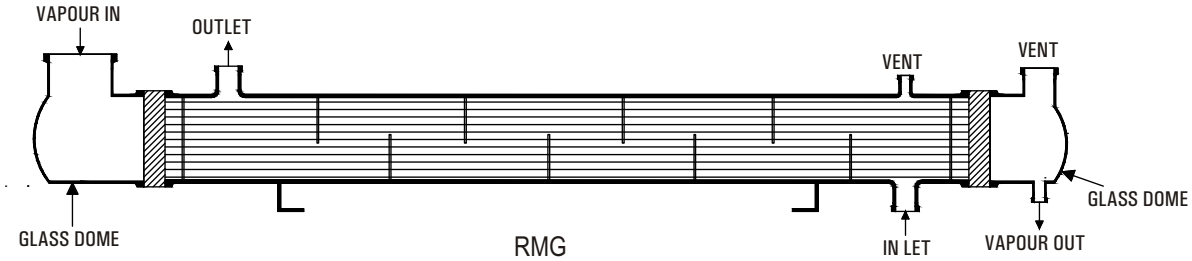




TUBE BUNDLE



RGM



RMG

RANGE OF APPLICATIONS

Permissible temperature range for both shell & tube sides - 40°C to 150°C.
Maximum permissible temperature difference between shell & tube sides 120°C.
All sizes & models are suitable for full vacuum on both side. Maximum limiting pressures are tabulated here below :

		Maximum Permissible Pressure Range, Kg/cm² (g)		
Model	Side	150 DN	225 DN	300 DN
RGG	Shell	2.0	1.0	1.0
	Tube	2.0	1.0	1.0
RGM	Shell	2.0	1.0	1.0
	TUbe	3.5	3.5	3.5
RMG	Shell	3.5	3.5	3.5
	Tube	2.0	1.0	1.0

The above ranges of application are admissible limiting values. For each specific case S.S. Scientific recommends the admissible operating data based on the relations between pressure and temperature, size and model.

TECHNICAL INFORMATION

Shell and tube heat exchanger is constructed with 12mm OD, 1.5 mm thick glass tube. This tube is arranged in triangular pitch of 21 mm. Baffles are provided with 30% cut at a distance of approximately is equal to inner diameter of shell. Generally, PTPE baffles are used in Glass shell and PP baffles in Metal shell.

Shell and tube heat exchanger can be operated within a temperature range of -40 °C to 150° C on either side. However, differential temperature should not exceed 120° C at any point. Shell and tube heat exchanger can be used predominantly under full vacuum, provided differential pressure does not exceed 3 bar g. The range of overall heat transfer co-efficient in the shell and tube heat exchanger is considered as follows.:

Condensation	:	Water - Water	:	600-900 Kcal/m², h,°C
Condensation	:	Water - Organic Solvents	:	400-600 Kcal/m², h,°C
Evaporation	:	Steam - Water	:	500-900 Kcal/m², h,°C
Cooling	:	Water - Water	:	500-600 Kcal/m², h,°C
Cooling	:	Water - Organic Solvents	:	250-600 Kcal/m², h,°C
Cooling	:	Water - Oil	:	75-350 Kcal/m², h,°C
Cooling	:	Water - Air	:	25-250 Kcal/m², h,°C

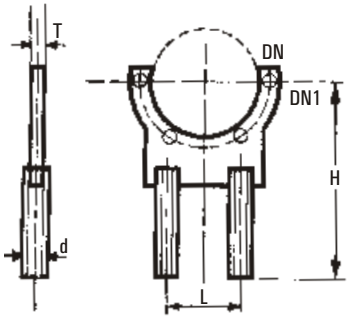
		Cross Section Cm²		Max. operating Pressure		
	No. of	Shell	Tube	Tube	Shell Side	
DN	Tubes	Side	Side	Side	Glass	Metal
80	7	23	5	3.0	3.0	3.0
100	19	43	12	2.0	2.0	2.0
150	37	93	23	1.5	1.5	2.0
225	73	189	46	1.0	1.0	2.0
300	151	348	96	0.7	0.7	2.0

Orientation of branches, if other than above, should be specified in or each Shell and tube heat exchanger is supplied with following spares.

DN 150-5 tubes, 4 plugs, 4 bushes, 4 'O' rings, I key.
DN 225 - 10 tubes, 6 plugs, 6 bushes, 6 'O' rings, 1 key.
DN300 - 15 tubes, 8 plugs, 8 bushes, 8 'O' rings, I key.

Following accessories are recommended to use with Shell and tube heat ex-changer

- PTFE bellow on all nozzles.
- Pressure relief valve.
- Supporting clamp.



RUBBER SUPPORTING CLAMP (S&T HEAT EXCHANGER)

This clamp is used for horizontal installations of shell and tube heat exchanger (Glass shell)

Cat. Ref.	DN	L	H	T	d
RSC 6/30	150	150	487	10	30
RSC 9/30	225	220	525	10	30
RSC 12/30	300	300	565	10	30

COLUMN COMPONENTS

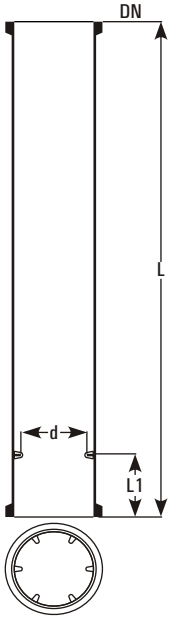
COLUMN
COMPONENTS

COLUMN SECTIONS

Column can be constructed either by using pipe sections with support plates or using column sections with packing supports.

Column sections are provided with fused shelf where packing support can rest.

Cat.Ref.	DN	L	L1	Minimum packing Size	Usual packing Size
CS 3/1000	80	1000	75	9	12
CS 4/1000	100	1000	75	12	15
CS 6/1000	150	1000	75	15	25
CS 6/1500	150	1500	75	15	25
CS 9/1000	225	1000	100	20	25
CS 9/1500	225	1500	100	20	25
CS 12/1000	300	1000	100	25	25
CS 12/1500	300	1500	100	25	25
CS 16/1000	400	1000	150	25	25
CS 16/1500	400	1500	150	25	25
CS 18/1000	450	1000	150	25	25
CS 18/1500	450	1500	150	25	25
CS 24/1000	600	1000	200	40	40

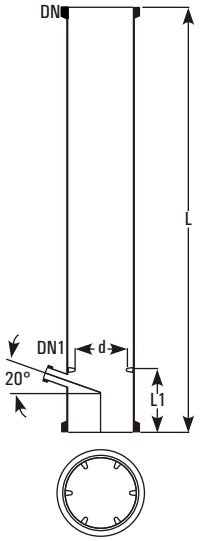


COLUMN SECTIONS

COLUMN SECTIONS WITH THERMOMETER BRANCH

Above column sections can be provided with a thermometer branch below the packing shelf at 20° slope

Cat.Ref.	DN	DN1	L	L1	d
CST 3/1000	80	25	1000	125	50
CST 4/1000	100	25	1000	125	75
CST 6/1000	150	25	1000	125	125
CST 6/1500	150	25	1500	125	125
CST 9/1000	225	25	1000	150	175
CST 9/1500	225	25	1500	150	175
CST 12/1000	300	25	1000	150	250
CST 12/1500	300	25	1500	150	250
CST 16/1000	400	25	1000	200	250
CST 16/1500	400	25	1500	200	350
CST 18/1000	450	25	1000	200	400
CST 18/1500	450	25	1500	200	400
CST 24/1000	600	25	1000	250	540

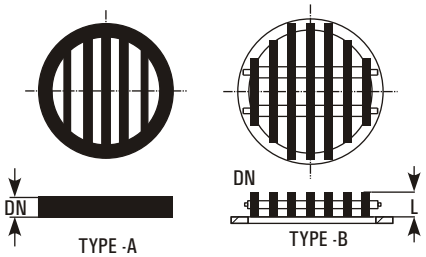


COLUMN SECTIONS WITH THERMOMETER BRANCH

PACKING SUPPORTS

Packing supports Type A are made of fused glass rods. Packing supports Type B (heavy duty) are made of glass plates vertically arranged and tied with PTFE tie rods.

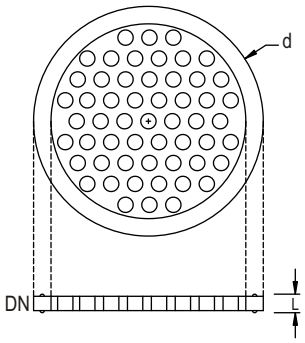
Cat.Ref. Size	DN	L	Cross Section Area	Max. Load Kgs.	Minimum Packing	Type
CP 3	80	10	45%	10	12	A
CP 4	100	12	50%	15	15	A
CP 6	150	15	55%	30	25	A
CP 9	225	19	60%	50	25	A
CP 12	300	19	65%	75	25	A
HD 16	400	70	70%	150	25	B
HD 18	450	70	70%	200	25	B
HD 24	600	95	70%	300	40	B



PTFE PERFORATED PLATES

These are used as packing retainers to prevent the packing from lifting due to vapour velocity. These can be clamped between two components without using any gasket.

Cat.Ref.	DN	d	L
TCP 3	80	99	7
TCP 4	100	132	9
TCP 6	150	184	10
TCP 9	225	254	12
TCP 12	300	340	16
TCP 16	400	463	25
TCP 18	450	525	25
TCP 24	600	689	30

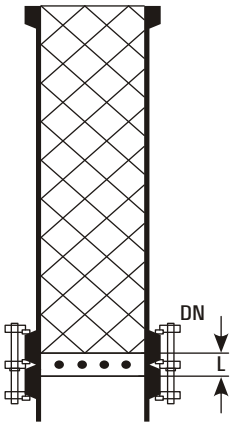


SUPPORT PLATE ASSEMBLY

Support Plate Assembly can be coupled with a pipe section (PS), so as to use the pipe section as a column section and to fill packings into it. This system provides following advantagesover the conventional system of using column section with a packing support.

- Higher cross section area.
- More packing height.
- No separate inventory of column sections.
- Delivery period of pipe section are shorter.

This assembly consist of a glass support plate, a metal flange, a PTFE 'O' ring and nut-bolts.



Cat.Ref.	DN	L	Cross Section Area	Max. Load Kgs.	Suitable Packing Size
LBE 3	80	25	70%	20	12
LBE 4	100	25	70%	30	15
LBE 6	150	50	70%	60	25
LBE 9	225	75	80%	90	25
LBE 12	300	75	80%	150	25

Packings require for various pipe sections (Kgs.)

Pipe Section	Packing size						
	Vol (L)	FC 9	FC 12	FC 15	FC 25	FCB 40	FCB 50
PS 3/1000	5	3	3	2	-	-	-
PS 4/1000	8	-	4	3	3	-	-
PS 6/1000	18	-	9	7	7	-	-
PS 9/1000	37	-	-	15	15	15	-
PS 12/1000	66	-	-	17	30	25	-
PS 16/1000	125	-	-	-	65	50	53
PS 18/1000	165	-	-	-	90	65	70
PS 24/1000	295	-	-	-	-	115	125

Notes of use of Column Packing

- Rasching ring upto 25mm is of Natural glass, 40mm and rasching ring is available only in Borosilicate glass.
- Due to their low bulk densities, Glass Raschig rings are particularly suitable for packing glass columns.
- Generally, the ratio of Column diameter to packing diameter should not be less than 8:1.
- When using smaller packing size, a small layer of larger packing should be used on packing support, to prevent the smaller packing falling through.
- In vacuum application and applications involving high vapour velocities, packing may be lifted and may damage to other parts. To prevent this, a packing retainer (PTFE perforated plates) should be used above the packed section.

COLUMN PACKING-RASCHIG RINGS

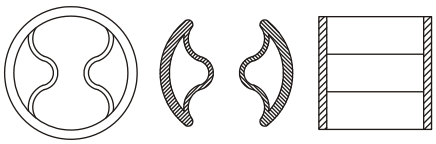
Raschig rings upto 25mm are also available in Neutral glass. 20mm, 30mm, 40mm and 50mm are available in Borosilicate glass 3.3.

Cat. Ref.	Size	Bulk Density Kg/Ltr	Specific Surface m^2/m^3	Glass
FC 8	8x8	0.6	500	Neutral
FC 9	9x9	0.6	500	Neutral
FC 12	12x12	0.5	400	Neutral
FC 15	15x15	0.4	300	Neutral
FC 25	25x25	0.35	250	Neutral
FCB 20	20x20	0.33	300	Borosilicate
FCB 30	30x30	0.27	180	Borosilicate
FCB 40	40x40	0.22	160	Borosilicate
FCB 50	50x50	0.19	120	Borosilicate

COLUMN PACKING-PALL RINGS

Pall Rings are also available for column packing as per below specification.

Cat.Ref.	Size	Bulk Density Kg/Ltr	Specific Surface m^2/m^3	Glass
FCP 30	30x30	0.38	234	Borosilicate
FCP 40	40x40	0.32	187	Borosilicate
FCP 50	50x50	0.26	140	Borosilicate

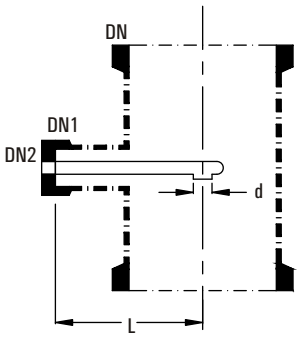


COLUMN FEED PIPE

Feed pipe directs the process fluid to the centre of the column.

Cat.Ref.	DN	DN1	DN2	L	d
FP 3	80	25	25	100	12
FP 4	100	25	25	125	12
FP 6	150	40	25	150	19
FP 9	225	40	25	175	19
FP 12	300	40	25	225	19
FP 16	400	40	25	275	19
FP 18	450	40	25	300	19
FP 24	600	50	40	450	25

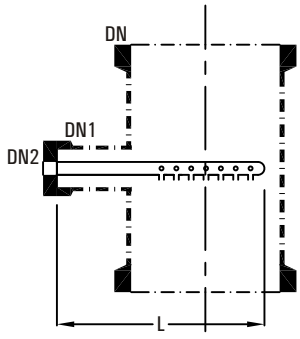
DN refers the nominal diameter of the column.



COLUMN FEED SPARGERS

In column feed spargers, holes are provided at three sides of pipe.

Cat.Ref.	DN	DN1	DN2	L	Holes
SPG 3	80	25	25	125	21x2mm
SPG 4	100	25	25	150	21x2mm
SPG 6	150	40	25	200	27x2mm
SPG 9	225	40	25	275	27x2mm
SPG 12	300	40	25	350	30x3mm
SPG 16	400	40	25	450	39x3mm
SPG 18	450	40	25	500	39x3mm
SPG 24	600	50	40	650	60x3mm

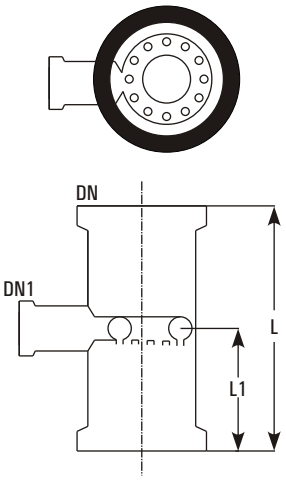


SPRAY FEED SECTION

Spray feed section are provided with circular tube having holes at the bottom.

Cat.Ref.	DN	DN1	L	L1	Holes
FR 3	80	25	200	100	21x2mm
FR 4	100	25	250	125	21x2mm
FR 6	150	40	250	125	27x2mm
FR 9	225	40	250	125	27x2mm
FR 12	300	40	300	150	30x3mm

For bigger columns, Spray feed pipe with Unequal Tee should be used.

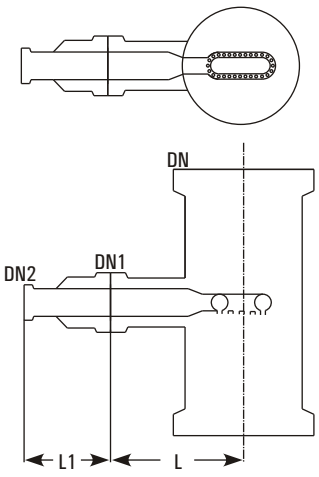


SPRAY FEED PIPES

Spray feed pipes are provided with oval tube having holes at the bottom.
These should be used with unequal tees.

Cat.Ref.	DN	DN1	DN2	L	L1	Holes Size	Tee Suitable
FD 6	150	80	25	225	125	27x2mm	PTU6/3
FD 9	225	100	25	325	150	27x2mm	PTU9/4
FD 12	300	150	25	400	200	30x3mm	PTU12/6
FD 16	400	150	50	500	200	39x3mm	PTU16/6
FD 18	450	150	50	550	200	39x3mm	PTU18/6
FD 24	600	150	50	700	200	60x3mm	PTU24/6

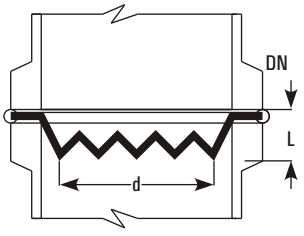
DN refers the nominal diameter of the column.



PTFE REDISTRIBUTORS

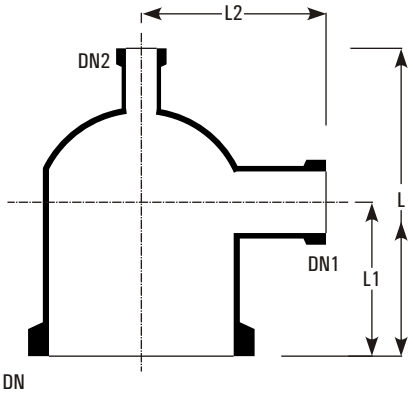
PTFE redistributors are used to prevent channeling in columns. These can be clamped between two components without using any PTFE gasket.

Cat.Ref.	DN	d	L
TL 3	80	55	20
TL 4	100	80	20
TL 6	150	100	20
TL 9	225	175	22
TL 12	300	215	25
TL 16	400	315	25
TL 18	450	365	30
TL 24	600	420	30



COLUMN ADAPTORS

Cat.Ref.	DN	DN1	DN2	L	L1	L2
CA 3/1/1	80	25	25	150	75	100
CA 3/1.5/1	80	40	25	175	100	100
CA 3/2/1	80	50	25	175	100	100
CA 4/1/1	100	25	25	150	75	125
CA 4/1.5/1	100	40	25	175	100	125
CA 4/2/1	100	50	25	225	125	125
CA 4/3/1	100	80	25	225	125	125
CA 6/1/1	150	25	25	200	100	150
CA 6/1.5/1	150	40	25	200	100	150
CA 6/2/1	150	50	25	250	125	150
CA 6/3/1	150	80	25	250	150	150
CA 6/4/1	150	100	25	275	150	175
CA 9/1.5/1.5	225	40	40	250	150	175
CA 9/2/1.5	225	50	40	250	150	175
CA 9/3/1.5	225	80	40	300	175	200
CA 9/4/1.5	225	100	40	350	175	200
CA 9/6/1.5	225	150	40	400	200	250
CA 12/1.5/1.5	300	40	40	300	150	225
CA 12/2/1.5	300	50	40	300	150	225
CA 12/3/1.5	300	80	40	300	150	250
CA 12/4/1.5	300	100	40	350	175	250
CA 12/6/1.5	300	150	40	425	225	250
CA 12/9/1.5	300	225	40	450	225	300
CA 16/2/2	400	50	50	400	200	300
CA 16/3/2	400	80	50	450	250	300
CA 16/4/2	400	100	50	450	250	300
CA 16/6/2	400	150	50	550	300	350
CA 16/9/2	400	225	50	550	300	350
CA 18/2/2	450	50	50	400	200	325
CA 18/3/2	450	80	50	450	250	350
CA 18/4/2	450	100	50	450	250	350
CA 18/6/2	450	150	50	550	300	350
CA 18/9/2	450	225	50	550	300	400
CA 18/12/2	450	300	50	750	400	400
CA 24/2/2	600	50	50	450	200	400
CA 24/3/2	600	80	50	500	250	400
CA 24/4/2	600	100	50	500	250	400
CA 24/6/2	600	150	50	650	300	450
CA 24/9/2	600	225	50	650	300	450
CA 24/12/2	600	300	50	800	400	500

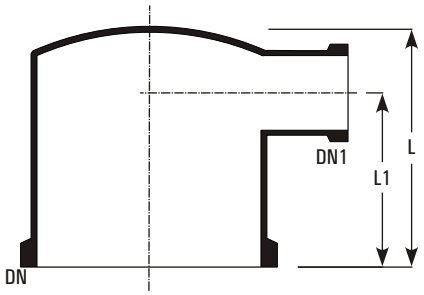


Column adaptors with DN2 of different size(maximum equaling to DN1) can be manufactured with the same dimensions.

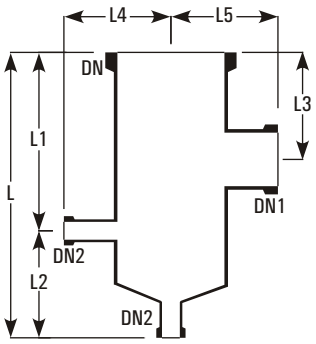
FLAT TOP COLUMN ADAPTORS

These are generally used as headers of shell and tube heat exchangers and columns.

Cat.Ref.	DN	DN1	L	L1
CAF 3/1	80	25	100	75
CAF 3/1.5	80	40	125	100
CAF 4/1	100	25	100	75
CAF 4/1.5	100	40	125	100
CAF 6/1	150	25	150	100
CAF 6/1.5	150	40	150	100
CAF 6/2	150	50	200	125
CAF 6/3	150	80	200	150
CAF 9/1.5	225	40	200	150
CAF 9/2	225	50	200	150
CAF 9/3	225	80	250	175
CAF 9/4	225	100	250	175
CAF 12/2	300	50	250	150
CAF 12/3	300	80	250	150
CAF 12/4	300	100	300	175
CAF 12/6	300	150	350	225



Cat.Ref.	DN	DN1	DN2	L	L1	L2	L3	L4	L5
CAM 4/2/1/1	100	50	25	450	300	150	200	125	125
CAM 6/3/1/1	150	80	25	450	300	150	200	150	150
CAM 9/3/1/1	225	80	25	450	300	150	200	175	200
CAM 12/3/1/1	300	80	25	450	300	150	200	225	250

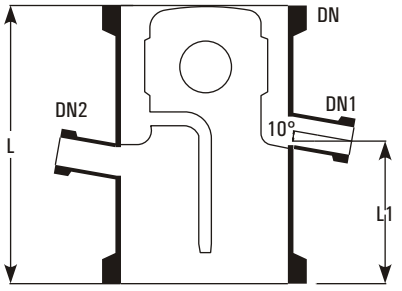


REFLUX DIVIDERS

Manually Operated

Reflux dividers are used to take off the distillate from the column. Usually a valve is to be fitted on distillate outlet which controls the reflux coarsely.

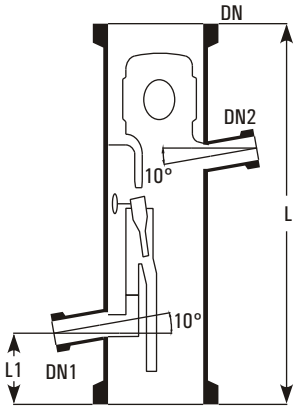
Cat.Ref.	DN	DN1	DN2	L	L1	Free Corss Section Cm2	Max. Product L/hr
RDA 3	80	25	25	200	100	20	300
RDA 4	100	25	25	250	150	50	500
RDA 6	150	25	25	250	150	100	700
RDA 9	225	25	25	375	150	150	900
RDA 12	300	25	25	375	150	250	1100
RDA 16	400	40	40	500	200	350	1300
RDA 18	450	40	40	600	275	500	1500



DN2 is used for insertion of a thermometer pocket. A bellow is recommended on the distillate outlet DN1.

Magnetically Operated

These reflux dividers are to be used with a electro -magnet and a timer. These have a swinging funnel machanism which is operated magnetically from outside to remove the condensate or to return the reflux. Through this, correct control of reflux-ratio is possible. Funnel remains at 100% reflux position while magnet is inactive.

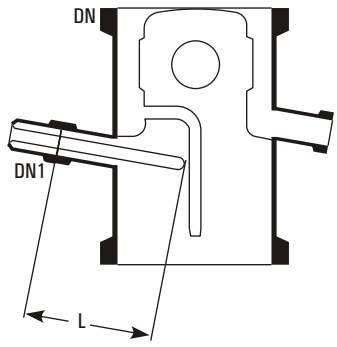


Cat.Ref.	DN	DN1	DN2	L	L1	Free Corss Section Cm2	Max. Product L/hr
RHM 3	80	25	25	375	75	20	90
RHM 4	100	25	25	400	75	50	180
RHM 6	150	25	25	450	100	100	300
RHM 9	225	25	25	550	100	150	500
RHM 12	300	25	25	700	100	250	650
RHM 16	400	40	40	800	150	350	1000
RHM 18	450	40	40	900	150	500	1300

DN2 is used for insertion of a Thermometer Pocket. A liquid seal is recommended on the distillate outlet of this reflux divider to prevent the vapour passing directly to the receiver.

THERMOMETER POCKETS FOR REFLUX DIVIDER

These thermometer pockets are to be used with reflux dividers or column sections. DN refers to the nominal diameter of the Reflux divider or Column.

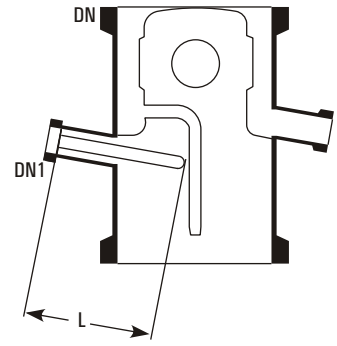


Type A

Cat.Ref.	DN	DN1	d	L
TP 3	80	25	12	75
TP 4	100	25	12	100
TP 6	150	25	12	125
TP 9	225	25	12	150
TP 12	300	25	12	200
TP 16	400	40	19	250
TP 18	450	40	19	300

THERMOMETER POCKETS FOR REFLUX DIVIDER

B type thermometer pockets are to be used with reflux dividers or column sections. DN refers to the nominal diameter of the Reflux divider or Column.



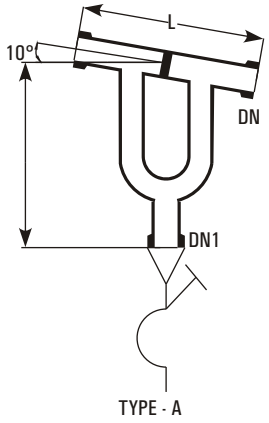
Type B

Cat.Ref.	DN	DN1	d	L
TP 3/F	80	25	12	75
TP 4/F	100	25	12	100
TP 6/F	150	25	12	125
TP 9/F	225	25	12	150
TP 12/F	300	25	12	200
TP 16/F	400	40	19	250
TP 18/F	450	40	19	300

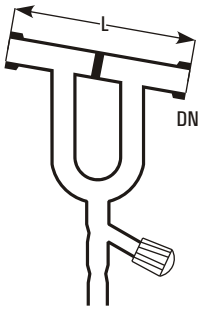
LIQUID SEALS

Liquid seals are to be fitted on the distillate outlet of magnetically operated reflux divider. This prevent the passing of vapour directly to the receiver.

Cat.Ref.	DN	DN1	L	Type
LS 1	25	25	200	A
LS 1.5	40	25	300	A
LSV 1	25	-	200	B



TYPE - A



TYPE -B

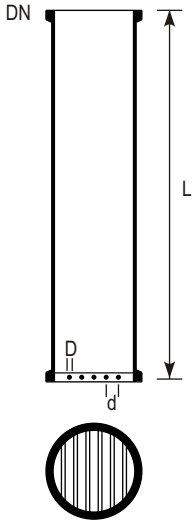
COLUMN SECTION WITH INBUILT PACKING SUPPORT

S.S. Scientific Industries introduce single piece column section with inbuilt packing support.

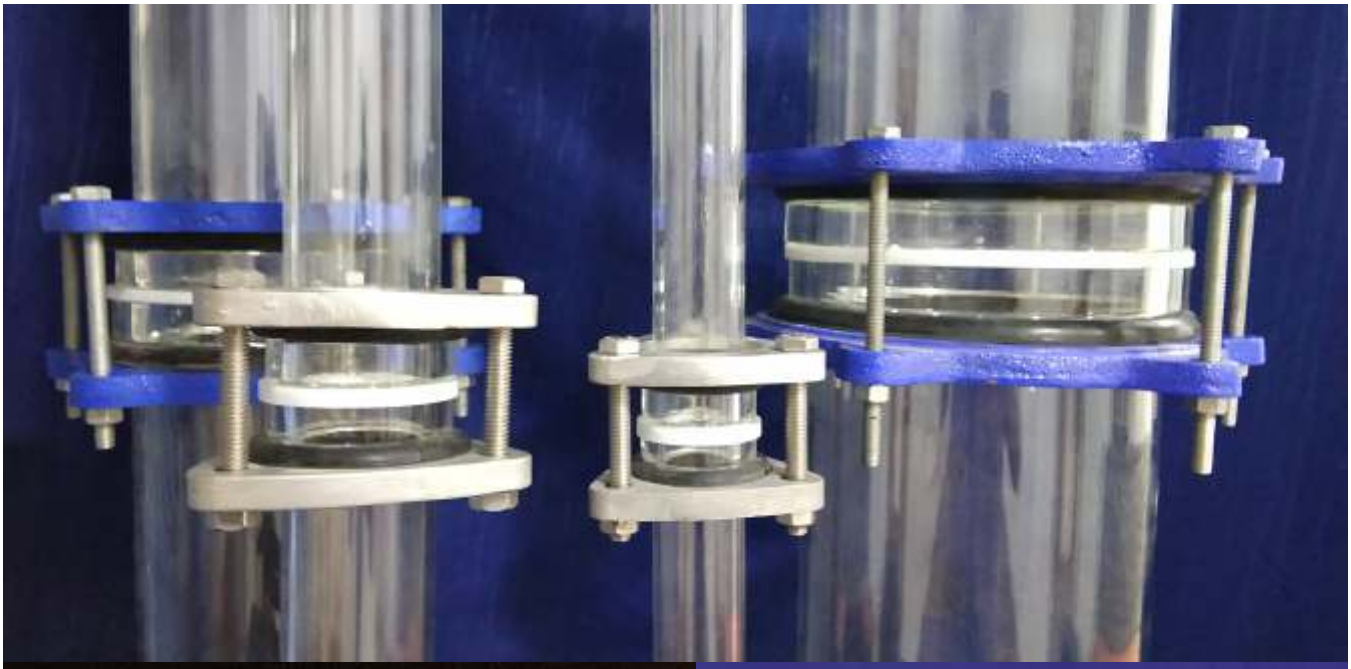
Advantages of this column against conventional column section:

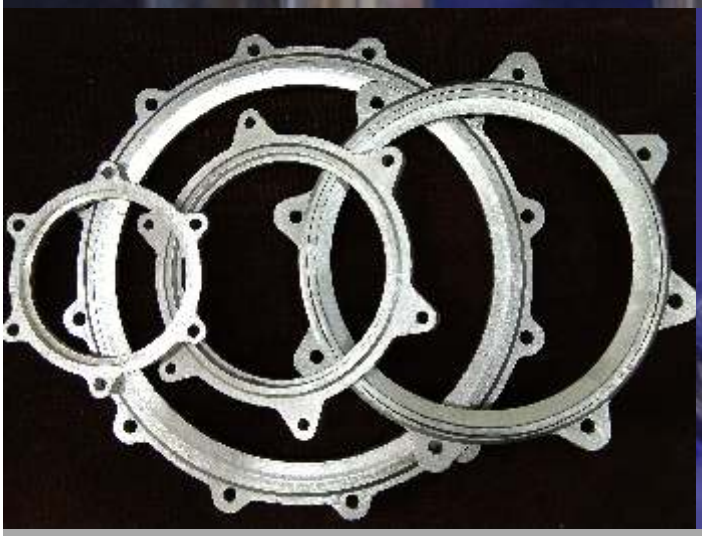
- Ease in installation being a single piece instead of two pieces.
- There is no need to maintain stock of CS and packing support.
- Increases effective packed height which results in to increase in efficiency.
- Zero maintenance against column flooding.

Cat.Ref.	DN	D	d	L	Max Load Kgs	Suitable Packing Size
CSP 3/1000	80	10	10	1000	20	12
CSP 4/1000	100	10	14	1000	30	15
CSP 6/1000	150	12	22	1000	60	25
CSP 9/1000	225	12	22	1000	90	25
CSP 12/1000	300	12	22	1000	150	25



COUPLINGS AND GASKETS



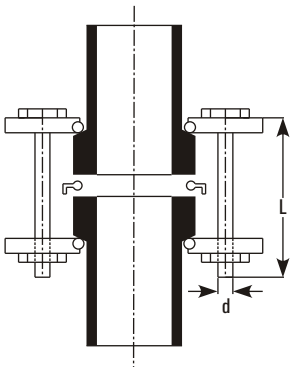


COUPLINGS AND GASKETS

COMPLETE COUPLINGS

A complete coupling is a set of two backing flanges with insert and nut-bolts. complete set of flanges require to make a joint & standard one are available in CI. Also available in other MOC like SS 304 & 316, Aluminum.

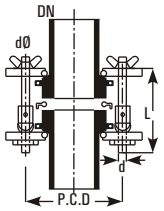
		Flanges		inserts		Nuts-Bolts		
Cat.Ref.	DN	Cat.Ref.	Qty	Cat.Ref.	Qty	d	L	Qty
CT 0.5	12	CF0.5	2nos	CN0.5	2nos	1/4"	50	3nos
CT 0.7	15	CF0.7	2nos	CN0.7	2nos	1/4"	50	3nos
CT 1	25	CF1	2nos	CN1	2nos	5/16"	65	3nos
CT 1.5	40	CF1.5	2nos	CN1.5	2nos	5/16"	65	3nos
CT 2	50	CF2	2nos	CN2	2nos	5/16"	75	3nos
CT 3	80	CF3	2nos	CN3	2nos	5/16"	75	6nos
CT 4	100	CF4	2nos	CN4	2nos	5/16"	100	6nos
CT 6	150	CF6	2nos	CN6	2nos	5/16"	100	6nos
CT 9	225	CF9	2nos	CN9	2nos	3/8"	125	8nos
CT 12	300	CF12	2nos	CN12	2nos	3/8"	150	12nos
CT 16	400	CF16	2nos	CN16	2nos	3/8"	150	12nos
CT 18	450	CF18	2nos	CN18	2nos	1/2"	150	12nos
CT 24	600	CF24	2nos	CN24	2nos	1/2"	150	12nos



QUICK RELEASE COUPLINGS

Cat.Ref.	DN	PCD	nxdØ
QCT 3	80	133	6x9Ø
QCT 4	100	178	6x9Ø
QCT 6	150	254	6x9Ø
QCT 9	225	310	8x11Ø
QCT 12	300	395	12x11Ø

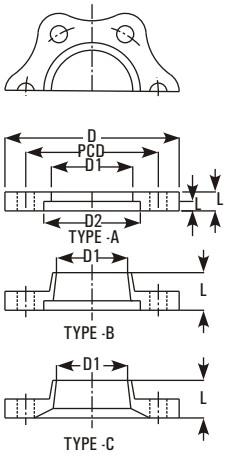
For easy & fast opening or closing of couplings as quick as possible without using tools, the Quick Release Coupling is an ideal solution. In case of solid charging material to reaction or addition vessels, we recommend to use our Quick Release Coupling.
Quick Release coupling are offered in CI & SS material as per the requirement. Quick Release Coupling is available from DN 80 to DN 300 sizes.



BACKING FLANGES

Backing flanges are used to couple a glass ends to a glass end or to a bellow. Backing flanges are made of cast iron and are used with Inserts.

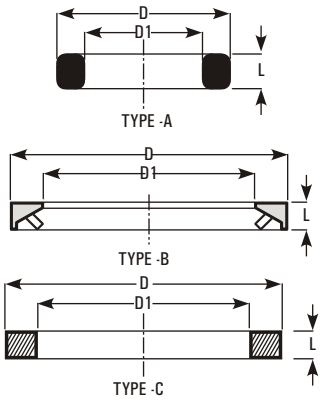
Cat.Ref.	DN	D	D1	D2	PCD	n x dØ	L	L1	Type
CF 0.5	12	50	25	28	38	3 x 7Ø	6	3	A
CF 0.7	15	65	29	37	48	3 x 7Ø	6	3.5	A
CF 1	25	92	43	51	70	3 x 9Ø	10	6	A
CF 1.5	40	110	58	66	86	3 x 9Ø	10	6	A
CF 2	50	120	70	81	98	3 x 9Ø	12	8	A
CF 3	80	155	101	112	133	6 x 9Ø	12	8	A
CF 4	100	200	134	148	178	6 x 9Ø	12	8	A
CF 6	150	275	186	196	254	6 x 9Ø	15	8	A
CF 9	225	350	260	282	310	8 x 11Ø	28	8	B
CF 12	300	425	342	363	395	12 x 11Ø	34	8	B
CF 16	400	525	467	476	495	12 x 12Ø	22	8	A
CF 18	450	630	537	557	585	12 x 14Ø	37	8	B
CF 24	600	755	643	690	710	12 x 14Ø	50	5	C



INSERTS

Split ring type inserts are used with backing flanges. These are made of Cast iron with asbestos lining. In addition, insert made of suitable composite rubber material for 25 DN to 150 DN size. New Non-Asbestos (make Champion) insert are being introduced for 25DN to 300DN.

Cat.Ref.	DN	D	D1	L	Type
CN 0.5	12	28	20	8	A
CN 0.7	15	37	22	8	A
CN 1	25	50	34	10	A
CN 1.5	40	65	48	10	A
CN 2	50	80	61	8	B
CN 3	80	111	90	9	B
CN 4	100	147	119	10	B
CN 6	150	195	168	10	B
CN 9	225	280	240	10	B
CN 12	300	361	324	10	B
CN 16	400	474	431	12	B
CN 18	450	555	500	18	B
CN 24	600	684	634	10	C



ADAPTOR BACKING FLANGES

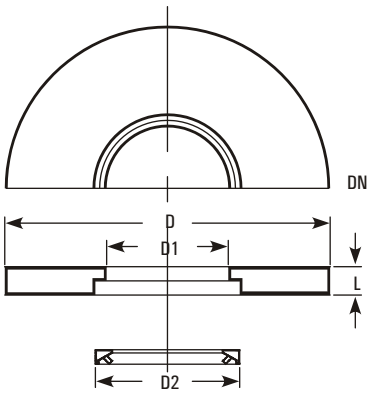
Adaptor backing flanges are used to couple a glass end to the flange having different bolt configuration. These flanges are made of cast iron and are supplied with inserts.
These are particularly used to fit a glass equipment on a non-glass equipment like Glass-lined Reactor etc.
Adaptor backing flanges are generally supplied undrilled. However, if specified, these can be supplied drilled as per "Table E", "Table F" and "ASA150" standards.

Drilled to Table E

Cat.Ref.	PCD	n x dØ
CFA 0.5/E	62	4 x 7Ø
CFA 0.7/E	62	4 x 7Ø
CFA 1/E	82	4 x 12Ø
CFA 1.5/E	98	4 x 12Ø
CFA 2/E	114	4 x 16Ø
CFA 3/E	146	4 x 16Ø
CFA 4/E	178	8 x 16Ø
CFA 6/E	235	8 x 19Ø
CFA 9/E	324	12 x 19Ø
CFA 12/E	406	12 x 23Ø

Drilled to Table F

Cat.Ref.	PCD	n x dØ
CFA 0.5/F	67	4 x 7Ø
CFA 0.7/F	67	4 x 7Ø
CFA 1/F	87	4 x 16Ø
CFA 1.5/F	105	4 x 16Ø
CFA2/F	127	4 x 16Ø
CFA 3/F	165	8 x 16Ø
CFA 4/F	190	8 x 16Ø
CFA 6/F	260	12 x 19Ø
CFA 9/F	356	12 x 23Ø
CFA 12/F	438	16 x 23Ø



Drilled to ASA 150

Cat.Ref.	PCD	n x dØ
CFA 0.5/A	62	4 x 7Ø
CFA 0.7/A	62	4 x 7Ø
CFA 1/A	79	4 x 12Ø
CFA 1.5/A	98	4 x 12Ø
CFA 2/A	121	4 x 16Ø
CFA 3/A	152	4 x 16Ø
CFA 4/A	190	8 x 16Ø
CFA 6/A	241	8 x 19Ø
CFA 9/A	298	8 x 19Ø
CFA 12/A	432	12 x 23Ø

Undrilling flanges

Cat.Ref.	DN	D	D1	D2	L
CFA 0.5	12	80	25	28	6
CFA 0.7	15	85	29	37	6
CFA 1	25	115	43	51	10
CFA 1.5	40	150	58	66	10
CFA 2	50	165	70	81	12
CFA 3	80	200	101	112	12
CFA 4	100	220	134	148	12
CFA 6	150	285	186	196	15
CFA 9	225	395	260	282	15
CFA 12	300	445	342	363	18

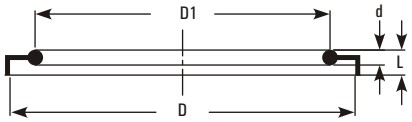
PTFE BELLOW & BELLOW FLANGES

PTFE BELLOW
& BELLOW FLANGES

PTFE "O" RING WITH LOCKING COLLAR

These PTFE O rings are specially made to use as gaskets in glass fittings. These are provided with a collar which helps to locate it on the glass end correctly.

Cat.Ref.	DN	D	D1	d	L
TR 0.5	12	26	18	3	5
TR 0.7	15	28	17	3	5
TR 1	25	42	33	3	5
TR 1.5	40	57	48	3	5
TR 2	50	70	59	3	5
TR 3	80	100	88	3	5
TR 4	100	134	119	4	6
TR 6	150	186	168	4	6
TR 9	225	260	236	4	7
TR 12	300	342	318	4	7
TR 16	400	467	435	6	7
TR 18	450	527	490	6	7
TR 24	600	686	640	8	10



PTFE BELLOWS - GLASS TO GLASS

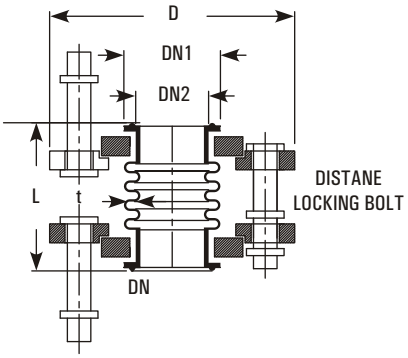
These bellows are used in installation of glass equipment for following purposes :
- to provide safe branching of pipelines from the main glass equipment.
- to accommodate odd degrees and variation in length.

Bellows are supplied along with required bellow flanges and nut-bolts.
Distance - locking bolts are provided to avoid excessive compression or contraction of the bellow. Gaskets are not required where bellows are used. For drilling details, refer "Bellow flanges"

LINE BELLOWS

These can withstand a temperature of 200°C under normal atmospheric conditions.

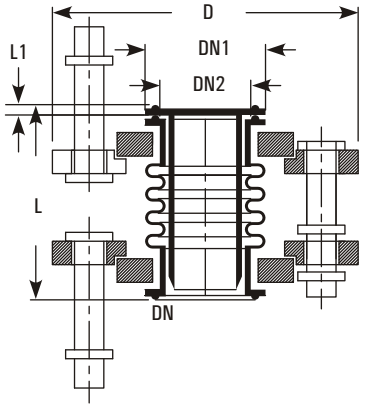
Cat.Ref.	DN	D	D1	D2	L
FBN 0.5	12	50	24	16	50
FBN 0.7	15	64	28	17	55
FBN 1	25	95	41	31	65
FBN 1.5	40	105	56	43	65
FBN 2	50	120	69	55	65
FBN 3	80	155	98	82	65
FBN 4	100	200	132	111	65
FBN 6	150	275	184	162	65
FBN 9	225	350	258	230	65
FBN 12	300	420	340	308	65



VACUUM BELLOWS

For pipelines of 80 DN and above operating under vacuum, the bellows are provided with an internal sleeve which supports the convolutions without affecting the flexibility of the bellow.
These bellows can withstand a temperature of 200°C under full vacuum.
For size upto 50DN, line bellows can be used for these applications.

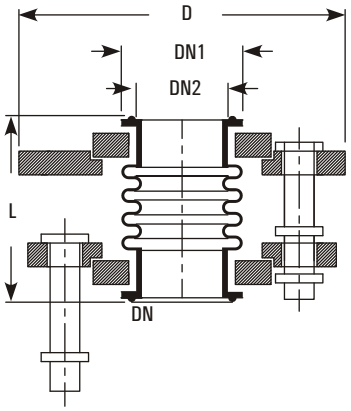
Cat.Ref.	DN	D	D1	D2	L	L1	T
VB 3	80	155	98	82	70	5	3.0
VB 4	100	200	132	111	70	5	3.5
VB 6	150	275	184	162	70	5	4.0
VB 9	225	350	253	230	70	5	5.0
VB 12	300	420	338	308	70	5	5.0

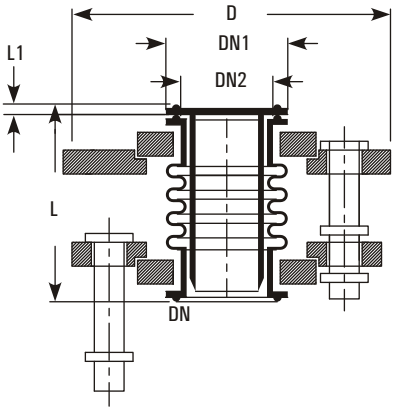


PTFE BELLOWS - GLASS TO METAL

These bellows are used in installation of glass equipment for following purposes :
- to minimize the transfer of vibrations from the rotating equipments which are connected to the glass assembly.
- to accommodate the thermal expansion of any metallic (non-glass) equipment which are connected to the glass pipeline.

These are similar to the bellows for glass-to-glass in construction, but having adaptor bellow flange at one end. Generally this adaptor flange is supplied undrilled so that it can be drilled as per the configuration of mating flange. However, this adaptor bellow flange can be supplied drilled AS per "Table E", "Table F" or "ASA 150" standards, if Specified.





LINE BELLOWS

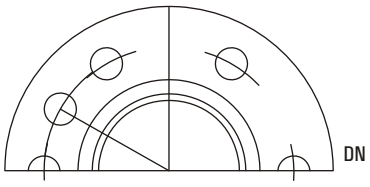
Cat.Ref. Undrilled	Cat.Ref. Table E	Cat.Ref. Table F	Cat.Ref. ASA 150	DN	D	L
FBF 0.5	FBF 0.5/E	FBF 0.5/F	FBF 0.5/A	12	80	50
FBF 0.7	FBF 0.7/E	FBF 0.7/F	FBF 0.7/A	15	85	55
FBF 1	FBF 1/E	FBF 1/F	FBF 1/A	25	115	60
FBF 1.5	FBF 1.5/E	FBF 1.5/F	FBF 1.5/A	40	150	65
FBF 2	FBF 2/E	FBF 2/F	FBF 2/A	50	165	65
FBF 3	FBF 3/E	FBF 3/F	FBF 3/A	80	200	65
FBF 4	FBF 4/E	FBF 4/F	FBF 4/A	100	220	65
FBF 6	FBF 6/E	FBF 6/F	FBF 6/A	150	285	65
FBF 9	FBF 9/E	FBF 9/F	FBF 9/A	225	395	65
FBF 12	FBF 12/E	FBF 12/F	FBF 12/A	300	445	65

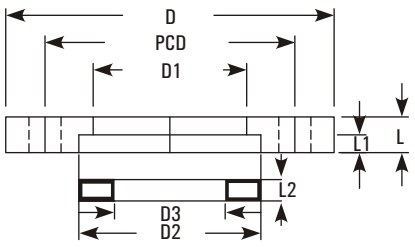
VACUUM BELLOWS

Cat.Ref. Undrilled	Cat.Ref. Table E	Cat.Ref. Table F	Cat.Ref. ASA 150	DN	D	L
VBF 3	VBF 3/E	VBF 3/F	VBF 3/A	80	200	70
VBF 4	VBF 4/E	VBF 4/F	VBF 4/A	100	220	70
VBF 6	VBF 6/E	VBF 6/F	VBF 6/A	150	285	70
VBF 9	VBF 9/E	VBF 9/F	VBF 9/A	225	395	70
VBF 12	VBF 12/E	VBF 12/F	VBF 12/A	300	445	70

BELLOW FLANGES

Bellow flanges are used to fit a bellow to a glass component. Standard Bellow are made CI. CI with Epoxy Coated, CI with PTFE coated, Aluminum, SS, 304 & 316 and are used in FBV, VB, FB type bellows. These are provided with two holes at 180° for Distance - locking bolts and are supplied with a split ring.





Cat.Ref.	DN	D	D1	D2	D3	L	L1	L2
BF 0.5	12	50	25	28	20	6	3	6
BF 0.7	15	65	29	37	22	6	3	6
BF 1	25	95	43	51	33	7	3	6
BF 1.5	40	110	58	66	45	7	3	6
BF 2	50	120	70	81	57	7	3	6
BF 3	80	155	101	112	84	7	3	6
BF 4	100	200	134	148	113	8	3	6
BF 6	150	275	186	196	164	8	3	6
BF 9	225	350	260	282	234	8	3	6
BF 12	300	425	342	363	310	10	5	8

Drilling details

Cat.Ref.	PCD	n x dØ	n x d1Ø
BF 0.5	38	3 x 9Ø	2 x 9Ø
BF 0.7	48	3 x 9Ø	2 x 9Ø
BF 1	70	3 x 9Ø	2 x 9Ø
BF 1.5	86	3 x 9Ø	2 x 9Ø
BF 2	98	3 x 9Ø	2 x 9Ø
BF 3	133	6 x 9Ø	2 x 9Ø
BF 4	178	6 x 9Ø	2 x 9Ø
BF 6	254	6 x 9Ø	2 x 9Ø
BF 9	310	8 x 11Ø	2 x 11Ø
BF 12	395	12 x 11Ø	2 x 11Ø

ADAPTOR BELLOW FLANGES

Adaptor bellow flange are used to fit a bellow to a flange having different bolt configuration. These flanges are made of cast iron and are supplied with a split ring.

These are particularly used to fit a bellow with a non-glass equipment like Glass-lined Reactor etc. These are used in FBF, VBF type PTFE bellows.

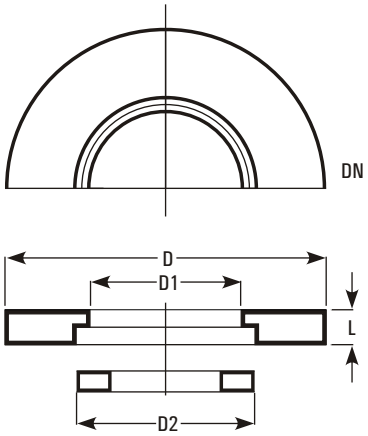
Adaptor bellow flanges are generally supplied undrilled. However, if specified , these can be supplied drilled as per "Table E", "Table F" and "ASA150" standards.

Undrilling flanges

Cat.Ref.	DN	D	D1	D2	L
BFA 0.5	12	80	25	28	6
BFA 0.7	15	85	29	37	6
BFA 1	25	115	43	51	7
BFA 1.5	40	150	58	66	7
BFA 2	50	165	70	81	7
BFA 3	80	200	101	112	7
BFA 4	100	220	134	148	8
BFA 6	150	285	186	196	8
BFA 9	225	395	260	282	8
BFA 12	300	445	342	363	10

Drilled to Table E

Cat.Ref.	PCD	n x dØ
BFA 0.5/E	62	4 x 7Ø
BFA 0.7/E	62	4 x 7Ø
BFA 1/E	82	4 x 12Ø
BFA 1.5/E	98	4 x 12Ø
BFA 2/E	114	4 x 16Ø
BFA 3/E	146	4 x 16Ø
BFA 4/E	178	8 x 16Ø
BFA 6/E	235	8 x 19Ø
BFA 9/E	324	12x19Ø
BFA 12/E	406	12x23Ø



Drilled to Table F

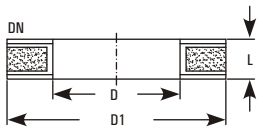
Cat.Ref.	PCD	n x dØ
BFA 0.5/F	67	4 x 7Ø
BFA 0.7/F	67	4 x 7Ø
BFA 1/F	87	4 x 16Ø
BFA 1.5/F	105	4 x 16Ø
BFA 2/F	127	4 x 16Ø
BFA 3/F	165	8 x 16Ø
BFA 4/F	190	8 x 16Ø
BFA 6/F	260	12 x 19Ø
BFA 9/F	356	12 x 23Ø
BFA 12/F	438	12 x 23Ø

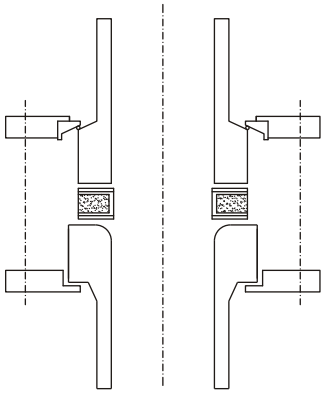
Drilled to ASA 150

Cat.Ref.	PCD	n x dØ
BFA 0.5/A	62	4 x 7Ø
BFA 0.7/A	62	4 x 7Ø
BFA 1/A	79	4 x 16Ø
BFA 1.5/A	98	4 x 16Ø
BFA 2/A	121	4 x 19Ø
BFA 3/A	152	4 x 19Ø
BFA 4/A	190	8 x 19Ø
BFA 6/A	241	8 x 19Ø
BFA 9/A	298	8 x 19Ø
BFA 12/A	432	12x23Ø

GLASS TO METAL ADAPTOR PLATE (REACTORS)

A flat metal ring with rubber cusions is enveloped with PTFE , to provide ideal sealing for cd reactors curved end nozzle. Only PTFE comes in the contact of process fluid.





Cat.Ref.	DN	D	D1	L
EMP 1	25	25	60	10
EMP 1.5	40	37	80	10
EMP 2	50	50	100	10
EMP 3	80	75	120	12
EMP 4	100	100	155	12
EMP 6	150	150	210	12
EMP 9	225	200	260	15
EMP 12	300	300	360	15

TUBULAR STRUCTURE PART

TUBULAR
STRUCTURE PART

SUPPORT OF COLUMN

Glass plants and pipeline should be supported correctly. To prevent inducing undesirable stresses in the glass, support should be rigid. When supported, glass should be in compression .

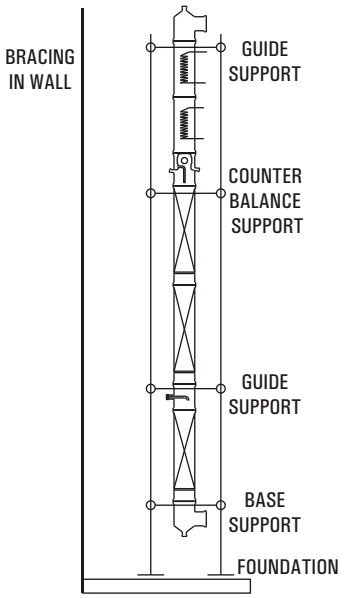
Generally, glass plant and equipment are supported in a rectangular tubular structure. This structure is formed of galvenised mild steel tubing with the cast iron fittings which are described in this catalogue. This type of structure provides enough flexibility for future modifications and is strong enough to support a glass unit.

Following rules should be followed while supporting a glass unit in a tubular structure.

1. The structure must be rigid. To give lateral support it must be braced back to the nearest wall or any rigid feature.

2. All glass columns are build up from a fixed point on whichwhole weight of the column should be taken. If total loads exceeds the permissible limits, counter balance supports should be used to releive excessive eight.

3. With change in temperature, glass column and tubular structure expands at different rate. Therefore glass unit must be free for vertical movement above the fixed point. Hence, above the fixed point, guides supports should be used to give lateral support.



STRUCTURE TUBES

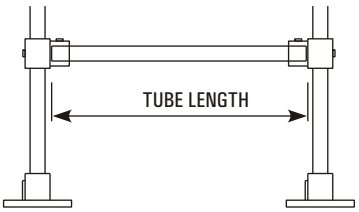
For forming the structure,"B" class galvanised tubes, Mild Steel with Epoxy Coated, Stainless Steel 304 & 316 are used in size of 1/2", 1", 1.1/4", 1.1/2" and 2". Cut tubes are available in required length to form a standard size structure. Cut tubes are provided with rubber plug at both the ends.

Tube size

NB Inches	NB mm	External Diameter
1/2"	15	19.5
1"	25	32.5
1.1/4"	30	41.5
1.1/2"	40	48.3
2"	50	60.3

Available cut lengths

Structure	NB (mm)				
Dimension	15*	25*	30*	40*	50*
For Vertical installation					
2500	-	2500	-	-	-
3000	-	3000	3000	-	-
3500	-	3500	3500	-	-
4000	-	-	4000	-	-
000	-	6000	6000	6000	6000
For Frames					
400	-	365	355	345	335
500	-	465	455	445	435
600	-	565	555	545	535
800	-	765	755	745	735
1000	-	965	955	945	935
1200	-	1165	1155	1145	1135
1500	-	1465	1455	1445	1435
For Supports					
400	435	445	445	455	465
500	535	545	545	555	565
600	635	645	645	655	665
800	835	845	845	855	865
1000	1035	1045	1045	1055	1065
1200	1235	1245	1245	1255	1265
1500	1535	1545	1545	1555	1565



STRUCTURE DIMENSION

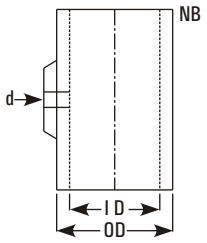
Cat. Ref. TBG (NBmm/Cut length)
for e.g. TBG 25/365

STRUCTURE FITTINGS

Following structure fittings are available to use with galvanised tubes in order to form a tubular structure for a glass plant. These fittings are made of cast iron. Also available in SS 304 & 316 and are suitable to the galvanised tubes described earlier.

These slidable fittings are provided with grub screws to fix it at required position on a galvanised tube.

These fittings are specially made to construct a tubular structure which provides enough flexibility for future modifications without involving any hammering and welding.



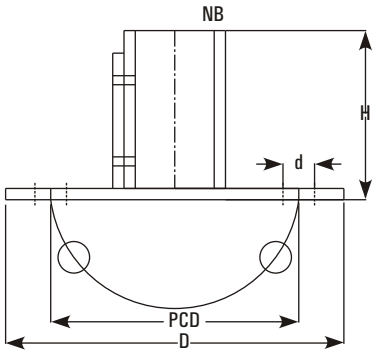
GENERAL DATA

NB	TUBE DIA	ID	OD	d
25	32.5	35	45	1/2"
30	42.5	45	55	1/2"
40	48.3	51	61	1/2"
50	60.3	63	73	1/2"

BASE

These are to be used with vertical tubes. Holes are provided for foundation.

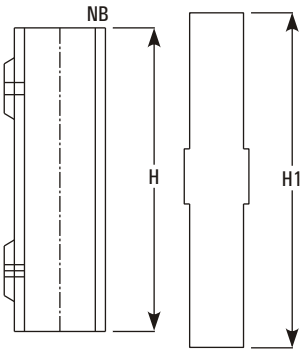
Cat.Ref.	NB	D	H	PCD	dØ
BS 25	25	150	75	110	4 x 14Ø
BS 30	30	150	75	110	4 x 14Ø
BS 40	40	150	75	110	4 x 14Ø
BS 50	50	175	75	125	4 x 14Ø



COUPLER

These are generally used to couple the vertical tubes where more length is require.

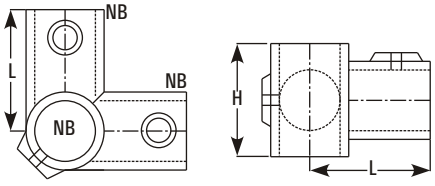
Cat.Ref.	NB	H	H1
CL 25	25	150	200
CL 30	30	150	200
CL 40	40	150	200
CL 50	50	150	200



BEND

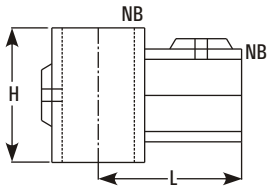
These are used to build frames on vertical tubes.

Cat.Ref.	NB	H	L
BN 25	25	50	55
BN 30	30	65	70
BN 40	40	70	80
BN 50	50	85	95



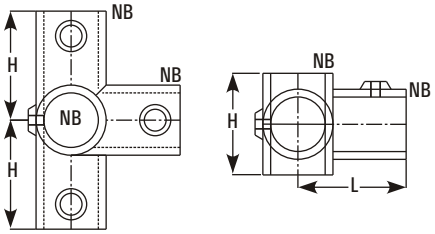
TEE

Cat.Ref.	NB	H	L
T 25	25	50	55
T 30	30	65	70
T 40	40	70	80
T 50	50	85	95



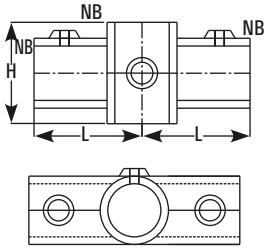
DOUBLE BEND

Cat.Ref.	NB	H	L
DBN 25	25	50	55
DBN 30	30	65	70
DBN 40	40	70	80
DBN 50	50	85	95



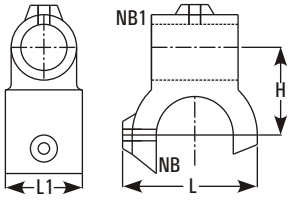
DOUBLE TEE

Cat.Ref.	NB	H	L
DT 25	25	50	55
DT 30	30	65	70
DT 40	40	70	80
DT 50	50	85	95



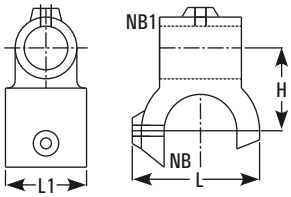
EQUAL BRACKET

Cat.Ref.	NB	H	L	L1
EBT 25	25	40	65	50
EBT 30	30	52	75	60
EBT 40	40	62	85	60
EBT 50	50	72	95	60



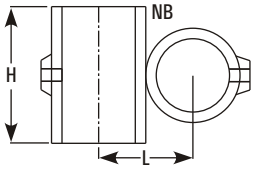
UNEQUAL BRACKET

Cat.Ref.	NB	NB1	H	L	L1
UBT 25/15	25	15	35	65	50
UBT 30/15	30	15	40	75	60
UBT 40/25	40	25	50	85	60
UBT 50/25	50	25	55	95	60



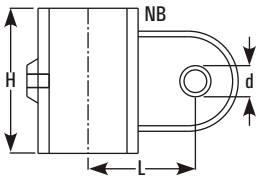
CROSS

Cat.Ref.	NB	H	L
X 25	25	50	45
X 30	30	65	55
X 40	40	65	70
X 50	50	65	85



SUPPORT

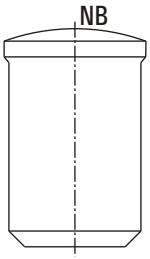
Cat.Ref.	NB	h	L	d
SPT 15	15	40	35	13
SPT 25	25	55	50	13
SPT 30	30	55	57	13
SPT 40	40	55	62	13
SPT 50	50	55	67	13



PLUGS

These are used to plug the open ends of galvanised tubes.

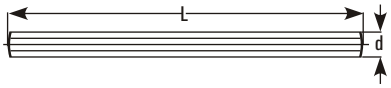
Cat. Ref.	NB
PG 15	15
PG 25	25
PG 30	30
PG 40	40
PG 59	50



STUDS

These are used as screwed rods with supports

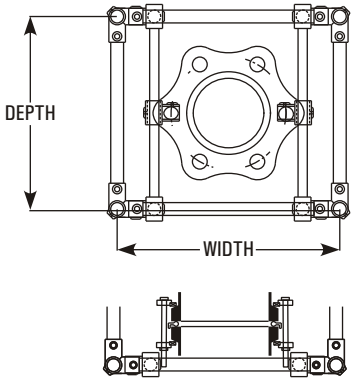
Cat.Ref.	d	L
ST 5/16-150	5/16"	150
ST 3/8-150	3/8"	150
ST 1/2-200	1/2"	200



STRUCTURE DIMENSIONS

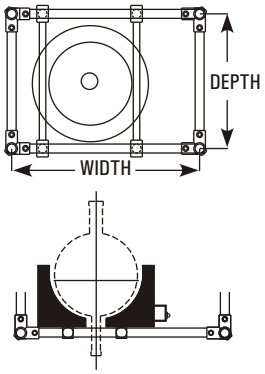
FOR COLUMNS

DN	Recommended tube size NB (mm)	Minimum Structure size Depth X Width
80	25	500 x 500
100	25	500 x 500
150	25,30	600 x 600
225	30	800 x 800
300	30	800 x 800
400	30	1000 x 1000
450	30,40	1000 x 1000
600	40,50	1200 x 1200



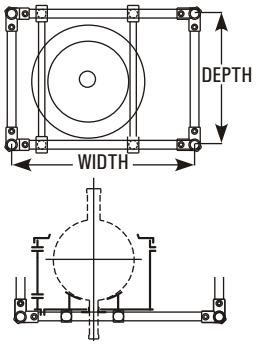
FOR VESSELS (IN HEATING MENTLES)

Size (Litres)	Recommended tube size NB (mm)	Minimum Structure size Depth X Width
20	25	400 x 600
50	25	600 x 800
100	25,30	800 x 800
200	30	800 x 1000



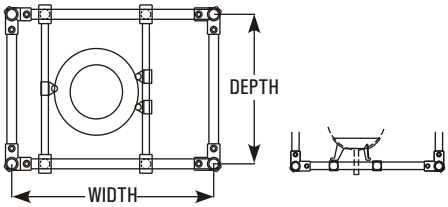
FOR VESSELS (IN HEATING BATHS)

Size (Litres)	Recommended tube size NB (mm)	Minimum Structure size Depth X Width
20	25	500 x 600
50	25	600 x 800
100	25,30	800 x 1000
200	30	800 x 1200



FOR VESSELS (IN VESSEL HOLDERS)

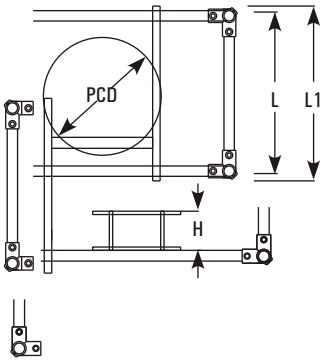
Size (Litres)	Recommended tube size NB (mm)	Minimum Structure size Depth X Width
20	25	500 x 600
50	25	600 x 800
100	25,30	1000 x 1000
200	30	1000 x 1000



COLUMN BASE SUPPORT FRAMES

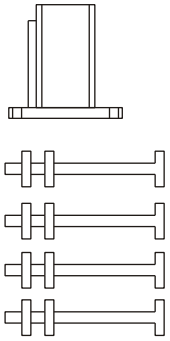
These channel frames are used as fixed support in erection of columns. These are supplied with full threaded jacking rods and U bolts.

Cat.Ref.	PCD	L1	L	H
FCSH 225	310	1000	800	75
FCSH 300	395	1000	800	75
FCSH 400	495	1200	1000	75
FCSH 450	585	1200	1000	100
FCSH 600	710	1400	1200	100

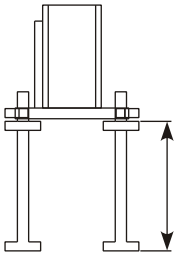


GROUTING OF BASE

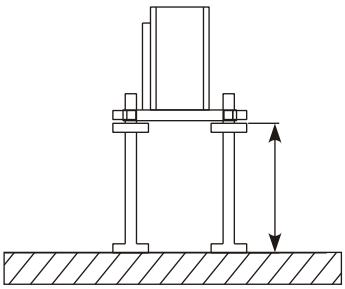
1.
Take one Cast Iron BASE and four foundation Bolts, each with 2 nuts.



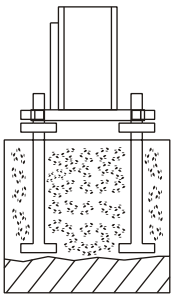
2.
Fit the bolts in BASE so that base is raised upto 150mm from head of bolts.



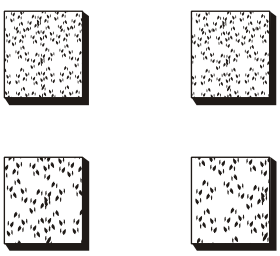
3.
Put this assembly on the floor and prepare a rough surface for proper bonding of grouting.



4.
Make a concrete block over the bolts of about 200 x 200 mm upto the base of BASE i.e. 150mm high.



5.
Prepare separate block for each BASE instead of making one big common block. For all BASES.



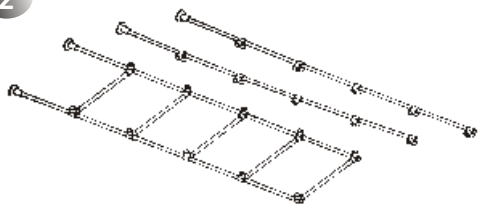
We can't think without glass

DESIGN OF STRUCTURE

1. Mark the position of required fittings on all the Vertical tubes, slide them in correct sequence and lightly Tighten.
2. Assemble one side frame of the structure by adding the cross tubes between two vertical tubes.
3. Assemble other side frame of the structure by adding the cross tubes between other two vertical tubes.
4. Build up the cross tubes in one side frame and Tighten lightly.
5. Add the other side frame on it and tighten all the fittings firmly.
6. Hoist the structure and brace it to some existing rigid feature.
7. Grout the foundation bolts and fix the structure bases with that.
8. Adjust bracing to obtain a correct plumb in Structure.
9. Adjust the horizonatal frames in correct level.
10. Assemble the support tubes at their positions.

1

2



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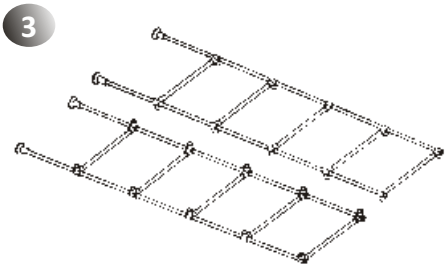

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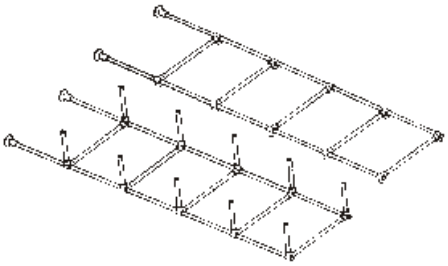

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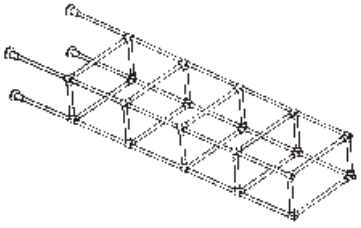

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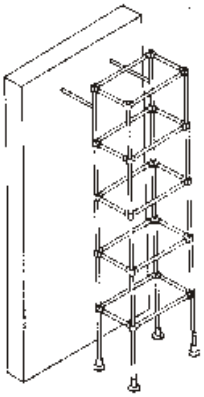

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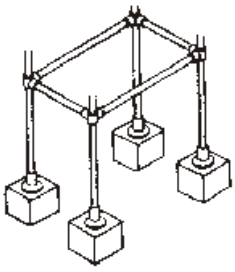

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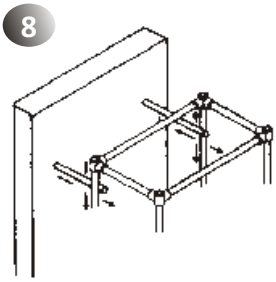

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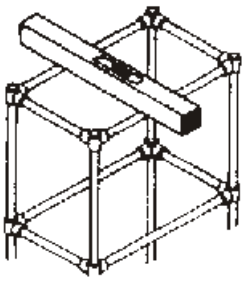

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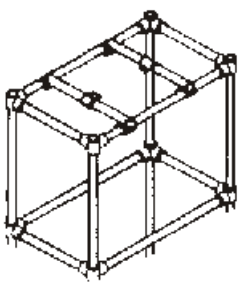
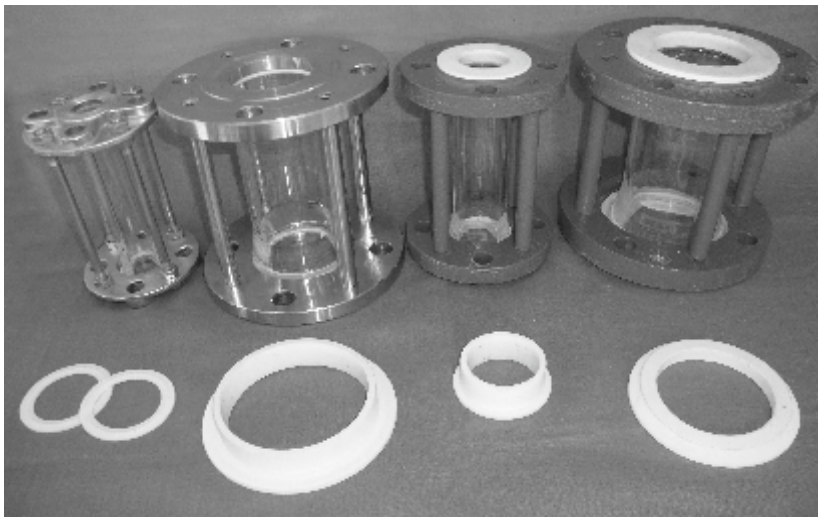


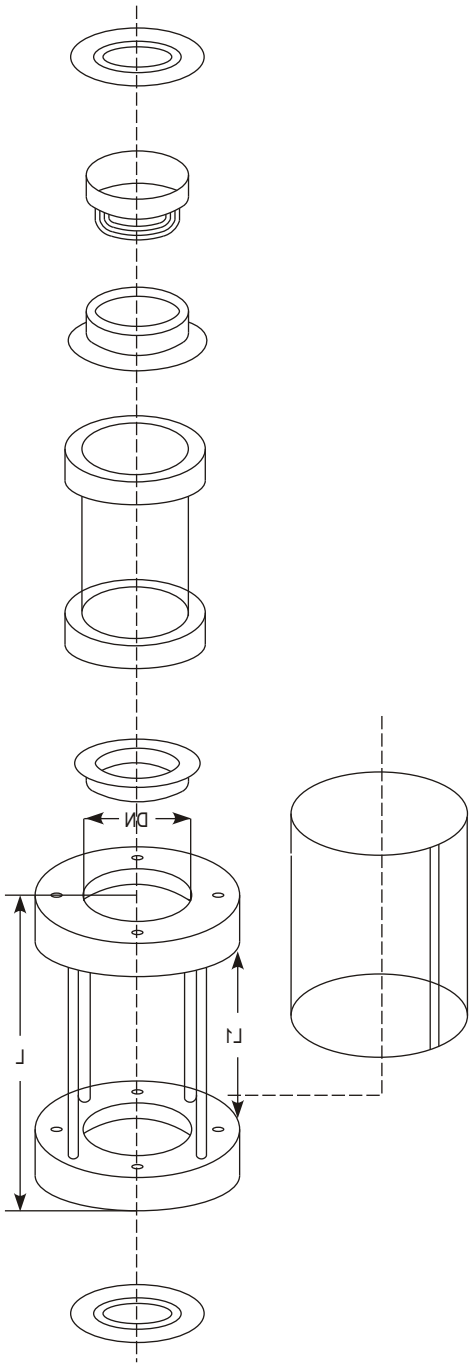
INSTRUMENTS

INSTRUMENTS

SIGHT GLASS



Sight Glass is a device used between any kind of non transparent pipelines to observe the flow of liquid. This can be used both in horizontal as well as vertical pipeline. Sight Glass is constructed in such a way that it gives a complete view from every angle. Maximum operating Temperature : 180' and hydraulic test pressure is 5kg/cm2. A sight glass consists of one glass pipe section, two metal frame, a pair of PTFE bushes or "O" ring and washers. Borosilicate pipe section is highly heat resistant has excellent chemical resistance and low thermal expansion.
Flange Drill : ASA 150# Standard Drilling.



SIGHT GLASS FRAME MS

Cat.Ref. Table E	Cat.Ref. Table F	Cat.Ref. Table ASA	DN	L	L1
SG 1/E	SG 1/F	SG 1/A	25	192	150
SG 1.5/E	SG 1.5/F	SG 1.5/A	40	192	150
SG 2/E	SG 2/F	SG 2/A	50	192	150
SG 3/E	SG 3/F	SG 3/A	80	192	150
SG 4/E	SG 4/F	SG 4/A	100	192	150
SG 6/E	SG 6/F	SG 6/A	150	192	150

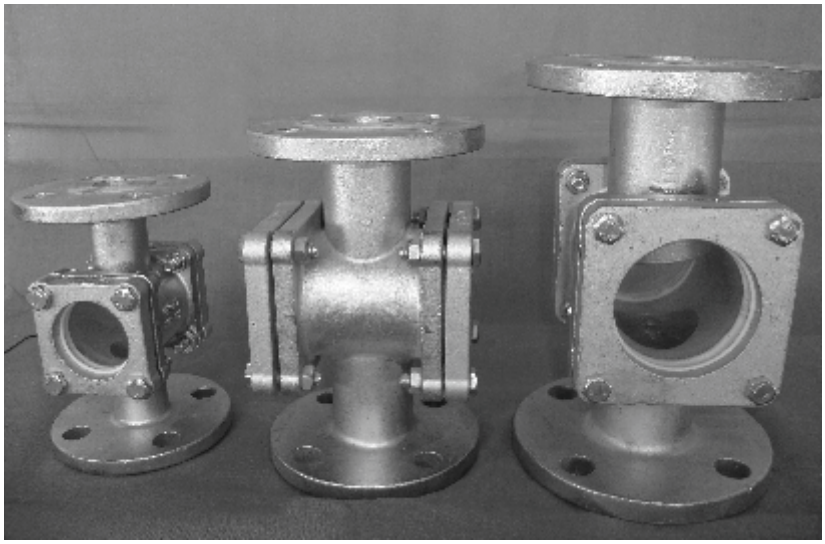
SIGHT GLASS FRAME SS 304

Cat.Ref. Table E	Cat.Ref. Table F	Cat.Ref. Table ASA	DN	L	L1
SG 1/E/304	SG 1/F/304	SG 1/A/304	25	192	150
SG 1.5/E/304	SG 1.5/F/304	SG 1.5/A/304	40	192	150
SG 2/E/304	SG 2/F/304	SG 2/A/304	50	192	150
SG 3/E/304	SG 3/F/304	SG 3/A/304	80	192	150
SG 4/E/304	SG 4/F/304	SG 4/A/304	100	192	150
SG 6/E/304	SG 6/F/304	SG 6/A/304	150	192	150

SIGHT GLASS FRAME SS 316

Cat.Ref. Table E	Cat.Ref. Table F	Cat.Ref. Table ASA	DN	L	L1
SG 1/E/316	SG 1/F/316	SG 1/A/316	25	192	150
SG 1.5/E/316	SG 1.5/F/316	SG 1.5/A/316	40	192	150
SG 2/E/316	SG 2/F/316	SG 2/A/316	50	192	150
SG 3/E/316	SG 3/F/316	SG 3/A/316	80	192	150
SG 4/E/316	SG 4/F/316	SG 4/A/316	100	192	150
SG 6/E/316	SG 6/F/316	SG 6/A/316	150	192	150

DOUBLE WINDOW SIGHT GLASS



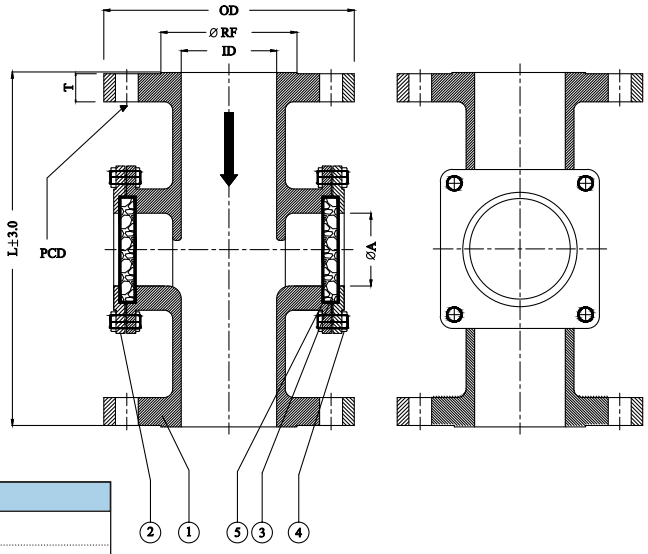
Double Window Sight Glass is used to meet industrial requirements of various applications to inspect the process fluid. Double Window Sight Glass contains two toughened glasses mounted opposite to each other. It is available in various thickness and diameter of glass to suit various applications, with respect to fluid pressure and temperature.

The investment casting construction ensures superior finishing and quality of the sight glass. Double Window Sight Glass is very easy to replace glass without dismantling the whole Sight Glass assembly from process Pipeline.

Double Window Sight Glass

Salient Features :

* Easy Maintenance
* Available in I.C. / CF8 / CF8M
* Manufactured to the Highest Standard
* Durable Construction
* Toughened fine polish
* Large View Area
* Special Face to Face Dimension
* Sizes Range from 25 mm to 100 mm
* Design & Testing As Per Mfg. Standard
* Material Test Certificate & Pressure Test Certificates furnished on request.



Operating Parameters

* Maximum Operating Pressure 10 to 15 Kg / cm^2
* Maximum Operating Temperature 150°C
* Maximum Thermal Shock 100°C

Sr.No	Description	Qty	Material
1	Body	1	I.C. / CF8 / CF8M
2	Cover	2	I.C. / CF8 / CF8M
3	Glass	2	Toughened
4	Bolt / Nut	8	SS 304 / 316 / REQU.
5	Gasket Packing	4	PTFE

Cat.Ref.	Size (NB)	L	ID	ØA	OD	ØRF	T	PCD	Ø D x N
SGDW 1	25 MM	130	25	45	108	51	11	80	16 x 4
SGDW 1.5	40 MM	170	40	60	127	73	14	98	16 x 4
SGDW 2	50 MM	180	50	70	152	92	16	120	19 x 4
SGDW 3	80 MM	205	80	90	191	127	19	152	19 x 4
SGDW 4	100 MM	230	100	100	229	157	25	191	19 x 4

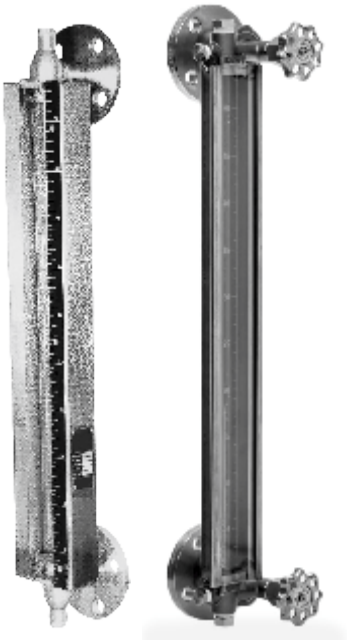
* Tolerance ±3

Technical Data

* End connection : Flange ends to as per ASME B16.5
* Face to face : ASME B16.5
* Manufacturing Std. : MFG
* Testing Std. : API 598

LEVEL INDICATOR (Tubular Type)

Tubular level Gauge for visual liquid level observation is very common in process industry. It is a simple and reliable device for direct reading in atmospheric or pressurized tank application. It is mounted parallel, along the side of tank. As the process level fluctuates, the level in the transparent glass tube changes accordingly and gives local liquid indication.



This is a very simple instrument. It is flange mounted to the tank. As the liquid level rises in the tank, the liquid also rises inside the glass tube and one can see the liquid level in the in the tank. In this model the glass tube is enclosed in an enclosure which also carries a graduated scale. The liquid level in the gauge can be conveniently read against this scale.

Specification

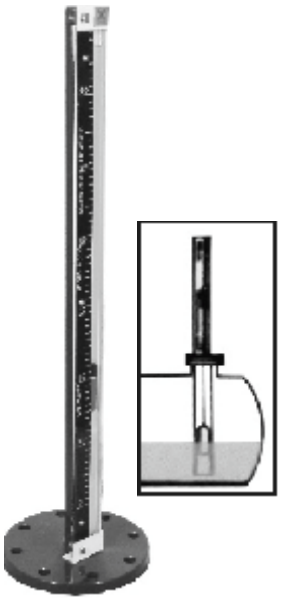
Application	:	Liquid
Wetted Part	:	MS/CS/SS304/SS304L/SS316/SS316L/PP/HDPE PVC/PVDF lined/PIFE Lined Other Material on request
Glass Protecting Channel	:	MS/SS304/SS316/PP/FRP/Aluminium
Design Temperature	:	Up to 80^{0}C
Design Pressure	:	Up to 7 Kg/cm^2 and full vacuum
C/C Distance	:	Up to 3000 mm
Connection	:	Flanged to ASA/BS/DIN/Socket Weld/Butt Weld

Ball Check type Tubular Type Level Indicator

Ball check type Level Indicator facility is provide to prevent "liquid loss" from vessel during breakage of gauge glass. It consists of a capsule located within the gauge 'neck' and contains a 'ball' which moves freely along its inner race between the stopper & orifice. During breakage, the pressure on 'ball' from gauge side will be atmospheric, whereas higher pressure from vessel side will cause the ball to move and block the orifice to minimize liquid loss.

LEVEL INDICATOR (Top Mounted Magnetic)

Simple principle of mechanics and magnetism harnessed to offer an absolutely safe, reliable and trustworthy level indicator for dangerous and toxic liquids under high pressure and temperature.



As the liquid level rises in the tank, the float is lifted up due to buoyancy. The float carries a stem attached to it and on the other side of the stem a magnet is fixed. The float stem moves inside an SS enclosure. External to this enclosure is a glass tube, which carries the magnetic follower (red in Colour). Due to magnetic attraction, the magnet on the float steam and the magnetic follower are coupled and move in union. As the float moves along with the liquid, the follower also moved inside the glass tube, and the position of the follower can be read against the scale.

Specification

Liquid	:	Acids/Alkalies/Solvents/Oils/Lubricants/Liquid Gases Stored in Underground or Over Ground Tanks
Density / Sp. Gravity	:	Minium 0.6
Viscosity	:	Up to 250 cp
Glass Protecting Channel	:	MS/SS304/SS316/PP/FRP/Aluminium
Design Temperature	:	Up to 230^{0}C
Design Pressure	:	Up to 7 Kg/cm^2
Tank Height (Range)	:	Up to 3000 mm
Material of Wetted Parts	:	MS/CS/SS304/SS304L/SS316/SS316L/PTFE Lined SS/PVC/PP
Connection	:	Flanged to ASA/BS/DIN/Triclover

Minimum Nozzle size required 4" NB for Liquids Below 0.8 Density

LEVEL INDICATOR (Side Mounted Magnetic)

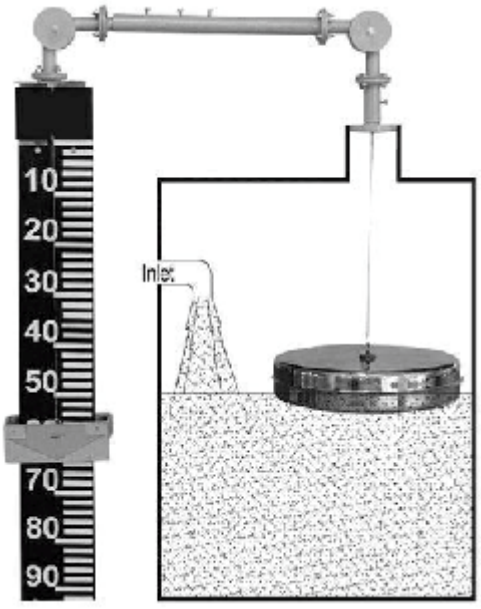
Simple magnetic principle used to get unique, absolutely safe and most reliable level indicator for dangerous liquids even under high pressures.

As the liquid level rises in the tank, the float is lifted up due to buoyancy. The float moves inside a SS float chamber. External to this float chamber is a glass tube/indicating PVC magnetic ball assembly which carries the magnetic follower. Due to magnetic attraction, the magnet on the float and the magnetic follower are coupled and move in union. So as the float moves along with the liquid, the follower capsule also moves inside the glass tube and PVC magnetic ball changes its colour, and the position of the follower capsule/magnetic ball can be read against the scale.

Specification

Liquid	:	Acids/Alkalies/Solvents/Oils/Lubricants/Liquid Gases
Density / Sp. gravity	:	Minimum .06
Viscosity	:	Up to 250 cp
Design Temperature	:	Up to 230^{0}C
Design	:	Up to 15 Kg/cm^{2}
C/C Distance	:	Up to 5000 mm
Material of wetted Parts	:	SS304/SS304L/SS316/SS316L
		PIFE Lined SS/PVC/PP
Connection	:	Flanged to ASA/BS/DIN/Triclover

LEVEL INDICATOR (Float & Board Type)



A totally new, reliable and accurate system for liquid level measurement in tall and overhead tanks.

Highly efficient and rugged in construction, this instrument is very suitable for large storage tanks for Water, Fire Water, DM Water, Oil, LSHS, Diesel, Lube Oil, Vegetable Oils, Molasses, Silicates, Glucose, All Non-Hazard, Non-Pressurised tank.

As the liquid rises in the tank, the large float also goes up, in turn moving the pointer on the graduated scale. The float is connected to the pointer with the wire rope which glides over almost frictionless nylon rollers, thereby ensuring trouble free operation.

Specification

Tank height/Range	:	0 to 15 mtrs Without Wire Rope Guide Assembly
		Above 15 mtrs With Wire Rope Guide Asseembly
Glass Protecting Channel	:	MS/SS304/SS316/PP/FRP/Aluminium
Design Temperature	:	Up to 150^{0}C
Design Pressure	:	Up to 1 Kg/cm^{2}
Connection	:	Flanged to ASA/BS/DIN/Screwed BSP/NPT
Wetted Parts Material	:	MS/CS/SS304/SS304L/SS316/SS316L/PP/HDPE

FLAME ARRESTOR

What is a Flame Arrestor?

A flame arrestor is a device fitted to the opening of an enclosure or to the connecting pipe work in a system of enclosures and which permits gases or vapours to flow under normal operating condition but prevents the transmission of a flame should an ignition take place.

The flame arrestors are divided into various group accordingly to their, place of installation, type and time of the flame presence.

How Flame Arrestor Work

Flame Arrestor are passive device with no moving parts. They prevent the propagation of flame from the exposed side of the unit to the protected side by the use of wound crimped metal ribbon type flame cell element. This construction produces a matrix of uniform opening that are carefully constructed to quench the flame by absorbing the heat of the flame. This provides an extinguishing barrier to the ignited vapour mixture.

Under normal operating conditions the flame arrestor permits a relatively free flow of gas or vapor through the piping system. If the mixture is ignited and the flame begins to travel back through the piping, the arrestor will be prohibit the flame from moving back to the gas source.

TYPE OF FLAME ARRESTOR

In-line flame arrestor

In-line flame arrestors are so called because they are located in the process line. If the flame could come from either direction then a bi-directional flame arrester is require. In-line flame arrester can be either deflagration or detonation arrestor depending on the conditions under which they are to be used. Pipe orientation is usually not a problem unless liquid is entrained in the gas flow and would tend to collect in the arrestor.

In-Line Flame Arrestor

End-of-line flame arrestor

End-of-line flame arrestor prevent flame from entering the pie, and not (as is sometime believed) from exiting the pipe. Without a weather-hood they may be mounted in almost any oriented but inverted mounting is not good idea as this increase the risk of heat being trapped and causing a burn through. With a weather-hood incorporated they may be fitted in a conventional vertical orientation and be used outside exposed to rain and snow.

End Of-Line Flame Arrestor

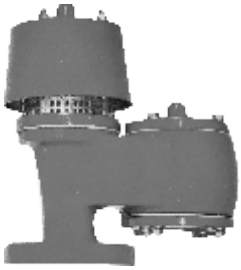
Standard Material of Construction

Part Name	Material
Body	CS ASTM A216 Gr. WCB / SS ASTM A351 Gr. CF8/CF8M
Arrestor Housing	CS / SS304 / SS316
Arrestor Element	SS316
Weather Hood (for end of line type)	SS
Gasket	CAF
Hex Bolt & Nut	SS
Stud & Nut	MS Zinc Plated, ASTM A193 Gr. B7 / 2H / Ss304 / Ss316
Finish	Epoxy Coated in CS, SS supplied unpainted

Breather Valves

Breather valve helps in breathing of the Storage in and out, These are mainly designed to prevent (1) Vapour Losses, (2) Evaporation, (3) Over Pressure and (4) Storage Buckling due to Negative Pressure(Vaccum). These Breather Valves are suitable for chemical conditions. Temperature and Blanketing System, In case of over pressure, due to high IN flow to the Storage, then Pressure inside is balances to normal, while withdrawing the liquid from the storage creates vaccum inside the Storage, as we are aware that Vaccum is such is such negative which can hold the liquid from drawing out or Buckle the vessel, In both the cases Breather Valve plays very important role in functioning of total system.

Breather Valves are designed with reference to API 2000, Spring Loaded Pallets can also be furnished, in case the vapour of the stored fluid will cause pollution, Flanged Units can convoy Vapour through inlet & outlet tubes to Safety Zone.



Breather Valve

Part Name	Material
Body Material	Aluminium / CS ASTM A216 Gr WCB / CS ASTMA 351 Gr Cf8/ CF8M / PTFE Lined
Trim MOC	CI / SS 304 / SS 316 / PTFE Coated.
Pallet / Lift	Fiber Glass Cloth Backed with Neoprene Rubber.
Weather Hood	Cast Al / FRP mould / CI.
Venting Screen	SS Wire Mesh / Perforated Sheet.
Bolts & Nuts	MS Zinc plated / ASTM A193 Gr B7/B8, ASTM a 154 Gr 2/24/8/8A / SS 304 & 316.
Size Available	25 NB to 150 NB.

* Due to the continuous development, the design and given data are subject to change without prior notice.

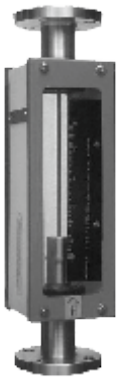
ROTAMETER

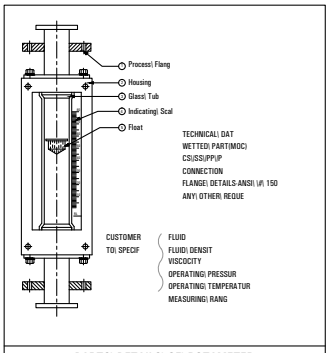
A Rotameter is a device that measures the flow rate of liquid or gas in a closed tube.

A Rotameter consists of a Conical Tube, typically made of glass with a float actually a shaped weight, inside that is pushed up by the Drag Force of the flow and pulled down by gravity. The position of the float indicates the flow rate on a marked scale.

It Is an instrument used to measure instant flow rate of Liquids and Gases.

It is installed in the line vertically upward with flanged or screwed connection.





PARTS\ DETAILS\ OF\ ROTAMETER

Specification

Fluid	:	Liquid
Density/Sp. gravity	:	Up to 2.95
Viscosity	:	Up to 200 cp
Design Temperature	:	Up to 150^{0}C
Design Pressure	:	Up to 15 Kg/cm^2 Depending on Model
Measuring Range	:	2.5 to 40,000 LPH of Water/Liquid & 0.1 to 750 NM^3 /hr of Air/Gas at Ntp
Line Size	:	Up to 4" NB
Available Material	:	MS/CS/SS304/SS304L/SS316/SS316L/PTFE Lined MS or SS SS/PVC/PP
Connection	:	Flanged to ASA/BS/DIN/Triclover Standard Screwed to BSP/NPT(M/F)
Accuracy	:	+ 2% of FSD & + 1.5% on request

Advantages :

A rotameter requires no external power or fuel, it uses only the inherent properties of the fluid, along with gravity, to measure flow rate.

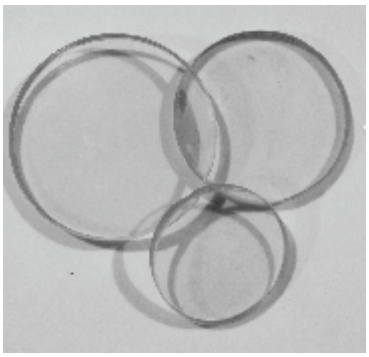
A rotameter is also a relatively simple device that can be mass manufactured out of cheap materials, allowing for its widespread use.

Since the area of the flow passage increases as the float moves up the tube, the scale is approximately linear.

Clear glass is used which is highly resistant to thermal shock and chemical action.

TOUGHENED GLASS

Toughened or tempered glass is glass that has undergone processes of controlled thermal treatment to increase its strength. Toughened glass is made from annealed glass that has been heated to approximately 650 C and then rapidly cooled. Due to the increased heat treatment and rapid cooling of the glass, especially between the surface and the inside of the glass, the treatment produces different physical properties. This results in compressive stress on the surface and improved bending strength of glass. Before toughening, the glass must be cut to size or pressed to shape. This is because once it is toughened, it cannot be re-worked on. Toughened glass is widely used in a number of applications.



Properties of Toughened Glass :

Properties	Toughened Glass
Thermal Shock Resistance	Up to 250°C
Mechanical Strength	Four to five times stronger than annealed glass
Tensile Strength	65 MPa
Bending Strength	120-200 N/mm2
Surface Compression	> 95 MPa
Design Stress for Architectural Purposes	50 MPa
Fragmentation	Small round crystals
Conducive for Processing	Cannot be cut after Toughening

TWO PIECE DESIGN FLANGED END BALL VALVES

MOC : SS-304 / 316

Ball Valves are mostly used in the Process Industries. The compact design of our valves will give you a product which will suit your requirements perfectly. We have paid attention to the design of all aspects of the product even the 'so-called' minute ones. Ball Valves are quarter-turn, straight through flow valves.

Some of the salient features are :

1. Compact design
2. Interchangeable parts
3. Blow-out proof stem
4. Low torque
5. Mirror finish ball
6. Studs and nuts of S.S.
7. Designed for easy maintenance
8. Smooth operation
9. Excellent control
10. Tight shut-off

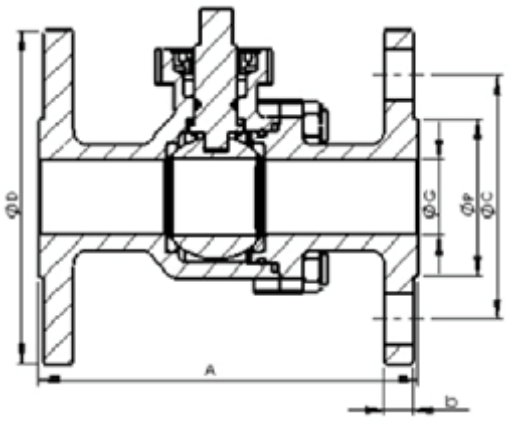
Two Piece Design Flanged End Ball Valves

1)	Design & Manufacturing	:	ASME B16.10
2)	Testing Standard	:	EN 12266 -I, BS 6755(part - 1)
3)	Material	:	A216 GR. WCB, A351 GR. Cf8, CF8M, Duplex Steel Etc.
4)	Class	:	ASME B16.5 CL. 150#
5)	Suitable Medium	:	Water, Oil, Air & Some corrosive liquid
6)	Flanged End	:	ASME B16.5
7)	Face to Face	:	ASME B16.10
8)	Operation	:	Lever, (Pneumatic On Request)

Dimensions (mm)									
Size	Face to Face (A)	Nominal Bore (ØG)	Flange OD (ØD)	Flange Thickness (b)	Raise Face (Ø P)	Raise Face Height	PCD (Ø C)	Drill Dia	No of Holes
15mm	108	13	90	8	35	2	60.5	16	4
20 mm	117.3	19	100	8.7	43	2	70	16	4
25mm	127	25	110	9.8	50.8	2	79.5	16	4
40mm	165	38	125	12.7	73	2	98.5	16	4
50mm	178	49	150	140	92	2	120.5	19	4
65mm	190	62	180	15.9	105	2	139.5	19	4
80mm	203	74	190	17.5	127	2	152.5	19	4
100mm	229	100	230	22.3	157.2	2	190.5	19	8

Test Pressure		
Test Type	CLASS 150	
	Kg/cm^2	PSIG
Hydro Body	30	455
Hydro Seat	22	312
Hydro Back Seat	22	312
Air/Pneumatic	6	80

* For Ball Valve Back Seat Test Not Applicable.



STANDARD SYSTEMS

1. Simple Distillation Unit
2. Reflux Reaction Cum Distillation Unit
3. Fractional Reaction Cum Distillation Unit
4. Fractional Vacuum Distillation Unit
5. Glass Assemlies Over GLR
6. Glass Reactor With Metal Jacket

We can't think without glass

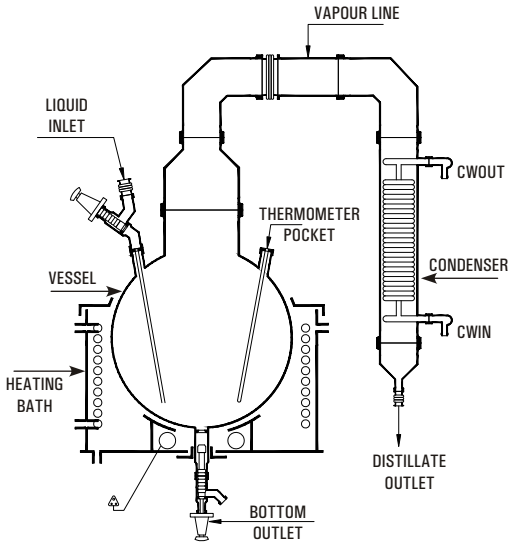
SIMPLE DISTILLATION UNITS

It consists of a vessel mounted in a heating bath and fitted with a condenser for condensing the vapours. A receiver with drain valve can be added for receiving the condensate.

The units are available in vessel sizes of 20, 50, 100, 200, 300 & 500 L and is suitable for operation under atmospheric pressure and full vacuum.

Cat. Ref.	Volume of Reactor	Bath KW	Vapour Line	Condenser M²
SDU 10	10 L	2.0	50 DN	0.20
SDU 20	20 L	3.0	80 DN	0.35
SDU 50	50 L	4.5	100 DN	0.50
SDU 100	100 L	6.0	150 DN	1.50
SDU 200	200 L	9.0	150 DN	1.50
SDU 300	300 L	10.5	225 DN	2.5

* SDU 500 on request basis



REFLUX REACTION CUM DISTRIBUTION UNIT

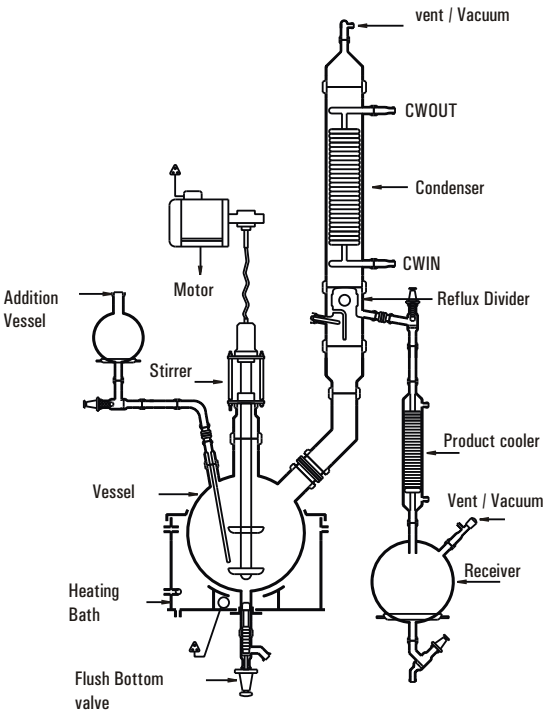
This unit is used for carrying out reactions under stirred condition and with provision for simple reflux distillation.

The reaction vessel is mounted in a heating bath and fitted with addition vessel, motor-driven stirrer and provision for condensation with refluxing. The product is sub-cooled and collected in a receiver.

The units are available in vessel sizes of 20, 50, 100, 200, 300 & 500Ltr is suitable for operation under atmospheric pressure and full vacuum.

Cat. Ref.	Volume of Reactor	Bath KW	Addition Vessel	Vapour Line	Condenser HTA M²	Cooler HTA M²	Receiver Size
RRDU 10	10 L	2	2L	50 DN	0.2	0.1	2L
RRDU 20	20 L	3	2 L	80 DN	0.35	0.10	5 L
RRDU 50	50 L	4.5	5 L	100 DN	0.50	0.20	10 L
RRDU 100	100 L	6	10 L	150 DN	1.50	0.35	20 L
RRDU 200	200 L	9	20 L	150 DN	1.50	0.35	20 L
RRDU 300	300 L	10.5	20 L	225 DN	2.50	0.5	20 L

* RRDU 500 on request basis

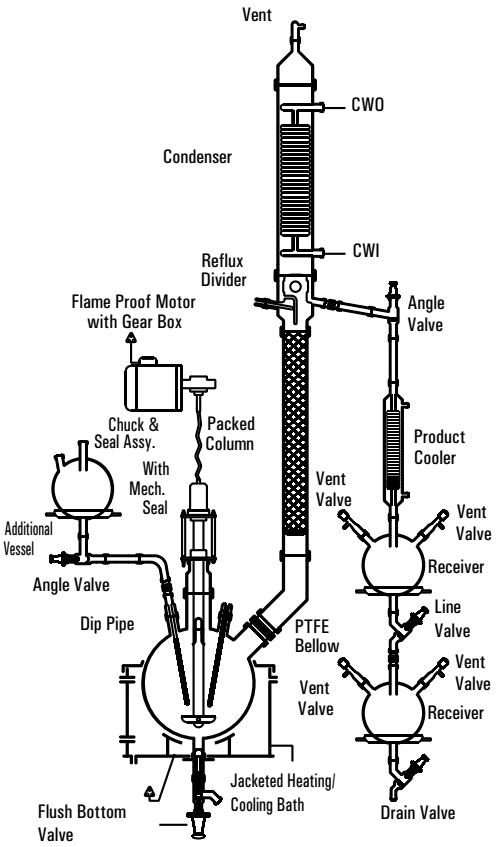


Optional items

- Heating mantle instead of jacketed heating / cooling bath.
- Simple drain valve instead of flush bottom valve.
- MS PTFE lined stirrer instead of glass stirrer.
- Variable frequency drive for variable speed.
- Cylindrical vessel instead of spherical vessel.

FEACTIONAL REACTION CUM DISTILATION UNIT

The unit has been designed to suit the customers requirement of combination of versatile reaction/distillation or combination for pilot plant work.
This has a flexibility of working at atmospheric pressure as well as under vacuum.
Typical unit has a reaction vessel fitted in a Metal Heating/Cooling bath having facility for heating and cooling bath by means of Heating/Cooling Fluids as a media.
The Standard system is equipped with stirrer heaving mechanical seal,a packed column on the side neck of the vessel, reflux divider, coil type condenser and or receiver system having a product, cooler, vent, drain and vacuum valves, Option of speed variation by machanical variator or electronic variator can be provid.
Receiver system is equipped with product cooler. Vent / vaccum valve and drain valve.
The above unit are available in 10 Ltr./20 Ltr./50Ltr.100 Ltr./200 Ltr. & 300Ltr Capacity with Spherical Reactor.



Cat. Ref.	Volume of Reactor	Bath KW	Addition Vessel	Vapour Line	Condenser HTA M²	Cooler HTA M²	Receiver Size
FRDU 10	10 L	2	2 L	50 DN	0.2	0.1	2L, 2L
FRDU 20	20 L	3	2 L	80 DN	0.35	0.1	2L, 5L
FRDU 50	50 L	4.5	5 L	100 DN	0.5	0.2	5L, 10L
FRDU 100	100 L	6	10 L	150 DN	1.5	0.35	10L, 20L
FRDU 200	200 L	9	20 L	150 DN	1.5	0.35	10L, 20L
FRDU 300	300 L	10.5	20 L	225 DN	2.5	0.5	20L, 20L

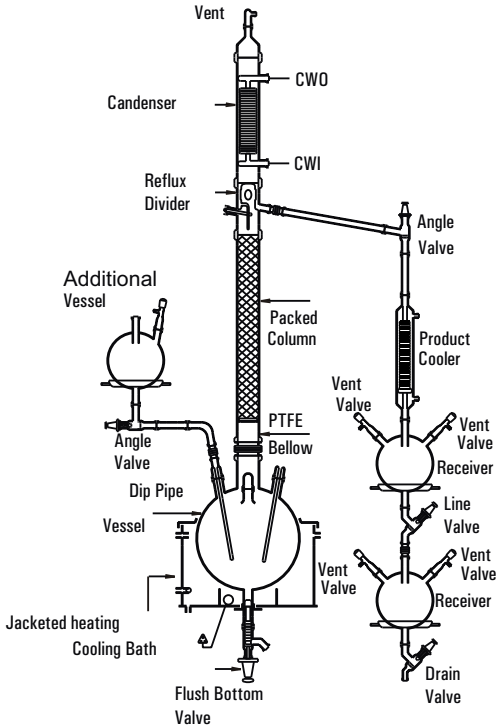
* FRDU 500 on request basis

Optional Items :
- Heating mantle instead of jacketed heating / cooling bath.
- Simple Drain Valve instead of flush bottom valve.
- MS PTFE lined stirrer instead of glass stirrer.
- Variable frequency drive for variable speed.
- Cylindrical vessel instead of spherical vessel.

FEACTIONAL VACUUM DISTILATION UNIT

This unit is typically used for only distillation and fractionation under vacuum or at atmospheric pressure. Typical unit has distillation vessel fitted in a Metal Heating/ Colling bath and with a Packed Column above Reflux divider and coil condensors below are fitted on the packed column. Condensed material is either taken back to the vessel or to the receiver via product cooler.

The above units are available in 10 Ltr./20 Ltr./50 Ltr./100 Ltr./200 Ltr. & 300Ltr. Capacity with Spherical vessels.



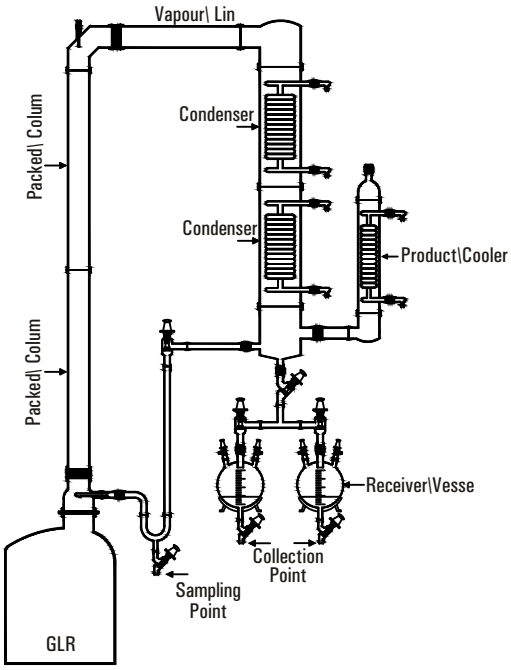
Cat. Ref.	Volume of Reactor	Bath KW	Addition Vessel	Vapour Line	Condenser HTA M²	Cooler HTA M²	Receiver Size
FVDU 10	10 L	2	2 L	50 DN	0.2	0.1	2L, 2L
FVDU 20	20 L	3	2 L	80 DN	0.35	0.1	2L, 5L
FVDU 50	50 L	4.5	5 L	100 DN	0.5	0.2	5L, 10L
FVDU 100	100 L	6	10 L	150 DN	1.5	0.35	10L, 20L
FVDU 200	200 L	9	20 L	150 DN	1.5	0.35	10L, 20L
FVDU 300	300 L	10.5	20 L	225 DN	2.5	0.5	20L, 20L

* FVDU 500 on request basis

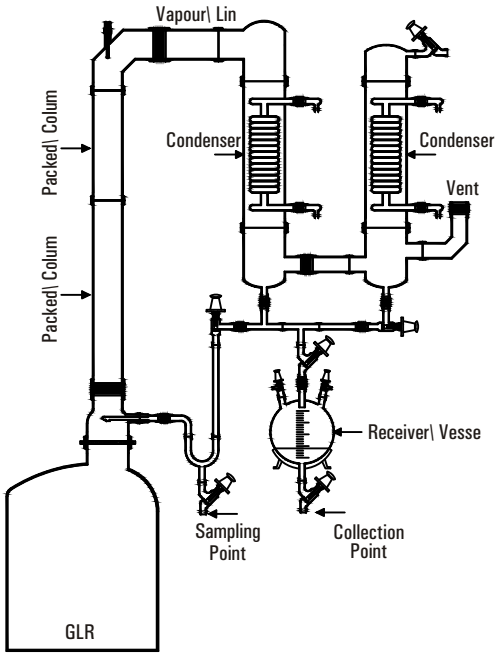
Optional Items :
- Heating mantle instead of jacketed heating / cooling bath.
- Simple Drain Valve instead of flush bottom valve.
- Cylindrical vessel instead of spherical vessel.

GLASS ASSEMBLIES OVER GLASS LINED REACTOR (GLR)

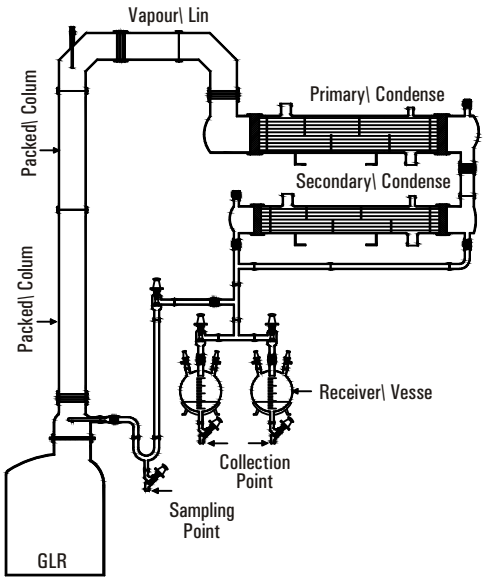
Design and features are built according to your requirements. Glass lined reactors are used instead of glass reactors specially, when scale of operation is large and relatively high pressure steam is to be used as heating media. Quite often assemblies like simple distillation unit, fractional distillation unit etc. are installed above glass lined reactors. The basic features of these assemblies remain the same but glass shell and tube heat exchanger is perferred due to large scale of operation. The different type of distillation unit over GLR are shown in adjecent figure GMP version are standard option.



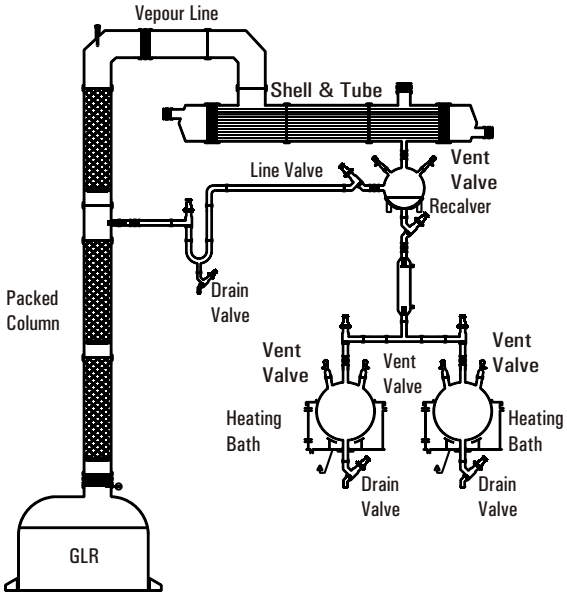
DESIGN 1



DESIGN 2



DESIGN 3



DESIGN 4

GLASS REACTOR WITH METAL JACKET

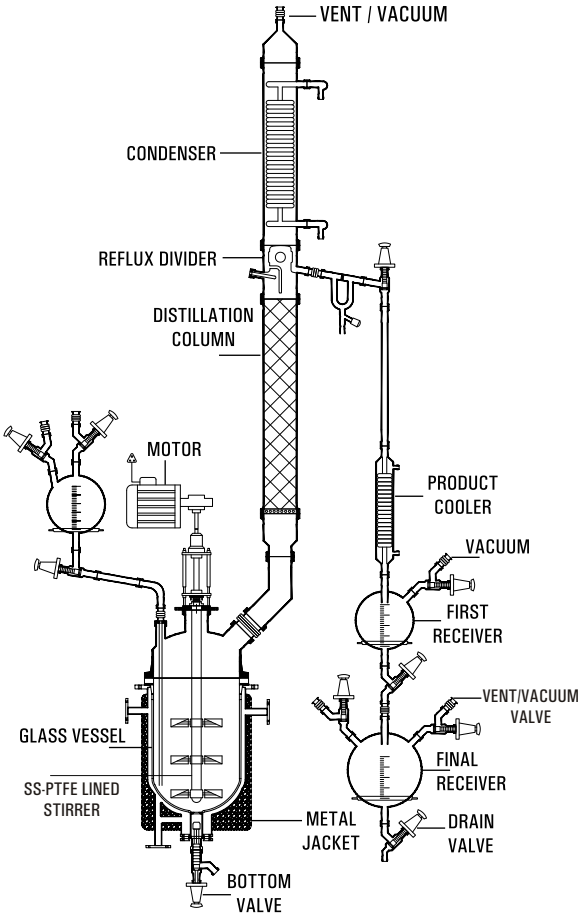
According to the customer's requirements and standard, we manufacture jacketed glass reactor which has many functions to satisfy kinds of experiments.

S. S. Scientific offers Glass Reactor with Metal Jacket for chemical & pharmaceutical industries for process development. Glass reactor will have metal jacket and metal insulation.

Glass Metal jacketed Reactor 5-500 liter
Pressure: - up to 1 Bar
Temperature: -50°C to +200°C
Material: Borosilicate glass 3.3 /PTFE/ SS 316.

Key Features:

- Reactor lift for easy opening i.e optimised for easy vessel cleaning.
- Temperature monitoring and control.
- Gas purging available.
- Vacuum / exhaust piping arrangement.
- Additional feeders / receivers as per requirement.
- Solid feeding arrangement.
- Ready for Cryogenic reactions (-50°C).
- Mixed systems with pressure reactor and vacuum distillation.



TECHNICAL PACKAGES

1. Wiping Film Evaporator
2. Gas Absorber (Falling Film Type)
3. HCL Gas Absorber (Packed Type)
4. Bromine Recovery System
5. Liquid-Liquid Extraction Unit
6. Solid-Liquid Extraction Unit
7. Multi Purpose Reaction Cum Distillation Unit
8. Mobile Mixing Reactor
9. Anhydrous HCL Gas Generator
   - Boiling Route
   - Sulphuric Acid Route
   - Calcium Chloride Route
10. Mobile Gas Scrubber
11. Continuous Distillation System
12. Pilot Plant Series

WIPING FILM EVAPORATOR

Introduction

Heat sensitive products like vitamins, hormones, enzymes or aromatic substances get adversely affected by way of material degradation due to higher temperature and residence time. This can be avoided if the reactions are carried under vacuum which allows the working temperature to be lowered, and by forming a thin film to reduce residence time, especially in case of liquids of high viscosity, or low thermal conductivity.

For these, S.S. Scientific introduces a specially designed range of Evaporators made of Borosilicate Glass. The range varies from laboratory size (80DN) to production plants (300DN).

Construction

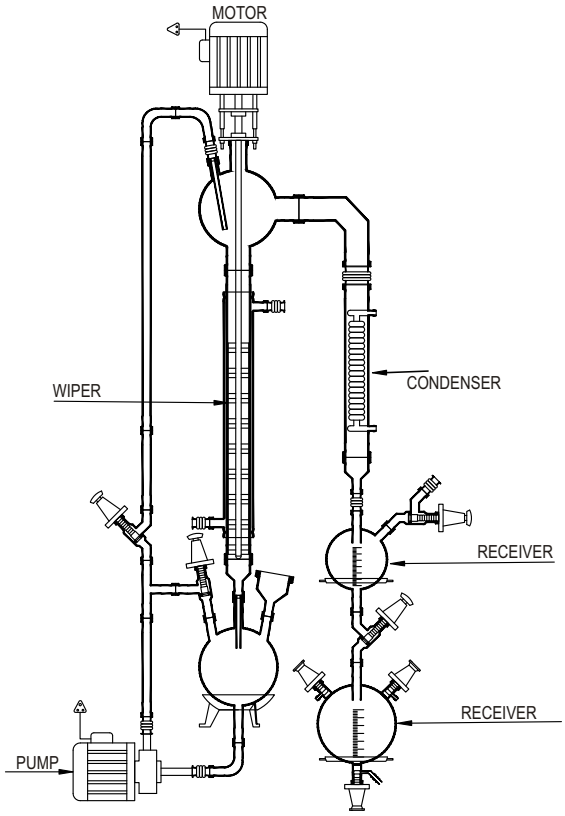
The core of the unit is a rotating, fully corrosion resistant wiper system. This has four rows of PTFE wipers. These rows of wipers are divided into vertical segments and each wiper is mounted between two glass rods.

A liquid distributor is located above the wipers. It distributes the medium, fed in through the feed pipe uniformly around the circumference of the evaporator before the medium is finally picked up by the wiper system itself.

The Evaporator has a vapour outlet which can be connected to a descending coil condenser and a receiver.

The drive used for the wiper system is a standard geared-motor with an AC speed regulator. The wiper shaft is sealed by means of a mechanical seal. The evaporator body is constructed as a jacketed pipe. For heating, thermic fluid upto 150 C can be circulated in the jacket.

The unit is designated by the jacketed pipe size. And the capacity of the unit depends on the evaporation rate which in turn depends on the Heat Transfer Area available, the type of heating media, and the evaporation environment i.e. vacuum conditions.



Model	Size DN (mm)	HTA (M^2)
WFE 3	80	0.35
WFE 4	100	0.47
WFE 6	150	0.70
WFE 9	225	1.06
WFE 12	300	1.41

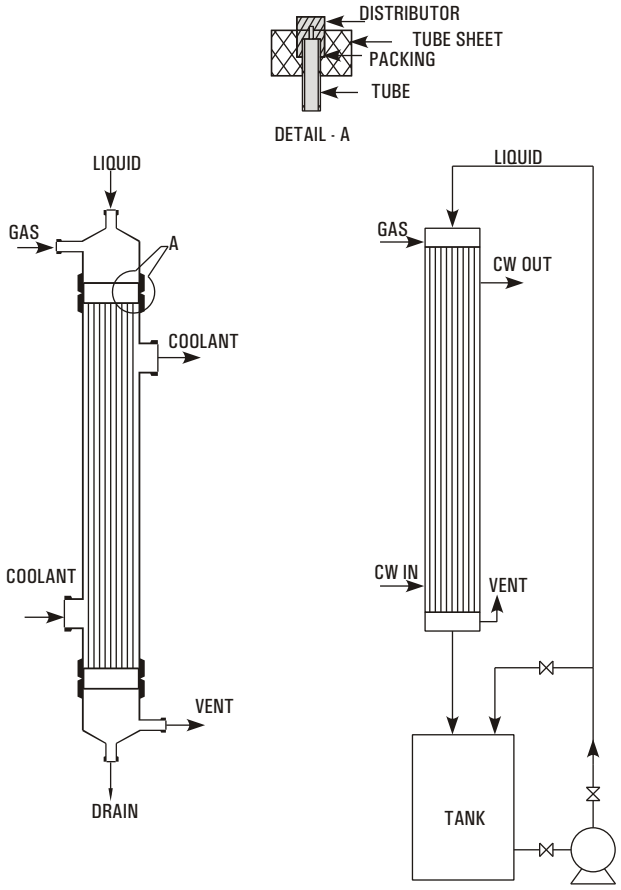
GAS ABSORBER (FALLING FILM TYPE)

Efficient gas absorption depends on the following :

1. Intimate contact. 2. Efficient Heat Transfer.

This is achieved in a Falling Film Absorber which is essentially a shell & tube heat exchanger in which both gas to be absorbed and absorbing liquid flow co-currently downward with extraction of heat by circulation of coolant in the shell. The absorbing liquid is circulated through a tank till desired concentration is achieved. The liquid flows at such a rate that the tubes do not flow full of the liquid but instead, descends by gravity along the inner walls of the tubes as a thin film. Obviously, this produces a much greater linear velocity for a given rate flow than could be obtained if the tube flowed full.

The equipment works as a number of water cooled wetted-wall columns in parallel and each tube is provided with distribution system on top to effect uniform distribution of both liquid and gas and also formation of a thin liquid film on the inner surface of the tube.



SALIENT FEATURES

1. The heat of absorption is continuously removed. This ensures better absorption and product concentration as compared with conventional packed tower.
2. Low residence time and operating temperature ideally suited to heat sensitive materials.
3. Borosilicate glass and PTFE contact parts ensure corrosion/ contamination free operation.
4. Both standard and custom built units are available.
5. Capable of operating from zero to maximum gas flow rate.
6. Ease of installation due to light weight.
7. Trouble free and consistent performance with minimal attention.
8. Wide application e.g. HCl, HBr, NH_3, SO_2, H_2S, Br_2 etc.
9. Less cost.
10. Negligible pressure drop compared to conventional columns.
11. Compact design Sleek and slender.
12. Both heat and mass transfer operations are incorporated in a single equipment.
13. Very high heat transfer coefficient as the liquid falls instead of flowing.
14. Scaling of process fluid is minimal due to high velocity and ease of cleaning by simple acid circulation.
15. Hot conditions are eliminated at all stages namely pipe, tanks and pumps etc.

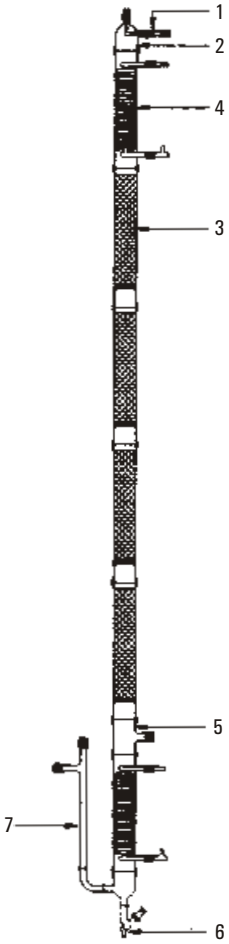
LIMITATIONS

1. Not recommended for gases containing high proportion of inert (insoluble).
2. Not applicable if the gases are not highly soluble.

SPECIFICATIONS

Cat. Ref.	Nominal Size (mm)	Absorber Area (m2)	No.of Tubes/ Tube OD (mm)	Max.Gas Absorption Rate (Pure HCl) * (kg/hr)	Max.Acid Prod. Rate (As 30 % HCl) (kg/hr) *	Height (m)
GAFF 3	80	1.00	4/ 20	30	100	4400
GAFF 4	100	1.76	7/ 20	60	200	4500
GAFF 6	150	4.80	19/ 20	150	500	4600
GAFF 9	225	7.80	31/ 20	250	833	4920
GAFF 12	300	15.30	61/ 20	500	1667	5050
GAFF 16	400	36.00	143/ 20	1175	3917	5300
GAFF 18	450	47.00	187/ 20	1500	5000	5700
GAFF 24	600	84.00	333/ 20	2700	9000	5800

HCL GAS ABSORBER (PACKED TYPE)



MAJOR COMPONENTS

1. SPARGER.
2. COLUMN ADAPTOR.
3. PACKED COLUMN.
4. HEAT EXCHANGER.
5. UNEQUAL TEE.
6. BOTTOM DRAIN VALVE.
7. SYPHON

This unit is suitable for absorption of gases like HCl, HBr, NH_3,So_2, etc.

The gas is introduced from the point (5), below the packed column (3), white water enters from enters from point (2) at the required rate. Due to counter current contact, absorption takes place in the column. The water and organic matter evaporates due to heat of absorption get condensed in the condenser (4) and flow back. The product gets cooled in the cooler (4) and is collected. The required concentration at the outlet can be monitored and achieved.

IMPORTANT NOTICE

- Start the chilled/cooler water circulation in coils of condensers before intro ducing the gas.

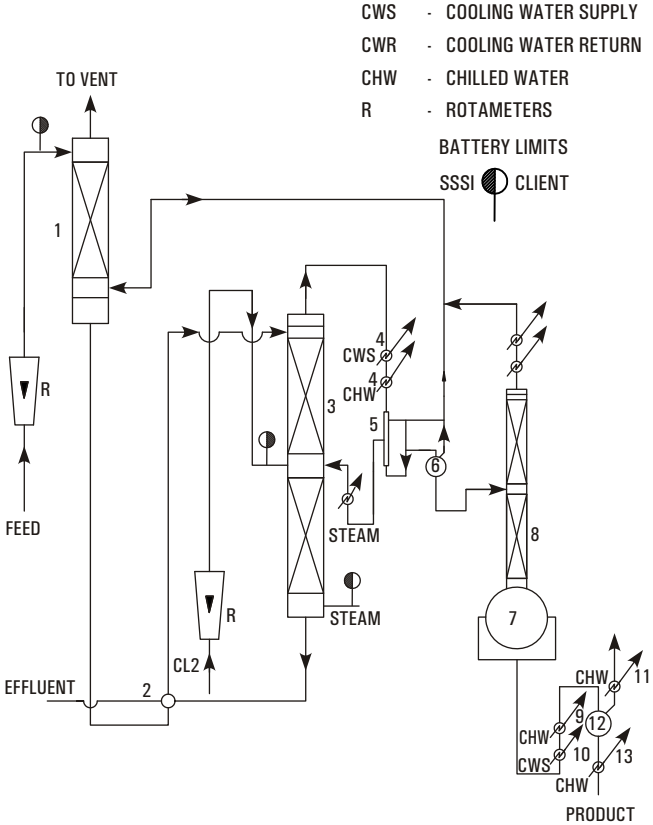
BROMINE RECOVERY SYSTEM

Bromine is available in the sea bittern, as well as Industrial waste e.g. Aq. HBr / Aq. NaBr / Aq. KBr. The Bromine concentration in the feedstock varies from 2 gpl to 300 gpl from industry to industry.

S.S. Scientific Industries offer suitable bromine recovery plant for the various feedstock based on his 11 years expertise in this field.

The package considered is schematically shown in drawing enclosed herewith.

The process consists of simultaneous chlorination & steam blowing. The feed stock acidic in nature is preheated to near its boiling in feed pre heater and then fed to the main column where steam and chlorine are blown simultaneously. The bromine as set free by chlorine are steam distilled. The liberated bromine together with steam and some excess chlorine is condensed in the condenser. The condensate is taken to a gravity separator where bromine and bromine water are separated. While bromine is taken in the purification column the aq. layer is recycled into the main column. Crude bromine is purified under reflux and pure bromine is collected in the receiver. All uncondensed vapour pass through the tail scrubber to recover the last traces of bromine.



SR.	DESCRIPTION
1.	TAIL SCRUBBER
2.	FEED PREHEATER
3.	Br_2 STRIPPING COLUMN
4.	Br_2 CONDENSERS
5.	PHASE SEPERATOR
6.	CRUDE Br_2 RECEIVING VESSEL

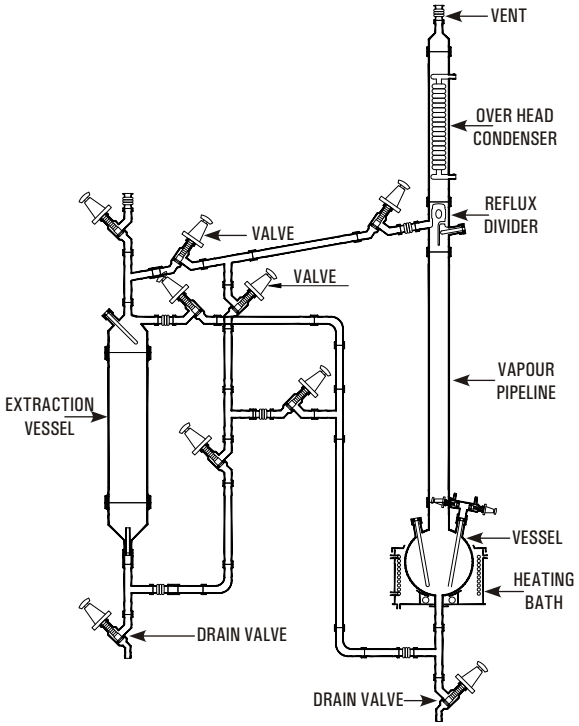
7.	REBOILER
8.	PURIFICATION COLUMN
9.	PRODUCT COOLER
10.	PRODUCT COOLER
11.	VENT CONDENSER
12.	PRODUCT RECEIVER VESSEL
13.	PRODUCT COOLER

LIQUID-LIQUID EXTRACTION UNIT

Liquid extraction, sometimes called solvent extraction, is the separation of constituents of a liquid solution by contact with another insoluble liquid. The unit described here is for a semi-batch operation.

The liquid to be extracted is poured into an extraction vessel. Solvent is boiled in a reboiler vessel and condensed in an overhead condenser, the condensed liquid collecting in a reflux divider and passing through pipework to the extraction vessel. The pipework incorporates valves in order that the solvent can enter the extraction vessel at either the base of the top, depending on the relative densities of the solvent and liquid to be extracted. The solvent and the extracted liquid pass back to the reboiler and the process is repeated until the extraction is complete. The extraction vessel is then drained and the solvent evaporated from the reboiler vessel and collected in the extraction vessel enabling the two liquids to be drained from their respective vessels.

The units are available in vessel sizes of 20, 50, 100, 200 & 300 L and is suitable for operation under atmospheric pressure.



Cat.Ref.	Reactor Capacity	Bath KW	Vapour Line	Extraction Vessel	Condenser M^2
LLEU 10	10 L	3.00	40mmx1m	10 L	0.35
LLEU 20	20 L	4.00	50mmx1m	20 L	0.50
LLEU 50	50 L	6.00	80mmx1m	50 L	1.50
LLEU 100	100 L	9.00	100mmx1m	100 L	1.50
LLEU 200	200 L	12.00	150mmx1m	200 L	2.25
LLEU 300	300 L	18.00	225mmx1m	300 L	4.00

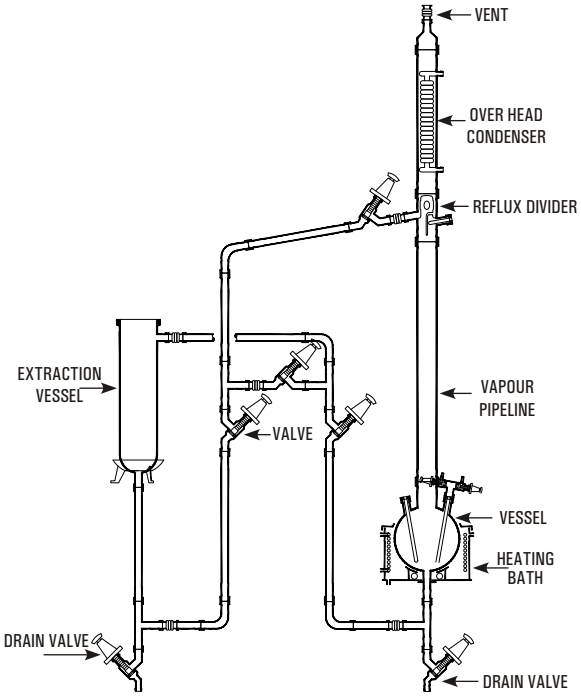
SOLID-LIQUID EXTRACTION UNIT

This operation involves preferential solublising of one or more soluble constituents (solutes) of a solid mixture by a liquid solvent. The unit described here is for a semi-batch operation.

The solid to be extracted is put inside a glass fiber bag and placed in an extraction vessel. Solvent from the reboiler is continuously evaporated, condensed and circulated through a reflux divider by means of piping network and valves. When desired/ steady concentration of solute is achieved in the solution the operation is discontinued. The solution is drained off and collected for further use.

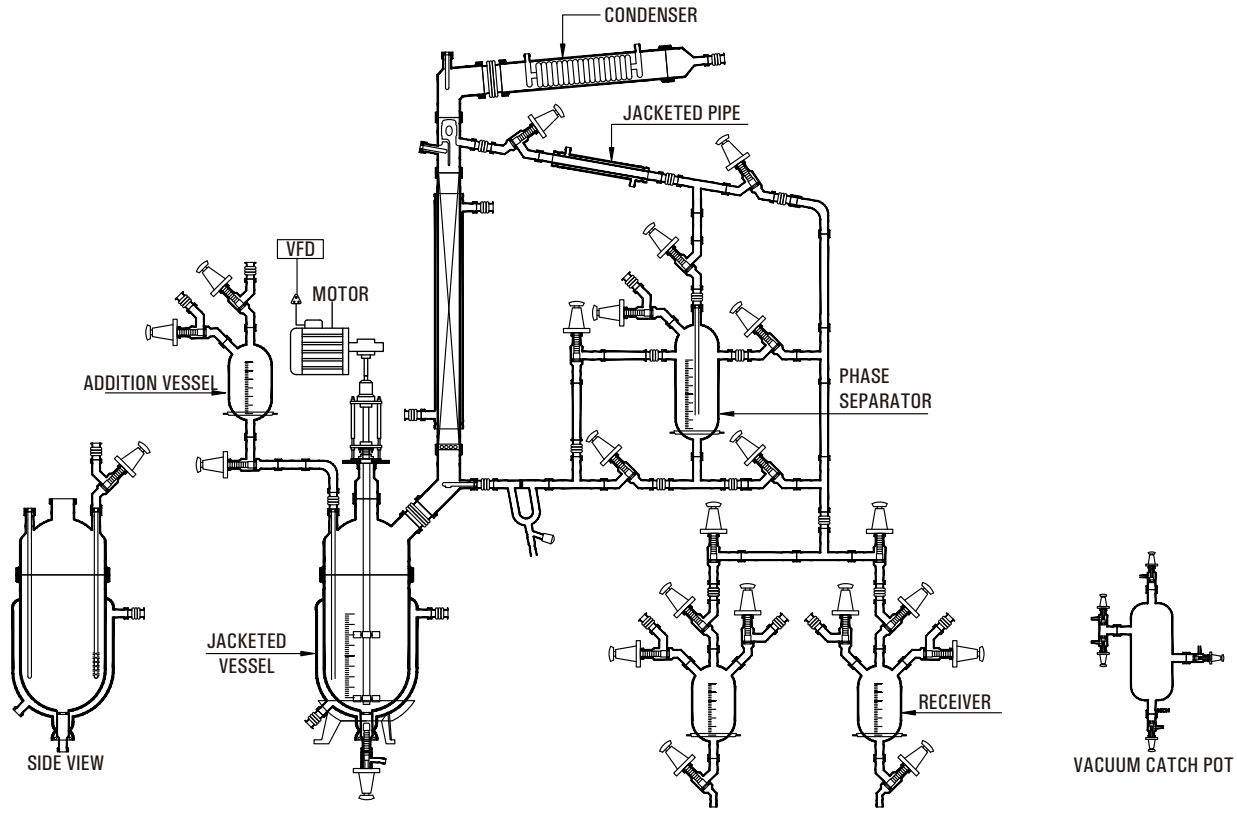
After charging fresh solid in fiber bag and solvent in reboiler, the cycle can be restarted again.

The units are available in vessel sizes of 20, 50, 100, 200 & 300 L and is suitable for operation under atmospheric pressure.



Cat. Ref.	Reactor Capacity	Bath KW	Vapour Line	Extraction Vessel	Condenser M^2
SLEU 10	10 L	3.00	40mmx1m	10 L	0.35
SLEU 20	20 L	4.00	50mmx1m	20 L	0.50
SLEU 50	50 L	6.00	80mmx1m	50 L	1.50
SLEU 100	100 L	9.00	100mmx1m	100 L	1.50
SLEU 200	200 L	12.00	150mmx1m	200 L	2.25
SLEU 300	300 L	18.00	225mmx1m	300 L	4.00

MULTI PURPOSE REACTION CUM DISTILLATION UNIT



S.S. Scientific Industries offer multipurpose pilot plant for chemical and pharmaceutical industries for process development, scale-up, process simulation and kilo-scale cGMP production in batch and semi-batch operation. The pilot plant used for chemical processing includes solid charging, liquid charging, reaction, heating / cooling, rectification, auto / manual reflux arrangement, layer separation, product cooler, vacuum catch pot, vacuum header etc.

The multipurpose pilot plant designed in such a way that we can modify the same easily as per process requirement.

Available with

Jacketed full glass reactor/ Cylindrical full glass reactor with Oil heating cooling bath / Spherical full glass reactor with Oil heating cooling bath
Multipurpose glass distillation overhead
SS / MS epoxy coated / MS painted frame supporting
Flame proof / Non flame proof / cGMP / non GMP models available
Excellent corrosion resistant.
Temp. Controller.
Gas purging, solid charging / multi liquid addition.
Vacuum / exhaust piping
Additional feeders / receivers
Solid feeding

Cat. Ref.	Reaction Capacity	Bath KW	Addition Vessel	Vapour Line	Condenser HTA (M^2)	Cooler HTA (M^2)	Receiver Size
MPRD 20	20 L	4.0	2 L	80 DN	0.35	0.10	2L, 5L
MPRD 50	50 L	6.0	5 L	100 DN	0.50	0.20	5L, 10L
MPRD 100	100 L	9.0	10 L	150 DN	1.50	0.35	10L, 20L
MPRD 200	200 L	12.0	20 L	150 DN	1.50	0.35	10L, 20L
MPRD 300	300 L	18.0	20 L	225 DN	2.50	0.50	20L, 20L
MPRD 500	500 L	24.0	50 L	300 DN	4.00	0.70	50L, 50L

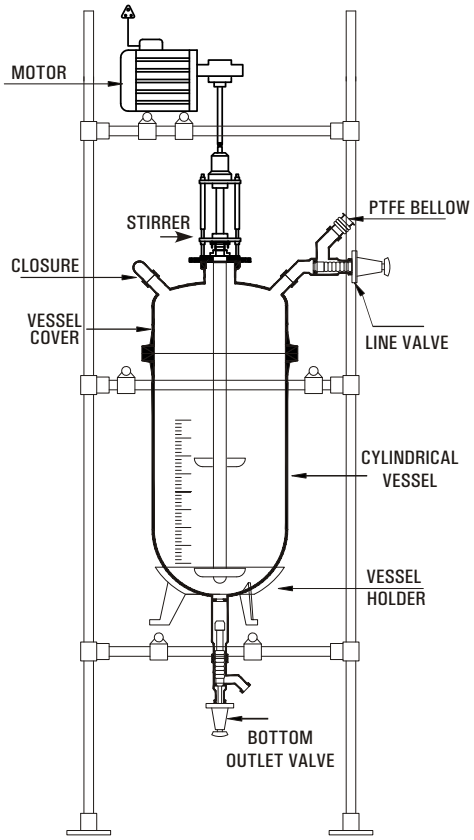
MOBILE'MIXING REACTOR

Glass Miixng Reactor (Cylindrical Type)

Glass Reactors are ideally used for wide applications in laboratory, pilot plant & for small-scale production. They reduce the need for investment in permanent installations & also reduce the pressure & temperature losses resulting from pipeline installation.

These reactors are available with spherical shape & in cylindrical shape. These reactors are also available in cylindrical jacketed form.

Cat.Ref.	Vessel Ref.	Nominal Cap.(l)
GMR 20	VZ 20/12	20
GMR 50	VZ 50/16	50
GMR 100	VZ 100/18	100
GMR 150	VZ 100/18	150
GMR 200	VZ 200/18	200
GMR 300	VZ 300/24	300

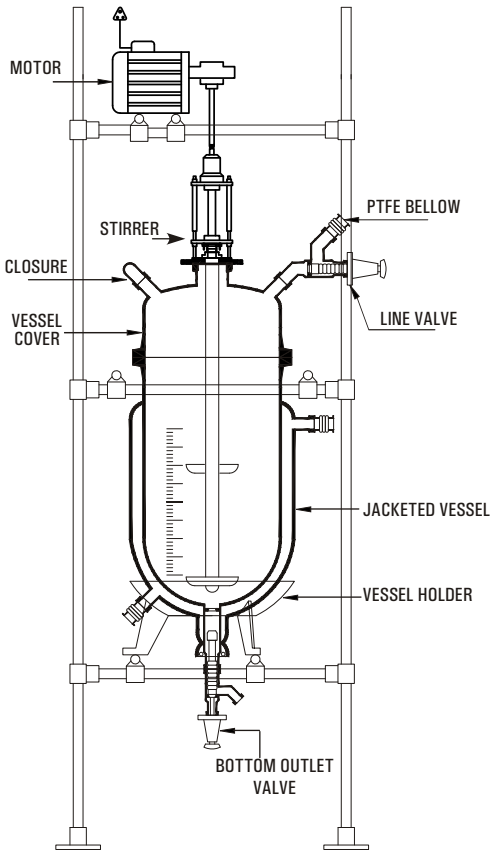


Glass Mixing Reactor (Jacketed Type)

The systems are available with different options, depending upon their size & their utility. Our Technical Team will glad to assist you in finding a suitable solution for your process requirement.

1. Stirrer Drive: Non-Flameproof or Flameproof Motor, 192 RPM with speed regulator.
2. Stirrer material of construction: Glass or PTFE Lined.
3. Stirrer shape: Glass Impeller Stirrer with PTFE Blades, Vortex Stirrer, propeller stirrer & anchor stirrer.
4. Stirring Assembly: Stirring Assembly with bellow seal or with mechanical seal.
5. Supporting Structure : Carbon Steel, Epoxy coated Carbon Steel, SS 304 & SS 316. All structure are available in Trolley mounted form.
6. Closing Valve: Drain Valve or Flush Bottom Outlet Valve.

Cat.Ref.	Vessel Ref.	Nominal Cap.(l)
GMR 5 / J	VZD 5/6	5
GMR 10 / J	VZD 10/9	10
GMR 20 / J	VZD 20/12	20
GMR 30 / J	VZD 30/12	30
GMR 50 / J	VZD 50/16	50



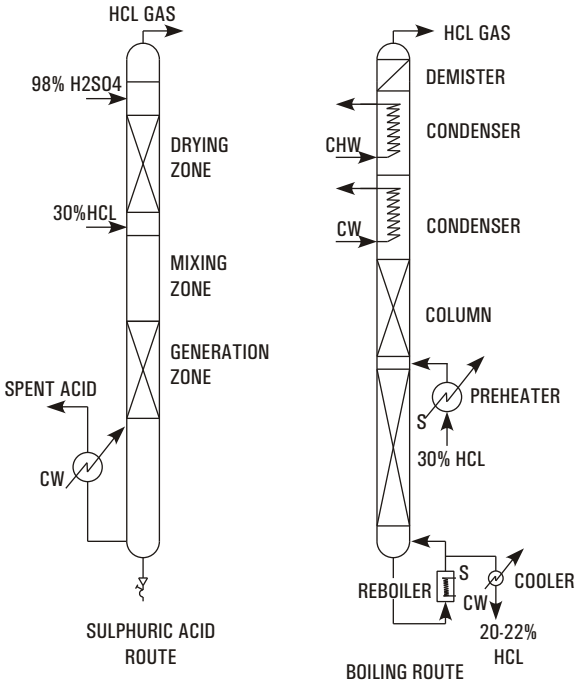
ANHYDROUS HCL GAS GENERATOR

Commercial Hydrochloric Acid is available in the market as 30% aqueous solution. But for certain applications e.g. bulk drug and pharmaceuticals, HCl is required in anhydrous state for critical reactions where moisture cannot be tolerated. Such users generate anhydrous HCl from commercial grade for their captive consumption.

METHOD

Several methods have been adopted by industries. But generation by Sulphuric Acid Route and Boiling Route are commonly practiced.

We also offer Calcium Chloride Route.



Route	Sulphuric Acid Route	Boiling Route
Working Principle	Hydrochloric acid is highly soluble in water but the solubility diminishes in presence of H2SO4 and at 70 to 75% H2SO4 concentration its solubility is negligible. Thus by adding (98%) commercial Sulphuric acid to commercial hydrochloric acid (30%) in proper ratio the entire HCl can be liberated in gaseous form leaving 75% H2SO4 as spent acid.	Aqueous hydrochloric acid forms a maximum boiling point azeotrope at 110°C containing 20.24% HCl at atmospheric pressure. Thus by distilling commercial hydrochloric acid (30%) pure HCl gas can be generated and spent acid will contain over 20.24% HCl.
Process Outline	Metered quantities of commercial sulphuric acid hydrochloric acids are fed to the unit where they mix in the Mixing Zone. The gas generated forms a froth and enters the Generation Zone where while traveling through a bed gas is released which travels upwards through the Drying Zone. Here the gas comes in intimate contact with downward flow of 98% H2SO4. The dry gas leaving the unit passes through a rotameter. The spent liquor containing 70-75% H2SO4 passes through the Cooling Zone before being discharged.	Metered quantity of commercial hydrochloric acid is preheated in a preheater by steam and fed to a fractionating column with steam as heating media in the reboiler. The vapours leaving the column are condensed with coolant as cooling water and chilled brine in stages. The relatively dry gas passes through a mist eliminator and then through a rotameter. The spent acid containing 22% HCl is cooled through a cooler and then discharged.
Salient Features	- Operational reliability the unit can be started/ stopped in seconds. - Available in wide range of capacities from 5 to 200 kg/hr of dry HCl. - Except cooling water no other utility e.g. steam chilled water etc. required. - Anhydrous gas. - Capable of operating from 25 to 120%. - Ease of installation. - Negligible pressure drop. - High efficiency 99%.	- Operational reliability. - Available in wide range capacities from 5 kg/hr to 200 kg/hr of dry HCl. - Except commercial hydrochloric acid, no other raw-material is required. - Anhydrous gas. - Capable of operating from 25-100%. - Ease of installation. - Negligible pressure drop.
Indicative Raw-material & Utilities for 20 kg/hr HCl	30% HCl - 70 kg/hr 98% H2SO4 - 170 kg/hr Cooling Water - 2 m^3/hr	30% HCl - 200 Kg/hr Saturated Steam - 50 kg/hr Cooling Water - 3.5 m^3/hr Chilled Brine - 4 m^3/hr

ANHYDROUS HCl GAS GENERATOR CALCIUM CHLORIDE ROUTE

Working Principle:

Hydrochloric acid and water form a maximum boiling point azeotrope at 110°C corresponding to a concentration of 20.24%; (w/w) HCl. By adding concentrated $CaCl_2$ solution to commercial hydrochloric acid the azeotrope point is eliminated and the entire' HCl becomes available for liberation by distillation. Anhydrous HCl gas generation through Calcium Chloride Route is the most environmental friendly technique.

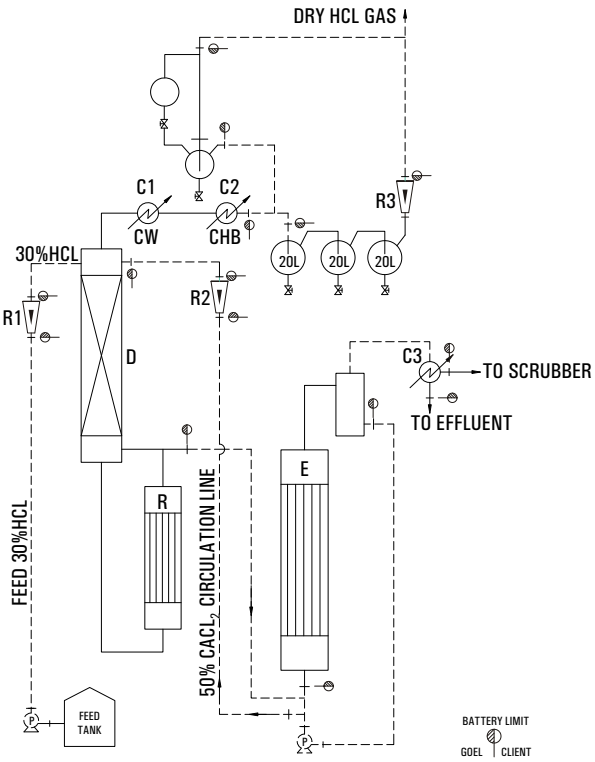
Process Description:

The above principle- is achieved in practice by feeding metered quantities of commercial HCl and 50% $CaCl_2$-solution to a stripping column with a steam heated re-boiler at bottom. The effluent from bottom of the column is a dilute acidic calcium chloride solution which is concentrated to 50% in a evaporator and re-used. The vapor leaving is condensed stage wise with cooling water and chilled brine as coolant. The relatively dry gas passes through a mist eliminator and then through a rotameter to the point of consumption.

Raw material utility requirements:

The indicative requirements for 20 Kg/hr HCl gas generator are given below.

1.	30-32 % HCl, (Kg/hr)	:	66
2.	Cooling water at 30 °C (M^3/hr)	:	4
3.	Chilled brine at -10 °C (M^3/hr)	:	3
4.	Steam at 6 Kg/cm^2 (g)	:	150



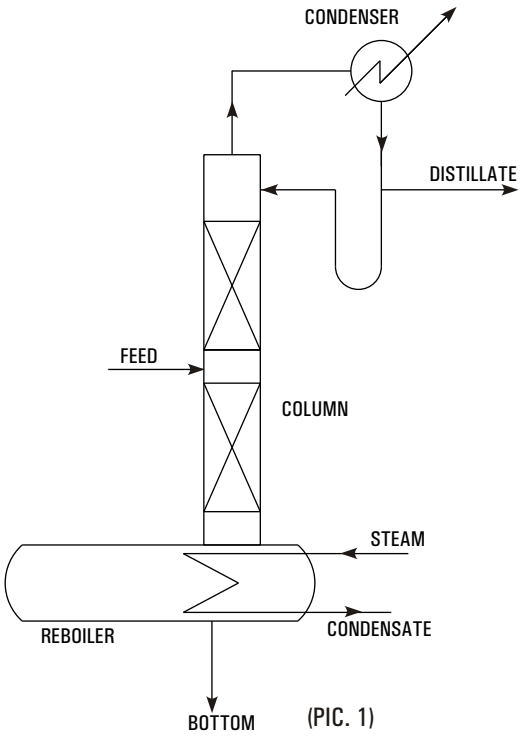
LEGEND	LEGEND	LEGEND
R - REBOILER	C2 - SECONDARY CONDENSER	CW - COOLING WATER
D - COLUMN	R1 - FEED HCL ROTAMETER	CHB - CHILLED BRINE
E - EVAPORATOR	R2 - FEED $CACL_2$ ROTAMETER	C3 - CONDENSER
C1 - PRIMARY CONDENSER	R3 - DRY HCL GAS ROTAMETER	P - PUMP

CONTINUOUS DISTILLATION SYSTEM

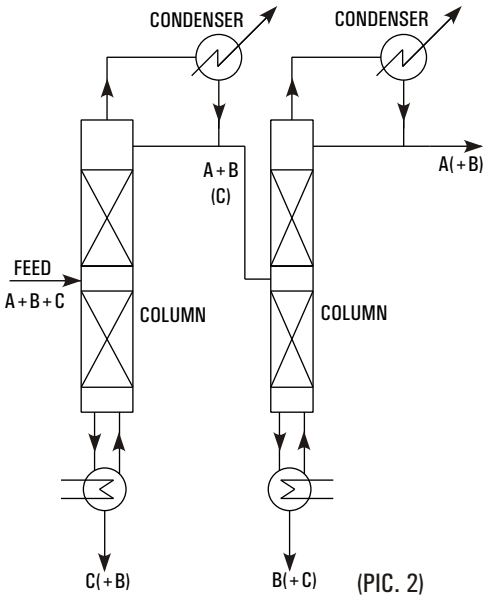
The limitations of batch distillations are naturally circumvented in continuous distillation as shown in Pic. 2 which is a typical fractionation unit comprising of ratification & stripping sections. Here feed is continuously fed to the column with withdrawal of top & bottom products. The process takes care on its own by simply maintaining the flow rates of feed & Utilities.

However when more than two products are desired as in case of multi component systems additional columns are required as each column is capable of giving two products only. That is to say, for multi component systems only one product is obtain in relatively pure form from each column. The other product containing the remaining components is fed to a subsequent column where again one product is obtained in relatively pure form. The addition of columns continue till the system becomes binary & both components are separated in the final column.

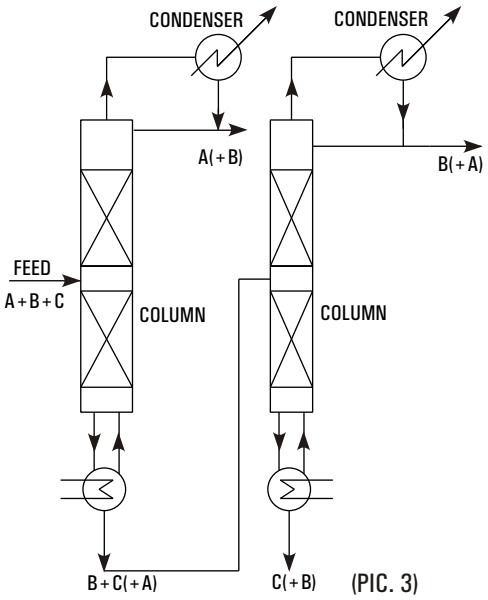
An important principle to be emphasized is that a total n-1 fractionators are required for complete separation of system of n components. Which of the two products in a column is to be obtained in relatively pure form depends on relative volatility of each component in the feed stock. For example consider a ternary solution consisting of a components A, B & C whose relative volatilities are in that order (A most volatile). In order to obtain three substances in substantially pure form either of the schemes shown in Pic. 3 may be used. Which of the two schemes would be used depends on the relative difficulties of separation in each method and the choice calls for finer considerations of principles of distillation. However scheme (b) is usually preferred since it requires one vaporization of substance A.



(PIC. 1)



(PIC. 2)



(PIC. 3)

Component given in bracket are in small quantities.

SOLVENT RECOVERY

Solvents are universally used in wide variety of industries, their use by no means being limited to the chemical industry. The choice of solvents such as xylene, acetone, butyl acetate, methanol etc. depends on the type of application and economical considerations.

In many cases, the solvent - after use - is contaminated and not in a reusable condition. Purchase of fresh solvent and disposal costs of the contaminated solvent can prove expensive operations. Therefore, it makes sound economic sense to investigate the recovery of contaminated solvents for re-use.

S.S. Scientific Industries design and supply solvent recovery plants which are capable of recovering solvents from a few kg per day to many tons per day.

Applications:

1. S.S. Scientific Industries Solvent Recovery Units are carefully designed to cater the specific requirement for each duty for wide range of solvents.

2. Continuous Distillation Units have distinct advantages, such as

2.1. Ease of Operation due to steady state working.

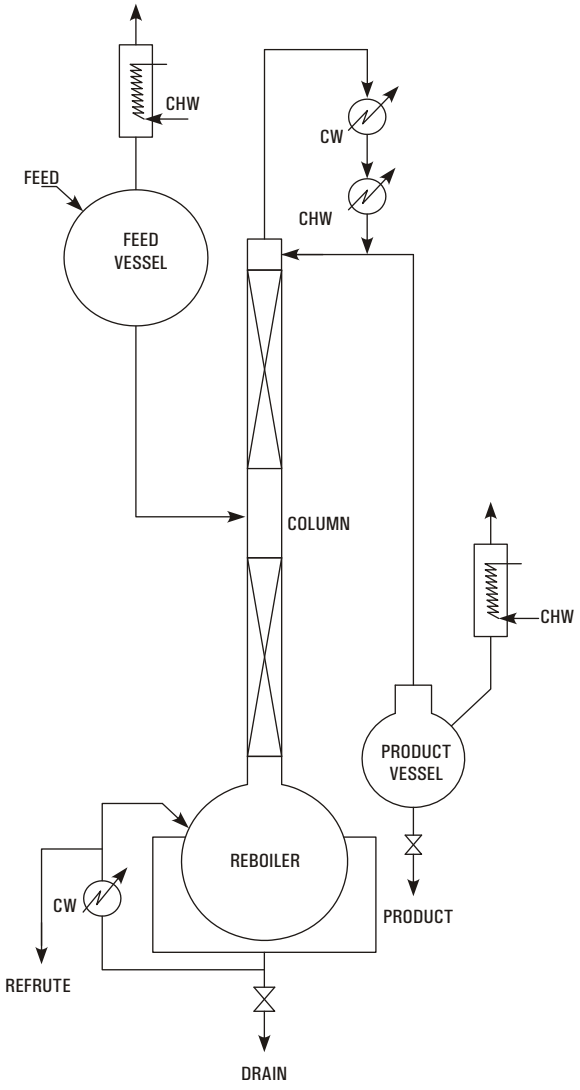
2.2 Economical design as each equipment viz. column, condenser reboiler is designed for uniform and steady-load.

2.3 Uniform product quality,

2.4 Uniform & low consumption of utilities.

2.5 Higher productivity as down time for start-up, emptying etc. is eliminated.

The outline flow-sheet of the plan is shown in Figure. Regulated quantity of feed is fed to a distillation column from an overhead vessel. The overhead vessel is provided with a vent condenser with chilled water circulation to arrest loss of acetone vapor. The reboiler at the bottom of column in this case was a steam heated oil-bath. The vapors from top of the column pass through primary and secondary condensers with cooling water and chilled water circulation. The condensate is partially refluxed and balance continuously drawn out and collected in receiver provided with a vent condenser. The residue from the re-boiler is continuously drained out.



PILOT PLANT SERIES

Our vision in the PPS is to provide single window source for all equipment and instrument of highest quality for Research and Development as well as Pilot Plants.

PPS Chemical Reactor:

Pilot Plant Reactors are equipped with see-through reaction vessels made of Borosilicate glass / glass lined steel. Contrary to conventional reaction vessels, the glass used for the upper section enables the chemist to observe process-taking place inside. It also prevents residues from adhering on to the smooth, unheated glass surface. Other attachments are available for distillation.

- Stirrer, Condenser, Reflux divider, Feed arrangement etc.
- PH controller, temperature controller, speed regulator for stirrer etc.

This is also available in spherical options and with auto control.

Volume	Temp	Pressure	Wetted Material
15 to 250 Ltrs.	-25to+200°C	+0.5 bar to Full Vacuum	glass/glass lined steel for higher capacity

PPS High pressure Reactor in Glass :

High-pressure reactor is used to carry out reaction at higher pressure, which is generally not possible with normal glass reactor.

Volume	Temp.	Pressure	Wetted Material
1 to 5Ltrs.	-5 to +150°C	up to +5 bar	Glass/PTEF

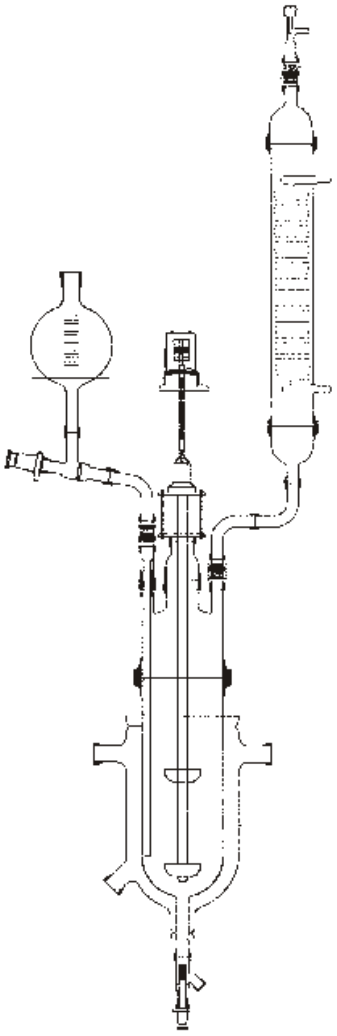
Metal reactors are also available to component reactions at very high pressure.

Agitator is designed for various duties :

- Lower to higher Reynolds mixing like Anchor type. Tubular type, Propeller type etc.

Heating and cooling arrangements:

- Through heating mantles, oil bath, thermic fluid, steam or hot condensate through glass jacket or glass coils.



ROTARY FILM EVAPORATOR

1 TO 50 LITERS

ROTARY FILM EVAPORATOR

ROTARY FILM EVAPORATOR

A **rotary film evaporator** is a device used in chemical laboratories for the efficient and gentle removal of solvents from samples by evaporation. When referenced in the chemistry research literature, description of the use of this technique and equipment may include the phrase "rotary film evaporator", though use is often rather signaled by other language (e.g., "the sample was evaporated under reduced pressure").

Rotary evaporators are also used in molecular cooking for the preparation of distillates and extracts.

The main components of a rotary film evaporator are:

1. A motor unit that rotates the evaporation flask or vial containing the user's sample.
2. A vapor duct that is the axis for sample rotation, and is a vacuum-tight conduit for the vapor being drawn off the sample.
3. A vacuum system, to substantially reduce the pressure within the evaporator system.
4. A heated fluid bath (generally water) to heat the sample.
5. A condenser with either a coil passing coolant, or a "cold finger" into which coolant mixtures such as dry ice and acetone are placed.
6. A condensate-collecting flask at the bottom of the condenser, to catch the distilling solvent after it re-condenses.
7. A mechanical or motorized mechanism to quickly lift the evaporation flask from the heating bath.

The vacuum system used with rotary film evaporators can be as simple as a water aspirator with a trap immersed in a cold bath (for non-toxic solvents), or as complex as a regulated mechanical vacuum pump with refrigerated trap. Glassware used in the vapor stream and condenser can be simple or complex, depending upon the goals of the evaporation, and any propensities the dissolved compounds might give to the mixture (e.g., to foam or "bump"). Commercial instruments are available that include the basic features, and various traps are manufactured to insert between the evaporation flask and the vapor duct. Modern equipment often adds features such as digital control of vacuum, digital display of temperature and rotational speed, and vapor temperature sensing.

KEY ADVANTAGES

1. That the centrifugal force and the frictional force between the wall of the rotating flask and the liquid sample result in the formation of a thin film of warm solvent being spread over a large surface.
2. The forces created by the rotation suppress bumping. The combination of these characteristics and the conveniences built into modern rotary film evaporators allow for quick, gentle evaporation of solvents from most samples, even in the hands of relatively inexperienced users. Solvent remaining after rotary evaporation can be removed by exposing the sample to even deeper vacuum, on a more tightly sealed vacuum system, at ambient or higher temperature.

SALIENT FEATURES

1. Universal corrosion resistance.
2. Auto controlled digital display of rotational speed and bath temperature.
3. Digital display of process time.
4. Automatic bath lifting.
5. Automatic bath lowering in case of power failure.
6. Withstands full vacuum.
7. Ideally suited for heat sensitive material.
8. Maintenance free working - Operational reliability.

CONSTRUCTION

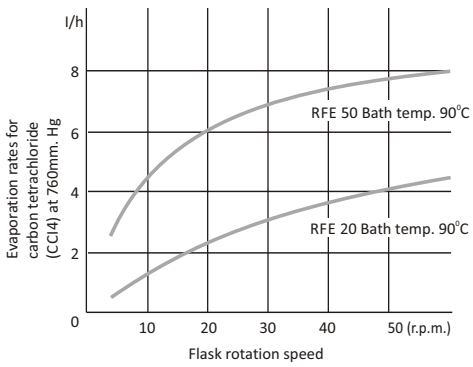
Rotary Film Evaporators are completely self contained units consisting mainly of :

An electrically heated Stainless Steel heating bath with facility for raising and lowering the height. Rotating flask of corrosion resistant borosilicate glass which is connected to drive by a coupling. The drive is a hollow glass shaft which also acts as vapour off-take pipe. The drive shaft is sealed on condenser/receiver with teflon seal. Power is transmitted to the shaft by a motor driven gear with provision for varying speed.

Condenser/receiver arrangements are of standard design depending on the model/size.

PERFORMANCE DATA

The performance of rota-evaporator depends on various parameters such as temperature differential between bath and contents of flask, RPM, flask capacity and working pressure. An indicative comparision of boil-up of CCl_4 rates for 20L & 50L is given in adjacent figure.



ROTARY FILM EVAPORATOR

1, 2, 3, 5 Ltrs.

Salient Features

* Attractive Vertical Orientation for Industrial & Robust Use
* 2 Ltr Pear Shaped evaporation flask, 1 Ltr receiver
* Glass Coil Condensor with 0.10 sq. mtr HTA
* Digital RPM indicator & VFD based speed control, 0.25 Hp Motor, 0-80 RPM
* Digital Temperature Indicator & controller
* Digital vapor temperature indicator
* Manual UP & Down of Bath
* Jacketed Bath with electrical heaters, 2 KW with Overflow nozzle & drain valves
* Durable gearbox, with Motor Encased into the mechanical Assembly
* Fully PU Coated
* The whole unit is base mounted.
* Fully tested & ready to use !!

Optional

* Chiller Unit
* Vacuum Pump with Setup

10, 20, 50 Ltrs.

Salient Features :

* Attractive Vertical Orientation
* Digital RPM indicator & VFD based speed control
* Digital Temperature Indicator & Controller
* Digital Process Time Indication
* Digital vapor temperature indicator
* Motorized VFD based UP & down of bath
* S.S. bath with Jacket & electrical heaters with overflow nozzle & drain valves
* Durable S.S. gearbox, with motor encased into the Mechanical Assembly
* Complete glass assembly as per the specs in the table
* Anti splashing hood
* PU coated
* The whole unit is mounted on lockable wheels.
* Dimensions : 1100 x 600 x 1500 approx (with glass assembly)
* Fully tested & ready to use !!

Optional :

* UPS back up for auto lowering bath
* Chiller unit
* Vacuum pump with setup

Technical informations related to various models are furnished below :

Model	Rotating Flask Cap. (Ltrs.)	Rotating Speed (rpm)	Electric Motor Rating	Condenser Cooling Area	Receiver Flask Cap. (Ltrs.)	Power Supply (Volt/Hz)	Bath Rating
RFE 2	2	0-80	40 Watt	0.15	1	230 V, 50 Hz	2
RFE 3	3	0-80	40 Watt	0.15	1	230 V, 50 Hz	2
RFE 5	5	0-80	40 Watt	0.15	2	230 V, 50 Hz	2
RFE 10	10	0-80	0.25 HP	0.20	5	230 V, 50 Hz	4
RFE 20	20	0-80	0.25 HP	0.30	10	230 V, 50 Hz	4
RFE 50	50	0-80	0.25 HP	0.50	20	230 V, 50 Hz	6

VALUABLE CUSTOMERS

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farmson Pharmaceutical Gujarat Pvt. Ltd.	Bharat Rasayan Ltd.	glenmark A new way for a new world	Deepak Nitrite Limited
Kiri Industries Limited	NEOGEN CHEMICALS LTD.	THINQ	IPL India Pesticides Limited
Transpek-Silox Indian Roots..Global Mindset	MSN	Shilpa Medicare Ltd.	MACLEODS Macleods Pharmaceuticals Limited
PAB Organics Pvt. Ltd.	KUTCH CHEMICAL INDUSTRIES LTD	MALWA CHEMICAL DIVISION	ROOPA INDUSTRIES LIMITED
LAURUS Labs Knowledge . Innovation . Excellence	Ami Life Sciences Pvt. Ltd.	PAN DRUGS LTD	ORGANIC PIGMENTS greenovat Organics P. Ltd. Mfgr. & Exptr. of Organic Pigments An ISO 9001-2008 Certified Company
Medilux Chemistry Possible	Amoli Organics Pvt. Ltd.	SRF We always find a better way	Angels Pharma India Pvt. Ltd.
PVT. LTD.	SURVIVAL TECHNOLOGIES PVT. LTD.	YMS laboratories	RAICHUR LABORATORIES

CERTIFICATE

We can't think without glass

SSSI design and manufactures of Industrial Glass equipment and systems .Our aims to achieve customer satisfaction by delivering reliable products which consistently meet customer requirements and regulatory requirements. We strive to exceed the expectations of our customers through the following:

- Gaining a complete understanding of our customer's requirements and designing to achieve each of these requirements.
- Improve Processes.
- Improve Product Quality.
- Improve On-time Delivery Performance.
- Improve Customer Satisfaction.

SSSI is committed to achieve these by maintain quality systems and consistently improving the effectiveness of quality systems and reviewing the suitable of quality policy from day to day.

SSSI maintaining best industry practices towards this endeavor.

Chittaranjan Nayak
(Director)

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We can't think without glass

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