BOROCILICATE GLASS

PRODUCT CATALOGUE

SHREE SAI SCIENTIFIC

www.shreesaiscientific.com

ABOUT US

Founded in the year 2004, at Vadodara (Gujarat, India),we “SHREE SAI SCIENTIFIC” are the renowned manufacturer and supplier of high grade Pipeline Component, industrial Valve, Vessels & Stirrers and other Component. Our offered range includes valve, jacketed Vessel, Heat Exchanger, Column Component, Structure Parts etc. We use premium quality raw materials and most advanced machinery to manufacture these products in accordance with set industrial standards. These products are high in demand due to their elevated strength, optimum performance, accurate dimensions, easy installation, corrosion resistance, low maintenance and durable finish standards.

The state-of-the-art infrastructure of our organization is equipped with advanced machines and equipment gives us the capability to bring forward a wide collection of high grade products in bulk quantities. This infrastructural unit is manned by a workforce of highly dedicated professionals. Professionals of our team are highly qualified and experienced that enables us to acquire this position in the industry. It is due to their determination and commitment towards our company that we have become a reputed name across the country. Our team members work in close-coordination with our client in order to provide an excellent quality product range as per their exact requirements.

We are quality centric firm that is why we give the first priority to fabricate the best quality products as per the set industry standards. Professionals recruited by us are very conscious, particularly in this domain and acquire the basic material only from authentic vendors of the industry, which ensure that our product comply with the set international quality standards.

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.

INDEX OF SECTIONS

1. INDEX 2
2. COMPANY PROFILE / FLAT 4
3. TECHNICAL INFORMATION 5
4. PIPELINE COMPONENTS 7
5. VALVES 13
6. VESSELS 15
7. STIRRERS 23
8. HEAT EXCHANGERS 25
9. COLUMN COMPONENTS 31
10. MEASUREMENT AND CONTROL 37
11. COUPLINGS 38
12. STRUCTURE AND SUPPORTS 43
13. SIGHT GLASS 49
14. STANDARD UNITS 50
15. MOBILE MIXING SYSTEMS 55
16. MULTI PURPOSE UNIT 56

INDEX

A

ADAPTOR BACKING FLANGES 40
ADAPTOR BELLOW FLANGES 42
ADAPTOR PLATE FOR REACTORS 12
ADDITION VESSELS 18
ANGLE VALVES 13
ANGLED HOSE CONNECTOR ASSEMBLIES 30
ASSEMBLIES OVER GLASS LINED REACTOR 54

B

BACKING FLANGES 39
BAFFLES JACKETED VESSEL 20
BAFFLES VESSEL 20
BASE 44
BELLOW FLANGES 42
BEND 44
BEND HOSE CONNECTORS 12
BENDS 450 10
BENDS 900 10
BENDS 900 WITH THERMOMRTER BRANCH 10
BLINDS 11
BOILERS 30
BOTTOM OUTLET VALVES 14

C

CHUCK & SEAL 23
CLOSURES 11
COLUMN ADAPTORS 35
COLUMN BASE SUPPORT FRAMES 46
COLUMN FEED PIPE 34
COLUMN FEED SPARGERS 34
COLUMN PACKING-RASCHIG RINGS 33
COLUMN SECTIONS 32
COLUMN SECTIONS WITH THERMOMETER BRANCH 32
COMPLETE COUPLINGS 39
CONDENSERS 29
COOLING BATHS 21
COUNTER BALANCE SUPPORTS 47
COUPLER 44
CROSS 45
CROSSES 11
CYLINDRICAL VESSEL COVERS 19
CYLINDRICAL VESSELS 19
CYLINDRICAL MIXING RECTOR 55

D

DECANTORS 22
DIGITAL TEMPERATURE INDICATOR 37
DIP PIPES 20
DOUBLE BEND 44
DOUBLE TEE 45
DRAIN VALVES 13

E

ELECTRO-MAGNETS 37
EQUAL BRACKET 45
EQUAL TEES 8

F

FIVE NECK BOTTOM OUTLET SPHERICAL VESSEL 17
FIVE NECK BOTTOM OUTLET SPHERICAL VESSEL 17
FLAMEPROOF STIRRER DRIVES 24
FLAT TOP COLUMN ADAPTORS 35
FOUR NECK BOTTOM OUTLET SPHERICAL VESSELS 16
FRACTION DISTILLATION UNIT 52

G

GAS SPARGERS 20
GAS SCRUBBER 54
GENERAL DATA 44
GROUTING OF BASE 47

H

HEATING BATHS 21
HEATING MANTLES 21
HOSE CONNECTORS 12

I

IMMERSIONS 30
INSERTS 39

J

JACKETED PIPE SECTIONS 12
JACKETED VESSELS 19
JACKETED MIXING REACTOR 55

K

KETTLES 19

L

LIQUID SEALS 36

INDEX

LIQUID-LIQUID EXTRACTION UNIT 53

M

MS FRAME SIGHT GLASS 49
MULTI PURPOSE UNIT 56

P

PACKING SUPPORTS 32
PIPE SECTIONS 8
PLUGS 45
PRODUCT COOLERS 30
PROPELLER STIRRER 23
PTFE "O" RING WITH LOCKING COLLAR 40
PTFE BELLOWS - GLASS TO GLASS 41
PTFE BELLOWS - GLASS TO METAL 41
PTFE PERFORATED PLATES 32
PTFE REDISTRIBUTORS 34
PTFE SPACERS 8
PTFE SUPPORT PLATES 33

R

REACTION UNIT 51
REACTION DISTILLATION UNIT 52
REDUCERS 9
REFLUX DIVIDERS 36

S

SHELL AND TUBE HEAT EXCHANGERS 26
SHORT DIP PIPES 20
SINGLE NECK SPHERICAL VESSELS 16
SIMPLE DISTILLATION UNIT 51
SOLID-LIQUID EXTRACTION UNIT 53
SPACERS 8
SPEED REGULATORS 24
SPHERICAL CYCLONES 17
SPHERICAL RECEIVERS 17
SPHERICAL VESSEL - General Data 16
SPHERICAL VESSELS WITH NOZZLE AT 90° 17
SPHERICAL VESSELS WITH WIDE BOTTOM OUTLET 18
SPRAY FEED PIPES 34
SPRAY FEED SECTION 34
SS 304 FRAME SIGHT GLASS 49
SS 316 FRAME SIGHT GLASS 49
STIRRER DRIVES 24
STIRRER WITH TEFLON BLADES 23
STIRRING ASSEMBLY WITH BELLOW SEAL 24
STIRRING ASSEMBLY WITH MECHANICAL SEAL 24
STRAIGHT THROUGH VALVES 13
STRUCTURE DIMENSIONS 46
STRUCTURE TUBES, GALVANISED 43
STUDS 45
SUPPORT 45
SUPPORT OF COLUMN 43
SUPPORT PLATE ASSEMBLY 33

T

TEE 44
THERMOMETER POCKETS 20
THERMOMETER POCKETS FOR REFLUX DIVIDER 36
THREE NECK BOTTOM OUTLET SPHERICAL VESSELS 16
TIMERS 37

U

U BENDS 10
U BENDS WITH BOTTOM OUTLET 10
UNEQUAL BRACKET 45
UNEQUAL CROSSES 11
UNEQUAL TEES 9

V

VENT / VACUUM VALVES 14
VENT VALVES 14
VESSEL HOLDERS 21
VESSEL HOLDING RINGS 22
VESSELS WITH BOTTOM OUTLET VALVE SEAT 18
VORTEX STIRRER 23

Y

Y BENDS 10

GENERAL INFORMATION

FAST AVAILABLE ITEMS

Items which are available faster are marked by * in the catalogue. Though it does not indicate any definate period of delivery, these items can be manufactured faster than the other items of its range. For example, Pipe section PS18/1000 can be supplied faster than any other pipe section of 450DN. This is because of following reasons :

- Semi finish goods or raw material for these items will be always available.
- Method of production of these items are set.
- Being fast moving items, these items may be available ex-stock withus.

REPAIRS

Though any damaged glass equipment can be repaired, mostly it is not economical to do so. Generally, the repair which involves less than one third of its original work, is worth to carry out repairing. Repair work is costly because :

a. It generally require greater skill than making a new one.
b. Since it involves high risk of total breakage, the risk of total loss of time spent on its repairing goes along with.
c. The work involved in receiving a damaged equipment, identifying it throughout the handling, cleaning it, estimating its repairing charges, re- estimating the repairing charges in case damage extends etc are relatively expensive.
d. Each job require individual attention throughout the execution.

However, while sending an equipment for repairing, following care must be taken :

a. Inform the nature of breakage and get an estimate of repairing charges in advance to avoid the loss of transportation expenses in case it is uneconomical to go for repairing.
b. Since repairing takes longer time to fit into production schedules and completion of repairing is highly uncertain, it is generally suggested to arrange for a substitute equipment to continue the work.
c. Equipment to be repaired should be clean. Since it can be cleaned better and at less cost at owner's premises, it should be cleaned before sending it for transportation. This also makes it safer to transport.
d. Pack with extra care, since cracks in glass have a tendency to extend with every jerk.
e. If possible, send broken pieces along with it.
f. Generally repairing work is accepted only for the equipment manufactured by us, and are repaired at owner's risk only.

DIMENSIONS OF FLAT ENDS

DN	D2	D1	D	H1	H2	A	B
25	41	26	34	13	8	65	9
40	56	39	49	14	9	65	9
50	69	51	62	16	11	65	9
80	98	77	91	18	12	65	9
100	132	105	123	20	17	65	9
150	184	154	166	22	19	65	9
225	258	220	233	24	26	65	9
300	340	308	315	24	26	65	9
400	463	405	425	25	35	65	9
450	525	455	499	25	50	78	9
600	684	600	640	25	60	65	9

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.

CATLOGUE REFERENCES

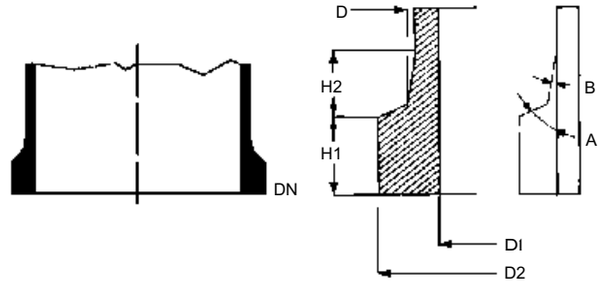
To avoid querries and delays in delivery, please always quote the catalogue reference in your order.

MODIFICATIONS

We reserve the right to carry out technical modifications of products and data mentioned in this catalogue as and when require.

STANDARDS PRACTICED

DIN ISO	3585
DIN ISO	3586
DIN ISO	3587
DIN ISO	4704
BSEN	1595
DIN ISO	718



TECHNICAL INFORMATION

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 composion.

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 elevatrd 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 increse or decrease the rate of attack. So it is not possible to give exact figures for corrosion by caustic solutions.

THERMAL PROPERTIES

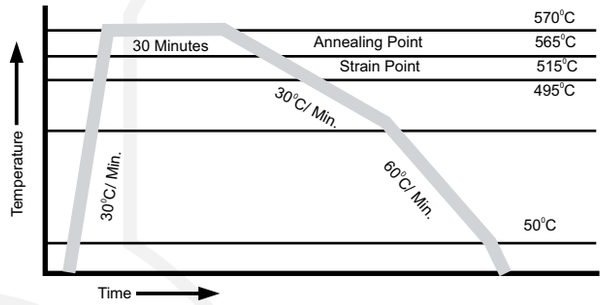
Linear coefficient of thermal expansion
The coefficient of thermal expansion of borosilicate glass over the temperature 0-300^{0}C is 3.3 x 10^{-6}/^{0}C. This is very low when compared with other glasses and metals. That is why, borosilicate glass is often called low expansion borosilicate glass.

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.

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.



RESHAPEING

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
Reshapeing 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 clour less.

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.

TECHNICAL INFORMATION

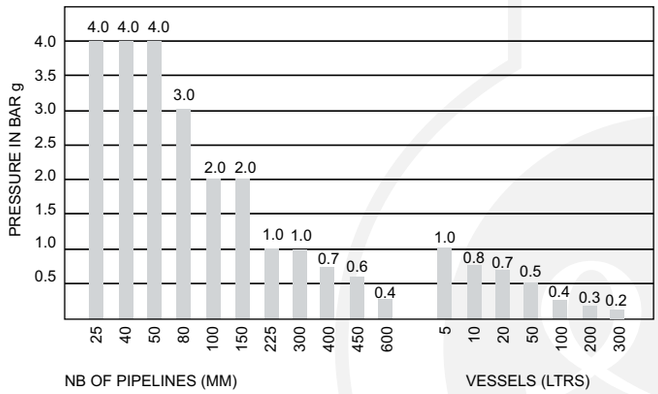
PERMISSIBLE OPERATING CONDITIONS

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 atmosperic.



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 thermalshock, it can be operated safely at temperatures upto 250^{0}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^{0}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^{0}C can be accomodated.

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^{0}C for FLAT and components.

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^{0}C to + 200^{0}C

ELECTRICAL CHARASTERISTICS

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^{0}ohm/cm at temperature of 200^{0}C.
The dielectric coefficient varies with current frequency.

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

EXTRA PROTECTION OF GLASS COMPONENTS 'X-BONDING'

X BONDING provide an added advantage of protection of standard glass components. The major advantage of X-Bonding systems is that if the glass is subject to accidental breakage, the bonded wrapping provides additional protection against the risk of injury, release of corrosive fluids or loss of expensive products.

X BONDING is a glass reinforced fibre coating which provide a higher level of protection on the glass components. This does have a slightly adverse effect on the transparency of the glass, making it translucent & not transparent.

Permissible Operating Temperature:
The permissible operating temperature for X-Bonding is 130° C unless limited by the individual operating temperature of the said component.

Permissible Operating Pressure:
The permissible operating pressure for X-Bonded components is same to that for Standard Glass Components.

Thermal Shock
Despite the thermal insulating effect of X-Bonding, the thermal shock characteristics remain the same as standard glass component.

PIPELINE COMPONENTS & VALVES

VESSELS

SPHERICAL VESSEL - General Data

SINGLE NECK SPHERICAL VESSELS

THREE NECK BOTTOM OUTLET SPHERICAL VESSELS

FOUR NECK BOTTOM OUTLET SPHERICAL VESSELS

FIVE NECK BOTTOM OUTLET SPHERICAL VESSEL

FIVE NECK BOTTOM OUTLET SPHERICAL VESSEL

SPHERICAL VESSELS WITH NOZZLE AT 90°

SPHERICAL CYCLONES

SPHERICAL RECEIVERS

ADDITION VESSELS

SPHERICAL VESSELS WITH WIDE BOTTOM OUTLET

VESSELS WITH BOTTOM OUTLET VALVE SEAT

CYLINDRICAL VESSELS

CYLINDRICAL VESSEL COVERS

KETTLES

JACKETTED VESSELS

BAFFLES VESSEL

BAFFLES JACKETED VESSEL

DIP PIPES

SHORT DIP PIPES

GAS SPARGERS

THERMOMETER POCKETS

HEATING MANTLES

HEATING BATHS

COOLING BATHS

VESSEL HOLDERS

VESSEL HOLDING RINGS

DECANTORS

STIRRERS

CHUCK & SEAL

STIRRER WITH TEFLON BLADES

VORTEX STIRRER

PROPELLER STIRRER

STIRRING ASSEMBLY WITH BELLOW SEAL

STIRRING ASSEMBLY WITH MECHANICAL SEAL

STIRRER DRIVES

FLAMEPROOF STIRRER DRIVES

SPEED REGULATORS

PIPELINE COMPONENTS

PIPE SECTIONS

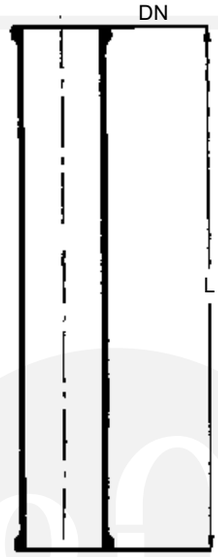
DN	25	40	50
L	Cat.Ref.	Cat.Ref.	Cat.Ref.
100	PS1/100*	PS1.5/100	PS2/100
150	PS1/150*	PS1.5/150*	PS2/150*
200	PS1/200*	PS1.5/200	PS2/200
250	PS1/250	PS1.5/250	PS2/250
300	PS1/300*	PS1.5/300*	PS2/300*
400	PS1/400	PS1.5/400	PS2/400
500	PS1/500*	PS1.5/500*	PS2/500
600	PS1/600	PS1.5/600	PS2/600
750	PS1/750	PS1.5/750	PS2/750
900	PS1/900	PS1.5/900	PS2/900
1000	PS1/1000*	PS1.5/1000*	PS2/1000*

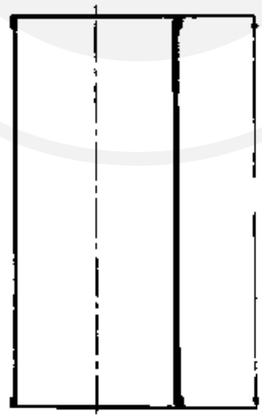
DN	80	100	150
L	Cat.Ref.	Cat.Ref.	Cat.Ref.
150	PS3/150*	PS4/150	PS6/150
200	PS3/200	PS4/200	PS6/200
250	PS3/250*	PS4/250*	PS6/250*
300	PS3/300	PS4/300	PS6/300*
400	PS3/400	PS4/400	PS6/400
500	PS3/500	PS4/500	PS6/500
600	PS3/600*	PS4/600*	PS6/600
750	PS3/750	PS4/750	PS6/750
900	PS3/900	PS4/900	PS6/900
1000	PS3/1000*	PS4/1000*	PS6/1000*

DN	225	300
L	Cat.Ref.	Cat.Ref.
300	PS9/300*	PS12/300
400	PS9/400	PS12/400*
500	PS9/500	PS12/500
600	PS9/600	PS12/600
750	PS9/750	PS12/750
900	PS9/900	PS12/900
1000	PS9/1000*	PS12/1000*
1200	PS9/1200	PS12/1200
1500	PS9/1500	PS12/1500

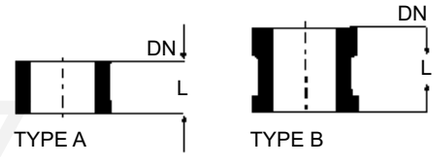
DN	400	450	600/800
L	Cat.Ref.	Cat.Ref.	Cat.Ref.
300	PS16/300	PS18/300	PS32/500
500	PS16/500	PS18/500	PS24/500
750	PS16/750	PS18/750	PS32/1000
1000	PS16/1000*	PS18/1000*	PS24/1000*
1200	PS16/1200	PS18/1200	PS32/1500
1500	PS16/1500	PS18/1500	PS24/1500

* marked items are available fast.





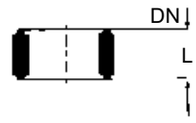
SPACERS



Spacers are used to make-up small increaments in length.

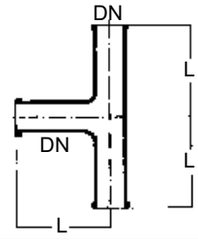
DN	Type	25	40	50
L		Cat.Ref.	Cat.Ref.	Cat.Ref.
5	A	SS1/5	SS1.5/5	SS2/5
15	A	SS1/15	SS1.5/15	SS2/15
25	A	SS1/25	SS1.5/25	SS2/25
50	B	SS1/50	SS1.5/50	SS2/50

PTFE SPACERS



DN	25	40	50
L	Cat.Ref.	Cat.Ref.	Cat.Ref.
5	SST1/5*	SST1.5/5*	SST2/5*
10	SST1/10*	SST1.5/10*	SST2/10*
15	SST1/15*	SST1.5/15*	SST2/15*
20	SST1/20*	SST1.5/20*	SST2/20*

EQUAL TEES

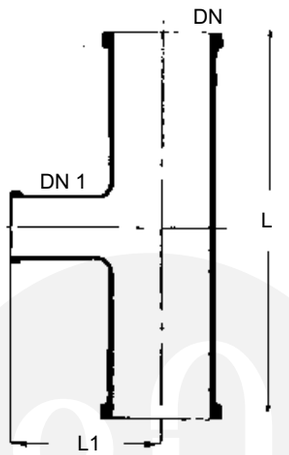


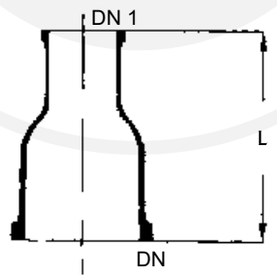
Cat.Ref.	DN	L
PT1	25	100
PT1.5	40	150
PT2	50	150
PT3	80	200
PT4	100	250
PT6	150	250
PT9	225	375
PT12	300	450

PIPELINE COMPONENTS

UNEQUAL TEES

Cat.Ref.	DN	DN1	L	L1
PTU1.5/1*	40	25	200	75
PTU2/1	50	25	200	80
PTU2/1.5*	50	40	200	100
PTU3/1*	80	25	250	100
PTU3/1.5*	80	40	250	100
PTU3/2	80	50	250	115
PTU4/1	100	25	250	110
PTU4/1.5*	100	40	250	125
PTU4/2*	100	50	250	125
PTU4/3	100	80	300	150
PTU6/1	150	25	250	150
PTU6/1.5*	150	40	250	150
PTU6/2*	150	50	250	150
PTU6/3*	150	80	300	175
PTU6/4	150	100	300	200
PTU9/1	225	25	300	185
PTU9/1.5*	225	40	300	185
PTU9/2*	225	50	300	185
PTU9/3	225	80	300	210
PTU9/4	225	100	450	250
PTU9/6	225	150	450	275
PTU12/1	300	25	400	230
PTU12/1.5*	300	40	400	230
PTU12/2	300	50	400	230
PTU12/3	300	80	400	275
PTU12/4*	300	100	400	275
PTU12/6*	300	150	450	300
PTU12/9	300	225	600	300
PTU16/1.5	400	40	400	275
PTU16/2	400	50	400	275
PTU16/3	400	80	400	300
PTU16/4*	400	100	400	300
PTU16/6*	400	150	500	350
PTU16/9	400	225	800	450
PTU16/12	400	300	800	450
PTU18/1.5	450	40	400	300
PTU18/2	450	50	400	300
PTU18/3	450	80	400	320
PTU18/4*	450	100	400	320
PTU18/6*	450	150	600	380
PTU18/9	450	225	800	400
PTU18/12	450	300	800	400
PTU24/4	600	100	600	450
PTU24/6	600	150	600	450
PTU24/9	600	225	800	525
PTU24/12	600	300	800	525





REDUCERS

Cat.Ref.	DN	DN1	L
PR1.5/1*	40	25	100
PR2/1*	50	25	100
PR2/1.5	50	40	100
PR3/1*	80	25	125
PR3/1.5	80	40	125
PR3/2*	80	50	125
PR4/1*	100	25	150
PR4/1.5*	100	40	150
PR4/2*	100	50	150
PR4/3	100	80	150
PR6/1	150	25	200
PR6/1.5*	150	40	200
PR6/2*	150	50	200
PR6/3*	150	80	200
PR6/4	150	100	200
PR9/1	225	25	250
PR9/1.5*	225	40	250
PR9/2*	225	50	250
PR9/3	225	80	250
PR9/4*	225	100	250
PR9/6	225	150	250
PR12/1	300	25	300
PR12/1.5*	300	40	300
PR12/2*	300	50	300
PR12/3	300	80	300
PR12/4*	300	100	300
PR12/6	300	150	300
PR12/9	300	225	300
PR16/1.5	400	40	350
PR16/2	400	50	350
PR16/3	400	80	350
PR16/4	400	100	350
PR16/6	400	150	350
PR16/9	400	225	350
PR16/12	400	300	350
PR18/1.5	450	40	375
PR18/2	450	50	375
PR18/3	450	80	375
PR18/4	450	100	375
PR18/6	450	150	375
PR18/9	450	225	375
PR18/12	450	300	375
PR24/4	600	100	400
PR24/6	600	150	400
PR24/9	600	225	425
PR24/12	600	300	425

* marked items are available fast.

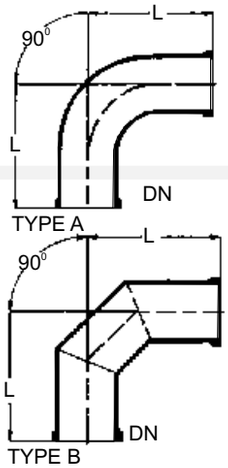
PIPELINE COMPONENTS

BENDS 90^0

Cat.Ref.	DN	L	TYPE
PB1/90*	25	100	A
PB1.5/90*	40	150	A
PB2/90*	50	150	A
PB3/90*	80	200	B
PB4/90*	100	250	B
PB6/90*	150	250	B
PB9/90	225	375	B
PB12/90	300	450	B

Bends in 80 and 100 degree are also available with same dimensions.

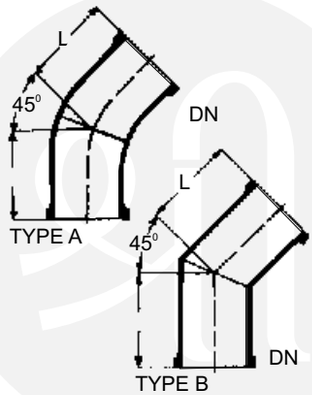
Bends DN 400/DN 450/DN 600 on request basis.



BENDS 45^0

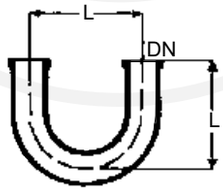
CCat.Ref.	DN	L	TYPE
PB1/45	25	75	A
PB1.5/45	40	100	A
PB2/45*	50	100	A
PB3/45	80	125	B
PB4/45*	100	175	B

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



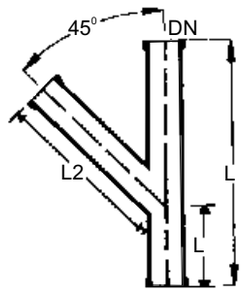
U BENDS

Cat.Ref.	DN	L
PU1*	25	150
PU1.5*	40	175
PU2	50	175
PU3	80	225



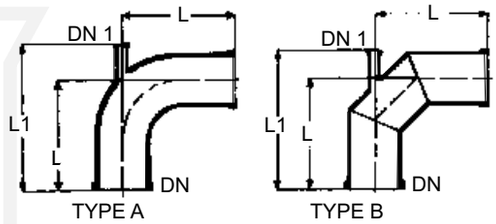
Y BENDS

Cat.Ref.	DN	L	L1	L2
PY1	25	200	75	150
PY1.5*	40	250	100	175
PY2	50	300	125	200
PY3	80	350	150	250
PY4*	100	450	150	350



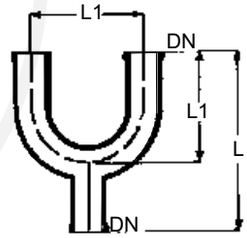
* marked items are available fast.

BENDS 90^0 WITH THERMOMRTER BRANCH



Cat.Ref.	DN	DN1	L	L1	TYPE
PBT1.5	40	25	150	225	A
PBT2	50	25	150	225	A
PBT3	80	25	200	275	B
PBT4*	100	25	250	350	B
PBT6*	150	25	250	375	B
PBT9	225	25	375	525	B
PBT12	300	25	450	550	B

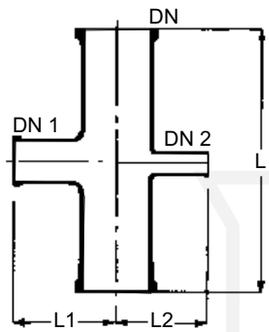
U BENDS WITH BOTTOM OUTLET



Cat.Ref.	DN	DN1	L	L1
PUO1*	25	25	250	150
PUO1.5*	40	40	275	175
PUO1.5/1	40	25	275	175
PUO2	50	50	275	175
PUO2/1	50	25	275	175
PUO3/1	80	25	350	225

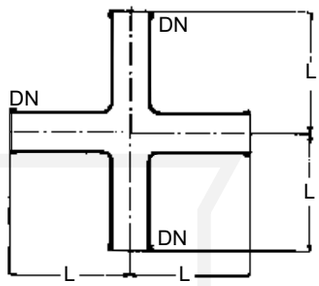
PIPELINE COMPONENTS

UNEQUAL CROSSES



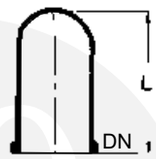
Cat.Ref.	DN	DN1	DN2	L	L1	L2
PXU2/1/1	50	25	25	200	80	80
PXU2/1.5/1*	50	40	25	200	100	80
PXU3/1/1*	80	25	25	250	100	100
PXU3/1.5/1*	80	40	25	250	100	100
PXU3/2/1	80	50	25	250	115	100
PXU4/1/1	100	25	25	250	110	110
PXU4/1.5/1*	100	40	25	250	125	110
PXU4/2/1*	100	50	25	250	125	110
PTU4/3/1*	100	80	25	300	150	150
PXU6/1.5/1*	150	40	25	250	150	150
PXU6/2/1*	150	50	25	250	150	150
PXU6/3/2*	150	80	50	300	175	150
PXU6/4/2	150	100	50	300	200	150
PXU9/1.5/1.5*	225	40	40	300	185	185
PXU9/2/1.5	225	50	40	300	185	185
PXU9/3/1.5*	225	80	40	300	210	185
PXU9/4/2*	225	100	50	450	250	185
PXU9/6/3	225	150	80	450	275	210
PXU12/2/1.5	300	50	40	400	230	230
PXU12/3/1.5	300	80	40	400	275	230
PXU12/4/1.5*	300	100	40	400	275	230
PXU12/6/2*	300	150	50	450	300	230
PXU12/9/3	300	225	80	600	300	275
PXU16/1.5/1.5	400	40	40	400	275	275
PXU16/3/1.5	400	80	40	400	300	275
PXU16/4/1.5	400	100	40	400	300	275
PXU16/6/3	400	150	80	500	350	300
PXU16/9/4	400	225	100	800	450	300
PXU18/1.5/1.5	450	40	40	400	300	300
PXU18/3/1.5	450	80	40	400	320	300
PXU18/4/1.5	450	100	40	400	320	300
PXU18/6/3	450	150	80	600	380	320
PXU18/9/4	450	225	100	800	400	320

CROSSES



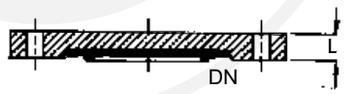
Cat.Ref.	DN	L
PX1*	25	100
PX1.5*	40	150
PX2	50	150
PX3	80	200
PX4	100	250

CLOSURES



Cat.Ref.	DN	L
PBE1*	25	50
PBE1.5*	40	75
PBE2*	50	75
PBE3	80	100
PBE4	100	125
PBE6	150	125
PBE9	225	150
PBE12	300	150

BLINDS



Cat.Ref.	DN	L
PBF1*	25	8
PBF1.5*	40	8
PBF2*	50	8
PBF3*	80	8
PBF4*	100	8
PBF6	150	9
PBF9	225	9
PBF12	300	9

* marked items are available fast.

PIPELINE COMPONENTS

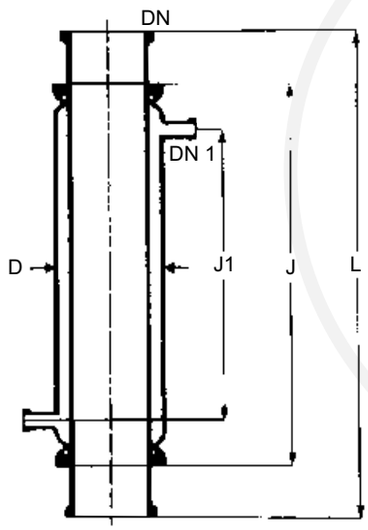
JACKETED PIPE SECTIONS

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 :

DN 80 - DN 150	1.0 bar
DN 225 - DN 300	0.5 bar

Cat.Ref.	DN	L	d	DN1	J	J1
PSD3/1000	80	1000	100	25	850	750
PSD4/1000	100	1000	150	25	850	750
PSD6/1000*	150	1000	225	25	850	700
PSD9/1000	225	1000	300	25	850	700
PSD12/1000	300	1000	400	25	850	650

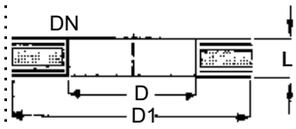


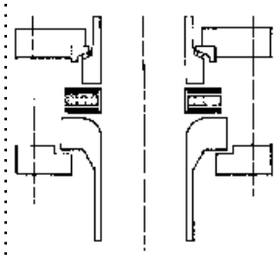
Metal Jackets

Pipe sections can also be provided with metal jackets. In metal jackets, maximum operating pressure is permitted upto 2.0 bar in all the size.

Cat.Ref.	DN	L	d	DN1	J	J1
PSJ3/1000	80	1000	100	25	850	750
PSJ4/1000	100	1000	135	25	850	750
PSJ6/1000*	150	1000	188	25	850	700
PSJ9/1000	225	1000	262	25	850	700
PSJ12/1000	300	1000	345	25	850	650

* marked items are available fast.



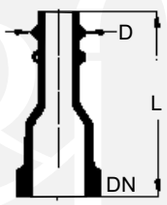


ADAPTOR PLATE FOR REACTORS

When reactors have a curved end nozzle,these adaptors are used as interface spacer to connect the glass/bellow with reactor.

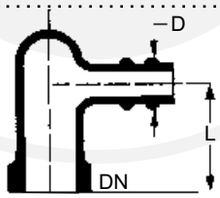
A flat metal ring with rubber cusions is enveloped with PTFE, to provide ideal sealing. Only PTFE comes in the contact of process fluid.

Cat.Ref.	DN	D	D1	L
EMP1	25	25	60	10
EMP1.5*	40	37	80	10
EMP2*	50	50	100	10
EMP3*	80	75	120	12
EMP4*	100	100	155	12
EMP6*	150	150	210	12
EMP9	225	200	260	15
EMP12	300	300	360	15



HOSE CONNECTORS

Cat.Ref.	DN	d	L
PHC1/1*	25	28	90
PHC1/.75	25	22	90
PHC1/.5	25	15	90
PHC1/.25	25	11	90
PHC1.5/1	40	28	100
PHC1.5/.75	40	22	100



BEND HOSE CONNECTORS

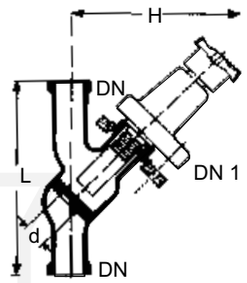
Cat.Ref.	DN	d	L
PBHC1/1*	25	28	60
PBHC1/.75*	25	22	60
PBHC1.5/.75	40	22	75
PBHC2/.75	50	22	100

VALVES

STRAIGHT THROUGH VALVES

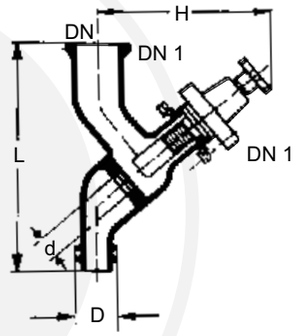
Cat.Ref.	DN	DN1	d	L	H
PV1*	25	25	18	175	175
PV1.5/1	40	25	18	225	175
PV1.5*	40	40	26	225	200
PV2	50	50	38	300	220

Spindles are made of PTFE.



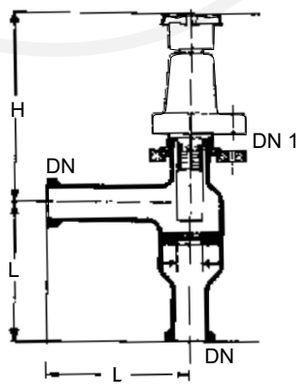
DRAIN VALVES

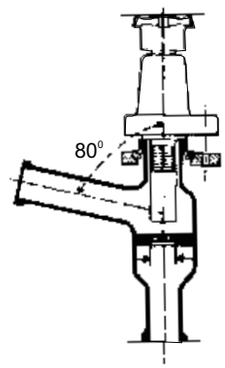
Cat.Ref.	DN	DN1	d	L	H	D
PVD1*	25	25	18	175	175	28
PVD1.5/1*	40	25	18	225	175	28
PVD1.5*	40	40	26	225	200	42
PVD2	50	50	38	300	220	50



ANGLE VALVES

Cat.Ref.	DN	DN1	d	L	H	Degree
PVE1*	25	25	18	100	175	90
PVE1/80*	25	25	18	100	175	80
PVE1.5	40	40	26	150	200	90
PVE2	50	50	38	150	220	90



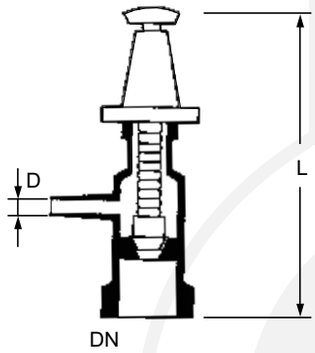


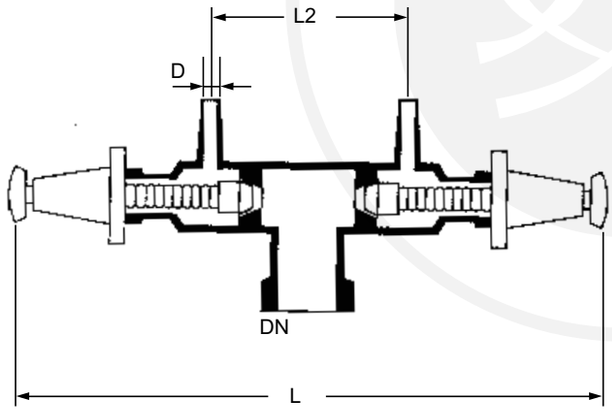
* marked items are available fast.

VALVES

VENT VALVES

Cat.Ref.	DN	D	d	L	Type
PVL1*	25	11	10	150	A
PVL1.5	40	11	10	150	A
PVLR1*	25	11	10	150	B
PVLR1.5	40	11	10	150	B





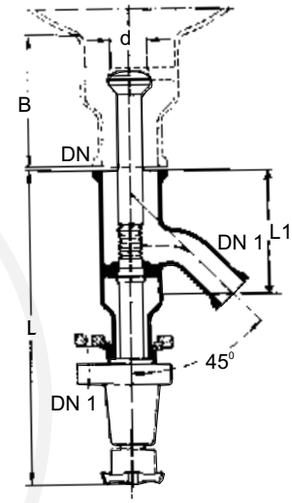
VENT / VACUUM VALVES

Cat.Ref.	DN	D	d	L	L1	L2
PVW 1/07	25	12	10	280	55	85
PVW 1.5/07	40	12	10	280	65	85

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	d	L	L1	B
BAL1.5*	40	25	25	26	260	105	190
BAL2	50	40	25	38	260	105	190



VESSELS & STIRRERS

VESSELS

SPHERICAL VESSEL - General Data

SINGLE NECK SPHERICAL VESSELS

THREE NECK BOTTOM OUTLET SPHERICAL VESSELS

FOUR NECK BOTTOM OUTLET SPHERICAL VESSELS

FIVE NECK BOTTOM OUTLET SPHERICAL VESSEL

FIVE NECK BOTTOM OUTLET SPHERICAL VESSEL

SPHERICAL VESSELS WITH NOZZLE AT 90°

SPHERICAL CYCLONES

SPHERICAL RECEIVERS

ADDITION VESSELS

SPHERICAL VESSELS WITH WIDE BOTTOM OUTLET

VESSELS WITH BOTTOM OUTLET VALVE SEAT

CYLINDRICAL VESSELS

CYLINDRICAL VESSEL COVERS

KETTLES

JACKETTED VESSELS

BAFFLES VESSEL

BAFFLES JACKETED VESSEL

DIP PIPES

SHORT DIP PIPES

GAS SPARGERS

THERMOMETER POCKETS

HEATING MANTLES

HEATING BATHS

COOLING BATHS

VESSEL HOLDERS

VESSEL HOLDING RINGS

DECANTORS

STIRRERS

CHUCK & SEAL

STIRRER WITH TEFLON BLADES

VORTEX STIRRER

PROPELLER STIRRER

STIRRING ASSEMBLY WITH BELLOW SEAL

STIRRING ASSEMBLY WITH MECHANICAL SEAL

STIRRER DRIVES

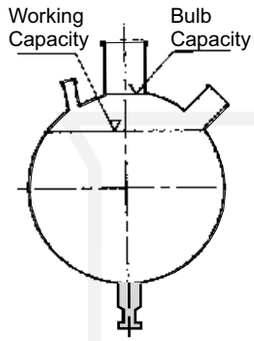
FLAMEPROOF STIRRER DRIVES

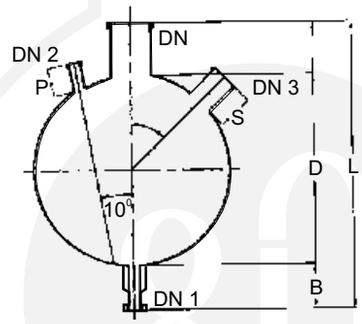
SPEED REGULATORS

VESSELS

SPHERICAL VESSEL - General Data

Nominal Capacity (Ltrs.)	Bulb Cap. (Ltrs.)	Working Cap. (Ltrs.)	Maximum Pressure (Bar)
5	5	4	1
10	10	9	0.8
20	21	20	0.7
50	62	58	0.5
100	118	111	0.4
200	212	200	0.3
300	300	300	0.2

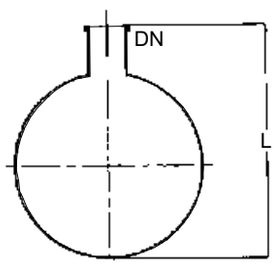




Nominal Capacity (Ltrs.)	L	D	DN	T	DN1	B	DN2	P	DN3	S
5	425	223	40	85	25	125	25	50	40	75
10	500	285	40	100	25	125	25	50	40	75
20	575	350	80	100	25	125	25	50	40	75
50	825	490	100	150	40	200	40	75	100	100
100	925	600	150	150	40	200	40	75	100	100
200	1175	750	225	250	40	200	40	75	100	100
300	1275	860	225	250	50	175	50	75	100	100

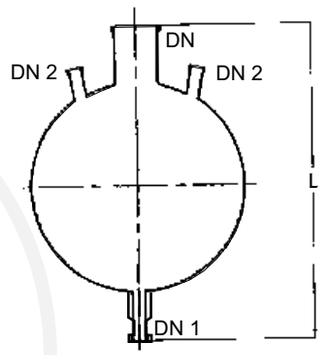
SINGLE NECK SPHERICAL VESSELS

Cat. Ref.	Nominal Capacity	L	DN
VSA5	5 L	300	40
VSA10	10 L	375	40
VSA20	20 L	450	80
VSA50	50 L	650	100
VSA100	100 L	750	150
VSA200	200 L	1000	225
VSA300	300 L	1100	225



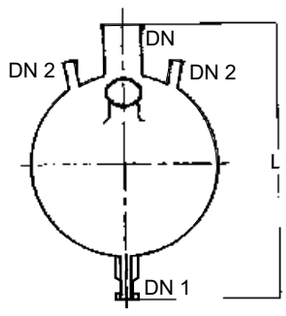
THREE NECK BOTTOM OUTLET SPHERICAL VESSELS

Cat. Ref.	Nominal Capacity	L	DN	DN1	DN2
VSM5	5 L	425	40	25	25
VSM10	10 L	500	40	25	25
VSM20	20 L	575	80	25	25
VSM50	50 L	825	100	40	40
VSM100	100 L	925	150	40	40
VSM200	200 L	1175	225	40	40
VSM300	300 L	1275	225	50	50



FOUR NECK BOTTOM OUTLET SPHERICAL VESSELS

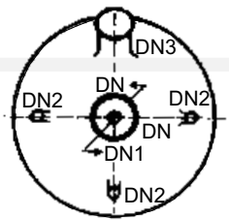
Cat. Ref.	Nominal Capacity	L	DN	DN1	DN2	Dn3
VSPL5	5 L	425	40	25	25	40
VSPL10	10 L	500	40	25	25	40
VSPL20	20 L	575	80	25	25	40
VSPL50	50 L	825	100	40	40	100
VSPL100	100 L	925	150	40	40	100
VSPL200	200 L	1175	225	40	40	100
VSPL300	300 L	1275	225	50	50	100



VESSELS

FIVE NECK BOTTOM OUTLET SPHERICAL VESSEL

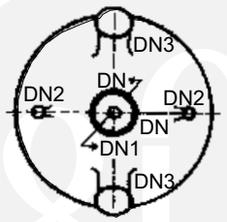
Cat. Ref.	Nominal Capacity	L	DN	DN1	DN2	Dn3
VSL5	5 L	425	40	25	25	40
VSL10	10 L	525	40	25	25	40
VSL20	20 L	575	80	25	25	40
VSL50	50 L	825	100	40	40	100
VSL100*	100 L	925	150	40	40	100
VSL200*	200 L	1175	225	40	40	100
VSL300	300 L	1275	225	50	50	100



(Top View)

FIVE NECK BOTTOM OUTLET SPHERICAL VESSEL

Cat. Ref.	Nominal Capacity	L	DN	DN1	DN2	Dn3
VS 5	5 L	425	40	25	25	40
VS 10	10 L	525	40	25	25	40
VS 20	20 L	575	80	25	25	40
VS 50	50 L	825	100	40	40	100
VS 100*	100 L	925	150	40	40	100
VS 200*	200 L	1175	225	40	40	100
VS 300	300 L	1275	225	50	50	100

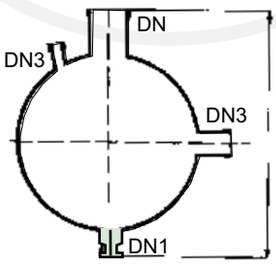


(Top View)

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
VSD5	5 L	425	40	25	25	50
VSD10	10 L	525	40	25	25	50
VSD20	20 L	575	80	25	25	50
VSD50	50 L	825	100	40	40	80
VSD100	100 L	925	150	40	40	80
VSD200	200 L	1175	225	40	40	150
VSD300	300 L	1275	225	50	50	150

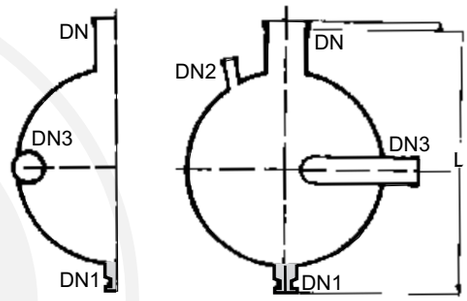


* marked items are available fast.

SPHERICAL CYCLONES

Cyclones can be used for the seperation of droplets and solids from gases and vapours. Cyclones are to be supportd on a vessel holder. A dip pipe should be used on the top neck.

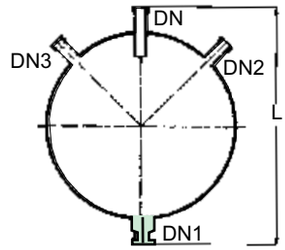
Cat. Ref.	Nominal Capacity	L	DN	DN1	DN2	Dn3
VSCY5	5 L	425	40	25	25	40
VSCY10	10 L	500	40	25	25	40
VSCY20	20 L	575	50	25	25	50
VSCY50	50 L	825	100	40	40	50



SPHERICAL RECEIVERS

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	(10°) Dn3
VR5*	5 L	350	25	25	25	
VR10*	10 L	425	25	25	25	
VR20*	20 L	500	25	25	25	
VRB5	5 L	350	25	25	25	25
VRB10	10 L	425	25	25	25	25
VRB20	20 L	500	25	25	25	25

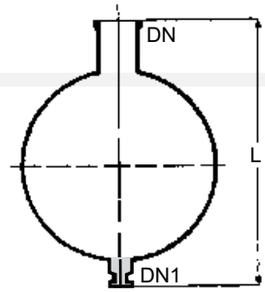


VESSELS

ADDITION VESSELS

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

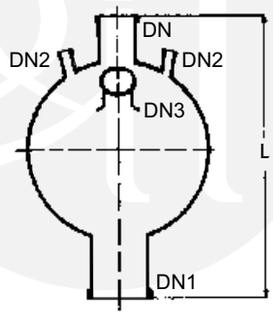
Cat. Ref.	Nominal Capacity	L	DN	DN1 Va5
5 L	375	375	40	
VA10*	10 L	450	40	25
VA20	20 L	525	80	25
VA50	50 L	725	100	40
VA100	100 L	825	150	40
VA200	200 L	1075	225	40
VA300	300 L	1175	225	50



SPHERICAL VESSELS WITH WIDE BOTTOM OUTLET

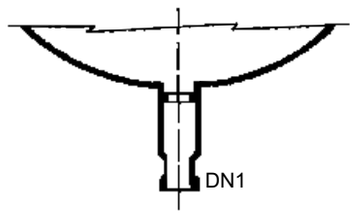
These vessels are generally used to fit immersion exchangers in the bottom. Special heating mantle or bath should be used if used with.

Cat. Ref.	Nominal Capacity	L	DN	DN1	DN2	Dn3
VSR50	50 L	750	100	150	40	100
VSR100	100 L	850	150	150	40	100
VSR200	200 L	1050	225	150	40	100
VSE50	50 L	800	100	225	40	100
VSE100	100 L	900	150	225	40	100
VSE200	200 L	1100	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'.



* marked items are available fast.

Notes on use of Spherical vessesls.

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
   (a) to fix thermometer pocket or,
   (b) to fix dip pipe for liquid inlet or,
   (c) to fix sparger for gas purging or,
   (d) to fix vacuum control or vent valve or,
   (e) 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 VS D, VSCY, VR, VA etc. are to be supported on a vessel holder only. In case of vesels upto 20L size, vessel holding rings can be used instead of vessel holder.

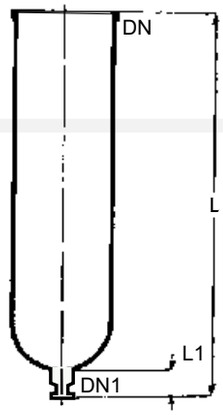
VESSELS

CYLINDRICAL VESSELS

Cat. Ref.	Nominal Capacity	DN	DN1	L	L1
VZ5/4*	5 L	100	25	700	175
VZ10/6*	10 L	150	25	700	175
VZ20/9*	20 L	225	25	750	175
VZ50/12*	50 L	300	40	1000	175
VZ100/18	100 L	450	40	900	175
VZ150/16	150 L	400	40	1400	175
VZ200/18	200 L	450	40	1500	175
VZ300/24	300 L	600	50	1300	175

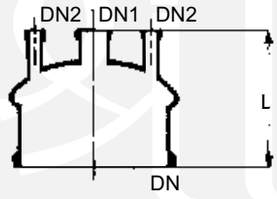
Cylindrical vessels of 50 Litres and above must be supported in a vessel holder.

Other accessories, like stirrers, baths, vessel holders etc, for cylindrical vessel scan be supplied to special orders.



CYLINDRICAL VESSEL COVERS

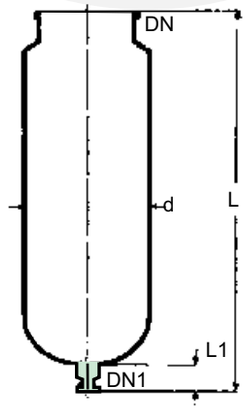
Cat. Ref.	DN	DN1	DN2	L
VZA4*	100	-	2x25	200
VZA6*	150	-	2x40	200
VZA9*	225	50	3x25	250
VZA12*	300	80	3x40	250
VZA16	400	100	3x40	275
VZA18	450	100	4x40	275
VZA24	600	100	4x40	300



KETTLES

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

Cat. Ref.	Nominal Capacity	DN	DN1	L	L1	d
KZ200	200 L	300	40	1400	175	485
KZ350	350 L	400	50	1500	175	620



* marked items are available fast.

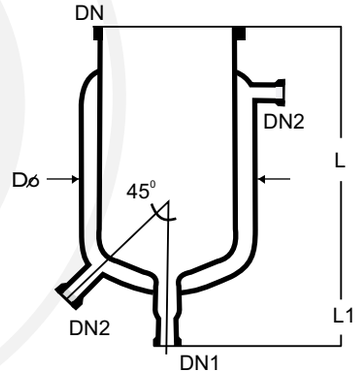
JACKETED VESSELS

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 high stresses between vessel and jacket by allowing the movement flexibility between two due to thermal expansion.

Glass Jackets

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 than 120°C

Cat. Ref.	DN	DN1	L	L1	D	DN2
VZD5/6	150	25	375	150	200	25
VZD10/9	225	25	385	150	300	25
VZD20/12	300	40	385	150	375	40
VZD30/12	300	40	535	150	375	40
VZD50/12	300	40	700	150	375	40
VZD100/18	300	40	835	200	550	40



Metal Jackets

These vessels can also be supplied with Metal Jackets. Metal Jacket can be used in a maximum operating pressure of 2.0 bar and a maximum operation temperature of 150°C.

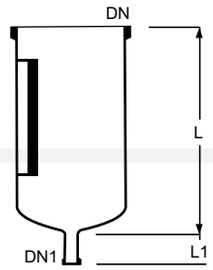
Cat. Ref.	Nominal Capacity	DN	DN1	d	L	J
VZJ5/4	5 L	100	25	135	700	550
VZJ10/6*	10 L	150	25	188	700	550
VZJ20/9	20 L	225	25	262	750	600
VZJ50/12	50 L	300	40	345	1000	850

VESSELS

BAFFLES VESSEL

Glass fused baffles are provided for effective mixing of the liquid while stirring

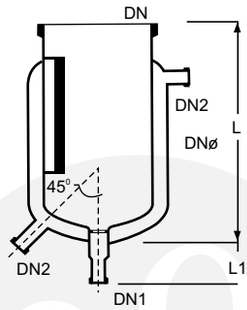
Cat. Ref.	DN	DN1	L	L1
VZ2/4/F	100	25	250	60
VZ5/6/F	150	25	350	60
VZ10/9/F	225	25	350	60
VZ20/12/F	300	40	350	60
VZ30/12/F	300	40	500	60



BAFFLES JACKETED VESSEL

Glass fused baffles jacketed vessels are provided for effective mixing of the liquid while stirring

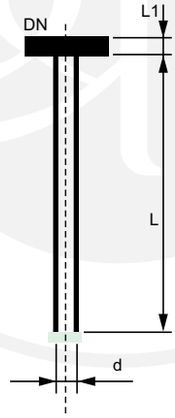
Cat. Ref.	DN	DN1	L	L1	D1	DN2
VZD2/4/F	100	25	275	75	140	15
VZD5/6/F	150	25	375	75	200	25
VZD10/9/F	225	25	385	75	300	25
VZD20/12/F	300	40	385	75	375	25
VZD30/12/F	300	40	535	75	375	25



DIP PIPES

Dip pipes are used as liquid inlet for spherical vessels.

Cat. Ref.	For Vessel	DN	DN1	d	L	L1
DP20/1*	20 L	25	25	12	300	100
DP50/1.5*	50 L	40	25	19	400	100
DP100/1.5*	100 L	40	25	19	500	100
DP200/1.5*	200 L	40	25	19	600	100

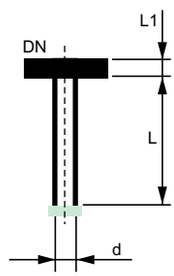


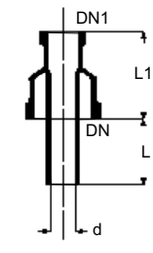
SHORT DIP PIPES

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

Cat.Ref.	DN	DN1	d	L	L1
DP1/1*	25	25	12	100	100
DP1.5/1*	40	25	19	100	100
DP1.5/1.5	40	40	19	100	100
DP2/1	50	25	25	100	100
DP2/1.5	50	40	25	100	100
DP3/1.5	80	40	37	100	125
DP4/1	100	25	25	100	150
DP4/2	100	50	50	100	150

* marked items are available fast.

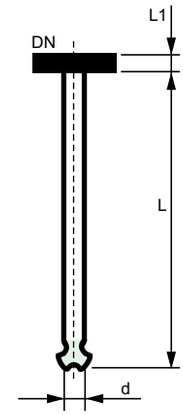




GAS SPARGERS

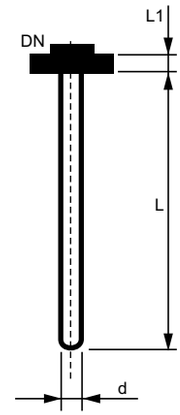
Gas spargers are used for gas feed/sparging in the vessels.

Cat.Ref.	For Vessel	DN	DN1	d	L	L1	No.of Holes
SPG20/1	20 L	25	25	12	300	100	5x1mm
SPG50/1.5	50 L	40	25	19	400	100	5x1mm
SPG100/1.5	100 L	40	25	19	500	100	5x1mm
SPG200/1.5	200 L	40	25	19	600	100	5x1mm



THERMOMETER POCKETS

Cat. Ref.	For Vessel	DN	d	L	L1
TP20/1*	20 L	25	12	300	50
TP50/1.5*	50 L	40	19	400	50
TP100/1.5*	100 L	40	19	500	50
TP200/1.5*	200 L	40	19	600	50



VESSELS

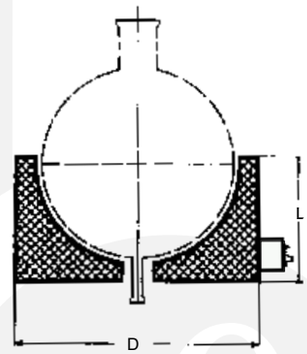
HEATING MANTLES

Heating Mantle is used for electrical heating of cylindrical as well as spherical vessels. Also available in flameproof & non-flame proof models. The flaneproof 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 encloser.

We can also provide flameproof digital temperature indicator cum controller with sensor.

Cat.Ref.	Vessel Size	D	L	Watts	Circ-uits	Supply Volts
JMD5	5 L	320	190	750	2	230
JMD10*	10 L	380	220	1200	2	230
JMD20	20 L	485	285	2000	3	230
JMD50	50 L	600	345	3700	3	415
JMD100	100 L	790	470	6000	3	145
JMD200	200 L	920	530	7500	6	415

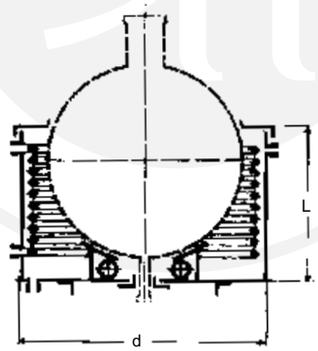
Cat.Ref.	Vessel Size	D	L	Watts	Circ-uits	Supply Volts
JMD5/F	5 L	330	200	600	1	230
JMD10/F	10 L	440	220	1000	1	230
JMD20/F	20 L	510	285	2000	2	230
JMD50/F	50 L	610	350	3600	3	415
JMD100/F	100 L	790	430	5200	3	145
JMD 200/F	200 L	940	510	8400	3	415



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.

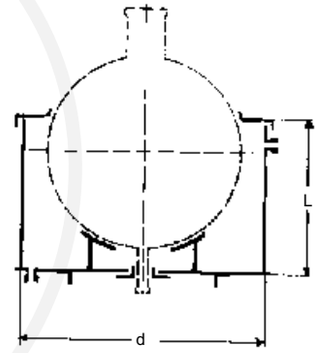
Cat.Ref.	Vessel Size	d	L	Watts	HTA Vessel	HTA Coils
SBH20	20 L	480	340	2x1500	0.25	0.4
SBH50*	50 L	615	415	2x2000	0.5	0.6
SBH100	100 L	720	535	2x3000	0.7	1
SBH200	200 L	900	620	2x4000	1	1.5



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.

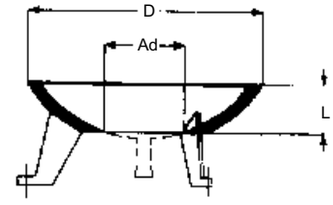
Cat.Ref. Size	Vessel	d	L
BHC20	20 L	480	340
BHC50	50 L	615	415
BHC100	100 L	720	535
BHC200	200 L	900	620



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
VSS20*	20 L	325	230	100
VSS50*	50 L	390	230	100
VSS100	100 L	410	250	100
VSS200	200 L	700	400	215

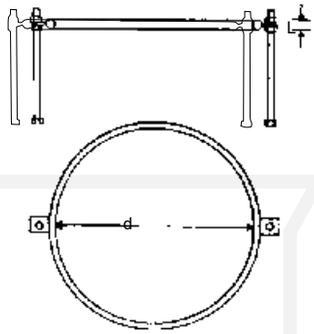


* marked items are available fast.

VESSELS

VESSEL HOLDING RINGS

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

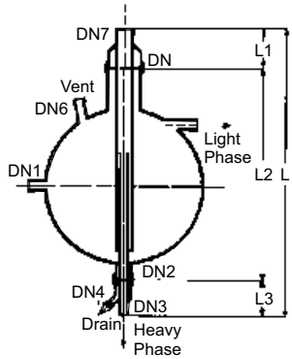


Cat.Ref.	Vessel Size	d	L
VRS2	2 L	100	15
VRS5*	5 L	150	15
VRS10*	10 L	215	15
VRS20*	20 L	300	15

DECANTORS

Decantation is a process of separation of two immiscible liquids having different densities. When these liquids allowed to settle forms two distinct layers, havier at bottom and lighter at top. Goel has developed a 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.

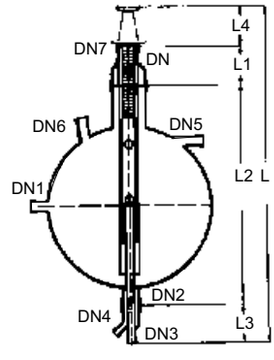
Goel's Decantor provides continuous separation, visual monitoring, and ensure separation even after feed is stopped.



Type-A

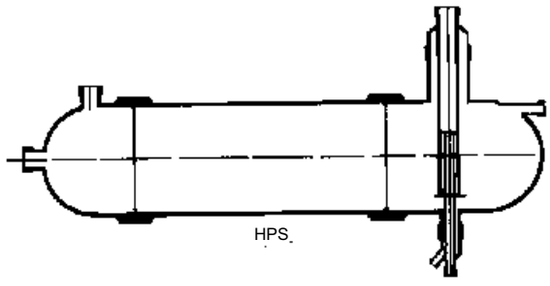
Decantors can be provided with Adjustable overflow valve, (Type B) to adjust the position of interface for different operating situations.

Cat. Ref.	Nominal Capacity	L	L1	L2	L3	L4	DN	Inlet DN1	DN2	Heavy Phase Outlet DN3	Drain DN4	Light hase Outlet DN5	Vent DN6	DN7	Type
SPS20	20 L	800	125	525	150		80	25	50	25	25	25	25	50	A
SPS50	50 L	1025	150	725	150		100	40	50	25	25	40	40	50	A
SPS100	100 L	1175	200	825	150		150	40	50	25	25	40	40	50	A
SPS200	200 L	1475	250	1075	150		225	40	50	25	25	40	40	50	A
SPA20	20 L	1000	125	525	150	200	80	25	50	25	25	25	25	50	B
SPA50	50 L	1225	150	725	150	200	100	40	50	25	25	40	40	80	B
SPA100	100 L	1375	200	825	150	200	150	40	50	25	25	40	40	80	B
SPA200	200 L	1675	250	1075	150	200	225	40	50	25	25	40	40	80	B

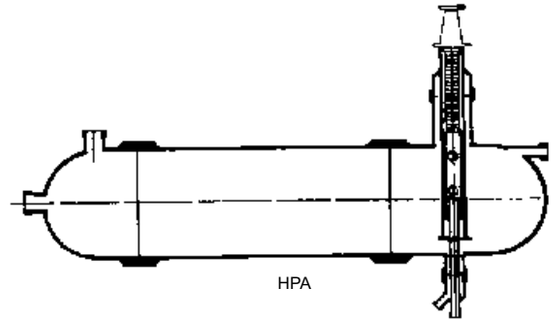


Type-B

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



HPS



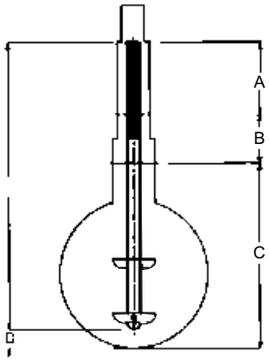
HPA

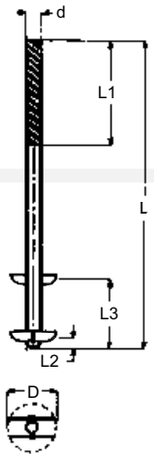
* marked items are available fast.

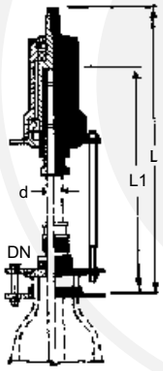
STIRRERS

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
300L	300	25	1000	50	1275





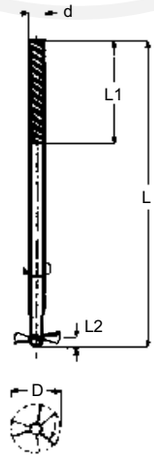


CHUCK & SEAL

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. Mechannical Seal	Vessel	DN	L	L1	d
CSA1 CSA1.5*	CSM1 CSM1.5*	20 L 50,100, 200 L	50 80	300 360	250 300	25 47

* marked items are available fast.



STIRRER WITH TEFLON BLADES

These stirrers are used with liquid of low viscosity.

Cat.Ref.	Vessel	L	L1	L2	L3	d	D
STB10	10	-	-	-	-	-	-
STB20	20	825	350	25	-	25	100
STB50	50	1050	350	25	200	47	150
STB100	100	1200	350	30	250	47	175
STB200	200	1450	350	30	325	47	200
STB300	300	1275	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
STV50	50	1050	400	50	47	95
STV100	100	1200	400	65	47	140
STV200	200	1450	400	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
STP50	50	1050	400	50	47	95
STP100	100	1200	400	65	47	145
STP200	200	1450	400	65	47	210

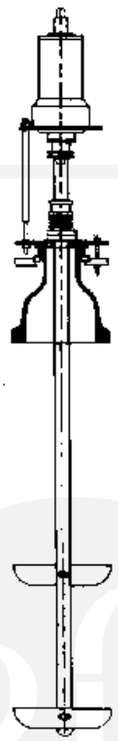
STIRRERS

STIRRING ASSEMBLY WITH 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
STBA20	20L	STB20	CSA1	PR4/2
STBA50*	50L	STB50	CSA1.5	PR6/3
STBA100*	100L	STB100	CSA1.5	PR9/3
STBA200	200L	STB200	CSA1.5	PR12/3
STVA50	50L	STV50	CSA1.5	PR6/3
STVA100	100L	STV100	CSA1.5	PR9/3
STVA200	200L	STV200	CSA1.5	PR12/3
STPA50	50L	STP50	CSA1.5	PR6/3
STPA100	100L	STP100	CSA1.5	PR9/3
STPA200	200L	STP200	CSA1.5	PR12/3



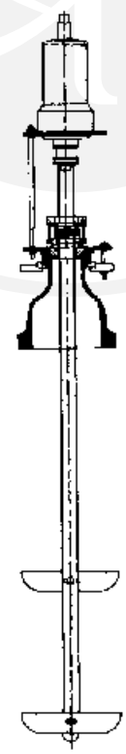
STIRRING ASSEMBLY WITH MECHANICAL SEAL

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
STBA20	20L	STB20	CSA1	PR4/2
STBA50*	50L	STB50	CSA1.5	PR6/3
STBA100*	100L	STB100	CSA1.5	PR9/3
STBA200	200L	STB200	CSA1.5	PR12/3
STB300	300L	STB300	CSA2	-
STVA50	50L	STV50	CSA1.5	PR6/3
STVA100	100L	STV100	CSA1.5	PR9/3
STVA200	200L	STV200	CSA1.5	PR12/3
STPA50	50L	STP50	CSA1.5	PR6/3
STPA100	100L	STP100	CSA1.5	PR9/3
STPA200	200L	STP200	CSA1.5	PR12/3

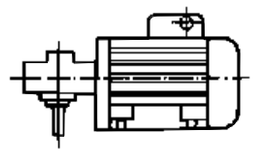
* marked items are available fast.



STIRRER DRIVES

A1400 RPM 3 Phase non-flameproof motor with built-in gear is supplied along with 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 chuck.

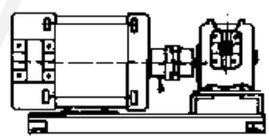
Cat.Ref.	HP	RPM
RSD.5*	0.5	192



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.

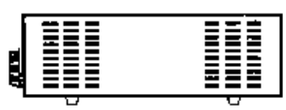
Cat.Ref.	HP	RPM
FSD.5*	0.5	192



SPEED REGULATORS

3 Phase non-flameproof regulators are available to control the speed of stirrer drives.

Cat.Ref.	Phase	Type
REG3	3	A
VFD3	3	B



HEAT EXCHANGERS

HEAT EXCHANGERS

SHELL AND TUBE HEAT EXCHANGERS

CONDENSERS

BOILERS

ANGLED HOSE CONNECTOR ASSEMBLIES

IMMERSIONS

PRODUCT COOLERS

HEAT EXCHANGERS

SHELL AND TUBE HEAT EXCHANGERS

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. MEET 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

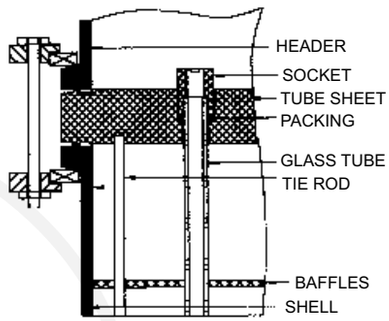
1. Universal corrosion resistance an excellent alternative to expensive MOCs like graphite, hastelloy, copper titanium, tantalum and other exotic metals.
2. Excellent heat transfer as fouling does not occur on smooth glass surfaces.
3. Flexibility of installation vertical/ horizontal.
4. Easy replacement 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 EXCHANGERS

(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.



TYPE

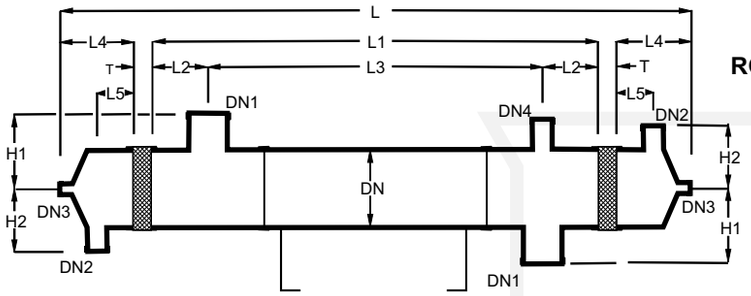
Three basic versions * are available :

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.

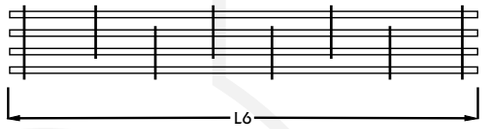
* MEET provides assistance to clients for selecting the right model for specific duty.

HEAT EXCHANGERS

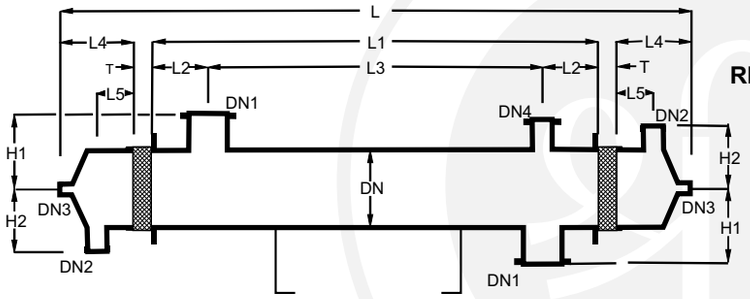
DIMENSIONAL SPECIFICATIONS



RGG



TUBE BUNDLE



RMG

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 (m2)	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

Nozzles in metal shell are drilled as per Table F

HEAT EXCHANGERS

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 herebelow :

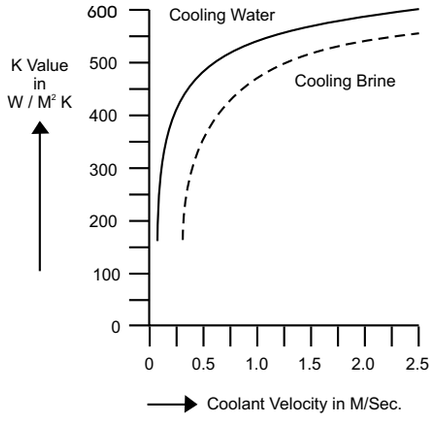
Model	Side	Maximum Permissible Pressure Range, Kg/cm² (g)		
		150 DN	225 DN	300 DN
RGG	Shell	2.0	1.0	1.0
	Tube	2.0	1.0	1.0
RGM	Shell	2.0	1.0	1.0
	TUbe	3.5	3.5	3.5
RMG	Shell	3.5	3.5	3.5
	Tube	2.0	1.0	1.0

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

PERFORMANCE & DESIGN DATA

The particular advantage of shell & tube heat exchanger is high heat transfer performance. The relation between heat transfer and velocity of flow can be easily seen in the diagram. On receipt of the operating data from client the most favourable shell and tube heat exchanger is selected. This accurate design combined with most reliable quality assurance ensure economy and operational reliability for the user. For approximate sizing some typical heat transfer coefficients are given here below :

Media	use	U-Values	
		kcal/m²hr k	W/m²k300 DN
Steam water	Condensation	350-550	410-640
Water-Water	Cooling	250-350	290-410
Water-air	Cooling	30-60	35-70



HEAT EXCHANGERS

CONDENSERS

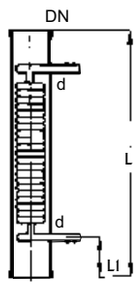
Condensers are used for condensation of vapours and cooling of liquids. Condensers are made by fusing number of parallel coils in a glass shell. Coils are made in different diameters using tubes of different bores.

The average co-efficient of heat transfer in coil condenser is considered as-

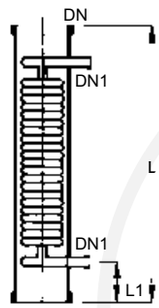
Condensation 200 - 270 Kcal/m^2,hr,°C appx.
Cooling 100 - 150 Kcal/m^2,hr,°C appx.

Precautions to be taken in use of condensers

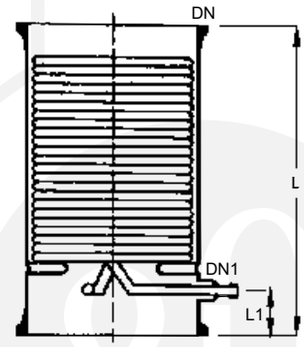
- Vapours should be passed through shell only.
- Maximum pressure of coolant should be 2.7 bars.
- Adequate flow of coolant should be used.
- Steam should not be used in coils.
- Coolant should not be heated to boiling point.
- Coolant control valve should be turned slowly.
- Coolant should be allowed 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.



TYPE-A



TYPE-B



TYPE-B

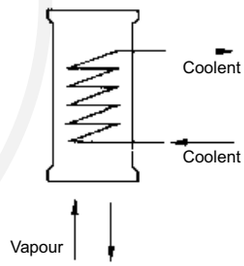
Cat. Ref.	DN	d/ DN1	L	L1	Type	Actual H.T.A. m2	Cross Area Cm2	Free Coolant Rate Kg/hr.	Max. Jacket Cap. Litre
HE3/3.5	80	16	600	100	A	0.35	5	1300	2
HE4/5*	100	19	600	100	A	0.50	30	2400	4
HE4/6	100	19	750	100	A	0.60	30	2400	6
HE6/10	150	25	600	100	B	1.00	52	2600	9
HE6/15*	150	25	850	100	B	1.50	52	2600	11
HE9/25*	225	25	800	100	B	2.50	125	3300	18
HE12/25	300	25	600	125	B	2.50	175	5700	25
HE12/40	300	25	900	125	B	4.00	175	5700	35
HE16/40	400	25	600	125	B	4.00	450	6200	60
HE16/50	400	25	700	125	B	5.00	450	6200	70
HE18/60	450	40	750	150	C	6.00	820	4800	100
HE18/80	450	40	900	150	C	8.00	820	6200	110
HE24/120	600	50	1250	300	C	12.00	1520	6200	265

* marked items are available fast.

METHODS OF USE

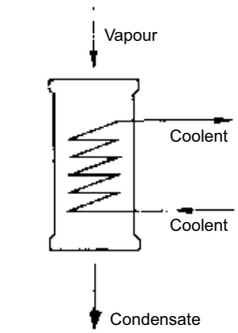
Vapours from bottom

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

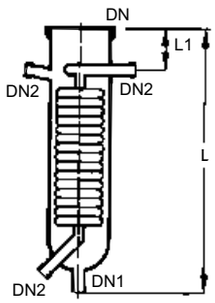
This method produce a cool condensate using the entire cooling surface area. This method should be used where the condensate can lead to "logging" of coils.



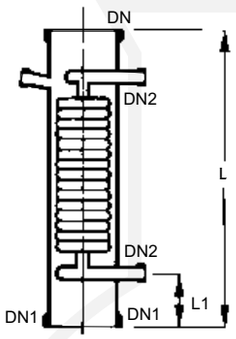
HEAT EXCHANGERS

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.



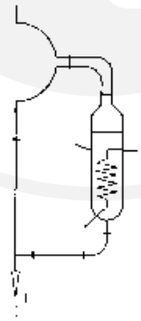
TYPE-A



TYPE-B

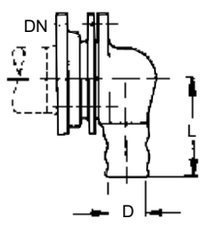
Cat. Ref.	DN	DN1	DN2	L	L1	Type	Actual H.T.A. m2	Free Cross Area Cm2	Jacket Cap. Litre
HEB4	100	25	25	375	100	A	0.15	40	2
HEB4/4	100	100	25	400	100	B	0.15	40	3
HEB6	150	40	25	450	100	A	0.35	50	5
HEB6/6	150	150	25	500	100	B	0.35	50	7
HEB9	225	40	25	700	100	A	1.00	150	16
HEB9/9	225	225	25	700	100	B	1.00	180	20
HEB12/12	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 equalant 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 be mounted in an external circulatory loop (as shown in figure) and not direct at the bottom of flask or column.
- Under certain circumstances, boilers can be mounted in series to provide larger heat transfer area.



ANGLED HOSE CONNECTOR ASSEMBLIES

Metal / Plastic angled hose connector assemblies are available to connect the flexible hose to the condensers. These are provide with a mating flange, a rubber gasket and nut bolts.

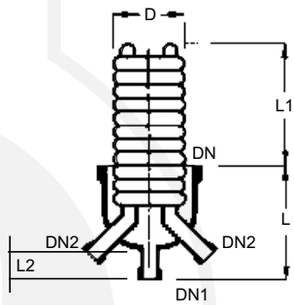


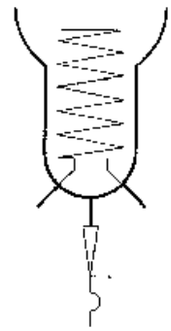
Cat.Ref.	DN	d	L
PMC1	25	22	70

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.



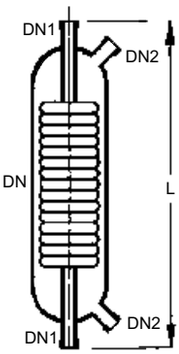


Cat. Ref.	DN	DN1	DN2	L	L1	L2	d	Actual H.T.A. m2
HEM6	150	40	25	200	200	75	145	0.4
HEM9	225	40	25	300	200	75	200	0.6

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 m2
HEF1/1	50	25	16	450	0.1
HEF1/2	50	25	16	600	0.2
HEF1/3.5	80	25	16	600	0.35
HEF1/5	100	25	19	600	0.5
HEF1/10	150	25	25	600	0.7
HEF1/15	150	25	25	850	1.25

COLUMN COMPONENTS / MEASUREMENT & CONTROLS

COLUMN COMPONENTS

- COLUMN SECTIONS
- COLUMN SECTIONS WITH THERMOMETER BRANCH
- PACKING SUPPORTS
- PTFE PERFORATED PLATES
- SUPPORT PLATE ASSEMBLY
- COLUMN PACKING-RASCHIG RINGS
- PTFE SUPPORT PLATES
- COLUMN FEED PIPE
- COLUMN FEED SPARGERS
- SPRAY FEED SECTION
- SPRAY FEED PIPES
- PTFE REDISTRIBUTORS
- COLUMN ADAPTORS
- FLAT TOP COLUMN ADAPTORS
- REFLUX DIVIDERS
- THERMOMETER POCKETS FOR REFLUX DIVIDER
- LIQUID SEALS

MEASUREMENT & CONTROLS

- DIGITAL TEMPERATURE INDICATOR
- TWO POINT DIGITAL TEMPERATURE INDICATOR
- ELECTRO-MAGNETS
- TIMERS
- AUTOMATIC LEVEL CONTROLLERS
- CONTINOUS TEMPERATURE CONTROLLER

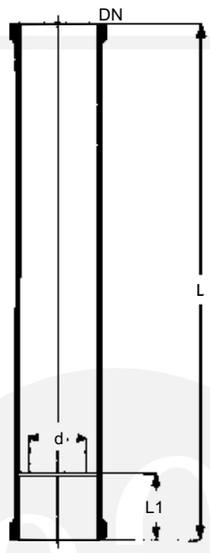
COLUMN COMPONENTS

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.

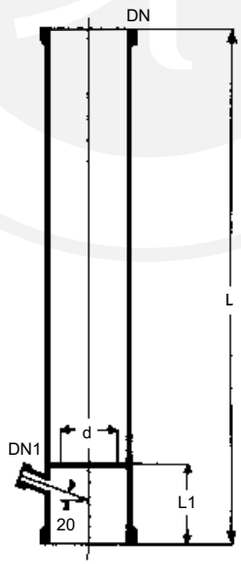
Cat.Ref.	DN	L	L1	Minimum packing Size	Usual packing Size
CS3/1000	80	1000	75	9	12
CS4/1000	100	1000	75	12	15
CS6/1000	150	1000	75	15	25
CS6/1500	150	1500	100	15	25
CS9/1000	225	1000	100	20	25
CS9/1500	225	1500	100	20	25
CS12/1000	300	1000	100	25	25
CS12/1500	300	1500	100	25	25
CS16/1000	400	1000	150	25	25
CS16/1500	400	1500	150	25	25
CS18/1000	450	1000	150	25	25
CS18/1500	450	1500	150	25	25
CS24/1000	600	1000	200	40	40



COLUMN SECTIONS WITH THERMOMETER BRANCH

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

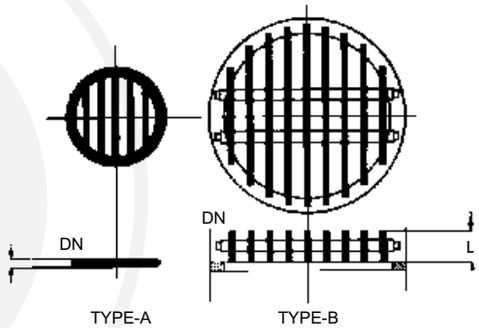
Cat.Ref.	DN	DN1	L	L1	d
CST3/1000	80	25	1000	125	50
CST4/1000	100	25	1000	125	75
CST6/1000	150	25	1000	125	125
CST6/1500	150	25	1500	125	125
CST9/1000	225	25	1000	150	175
CST9/1500	225	25	1500	150	175
CST12/1000	300	25	1000	150	250
CST12/1500	300	25	1500	150	250
CST16/1000	400	25	1000	200	250
CST16/1500	400	25	1500	200	350
CST18/1000	450	25	1000	200	400
CST18/1500	450	25	1500	200	400
CST24/1000	600	25	1000	250	540



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.

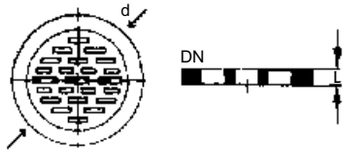
Cat.Ref.	DN	L	Cross Section Area	Max. Load Kgs.	Minimum Packing Size	Type
CP3	80	10	45%	10	12	A
CP4	100	12	50%	15	15	A
CP6	150		55%	30	25	A
CP9	225	19	60%	50	25	A
CP12	300	19	65%	75	25	A
HD16	400	70	70%	150	25	B
HD18	450	70	70%	200	25	B
HD24	600	95	70%	300	40	B



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
TCP3	80	99	7
TCP4	100	132	9
TCP6	150	184	10
TCP9	225	254	12
TCP12	300	340	16



COLUMN COMPONENTS

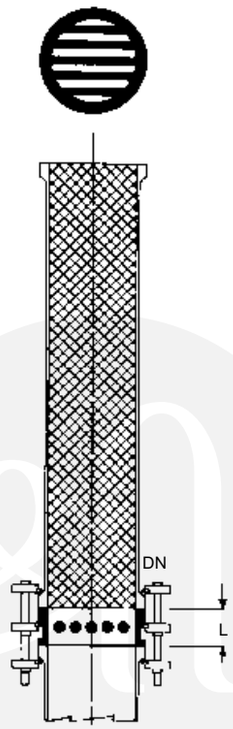
SUPPORT PLATE ASSEMBLY

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 advantages over 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
LBE3*	80	25	70%	20	12
LBE4*	100	25	70%	30	15
LBE6*	150	50	70%	60	25
LBE9*	225	50	80%	90	25
LBE12*	300	50	80%	150	25



COLUMN PACKING-RASCHIG RINGS

Raschig rings upto 25mm are made from Neutral glass. 40mm and 50mm raschig rings are available only in Borosilicate glass.

Cat.Ref.	Size	Bulk Density Kg/Ltr	Specific Surface m2/m3	Glass
FC9	9x9	0.6	500	Neutral
FC12	12x12	0.5	400	Neutral
FC15*	15x15	0.4	300	Neutral
FC25*	25x25	0.3	200	Neutral
FCB40	40x40	0.3	160	Borosilicate
FCB50	50x50	0.32	120	Borosilicate

*marked items are available fast.

Packings require for various pipe sections (Kgs.)

Pipe Section	Packing size						
	Vol (L)	FC	FC 12	FC 15	FC 25	FCB 40	FCB 50
PS3/1000	5	3	3	2	-	-	-
PS4/1000	8	-	4	3	3	-	-
PS6/1000	18	-	9	7	7	-	-
PS9/1000	37	-	-	15	15	15	-
PS12/1000	66	-	-	17	30	25	-
PS16/1000	125	-	-	-	65	50	53
PS18/1000	165	-	-	-	90	65	70
PS24/1000	295	-	-	-	-	115	125

Notes of use of Column Packing

- 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.

PTFE SUPPORT PLATES

PTFE Support plates are sandwitched between two pipe sections to provide base to packing supports.

Cat.Ref.	DN	OD	ID	L
CPS9	225	258	175	15
CPS12	300	340	250	15
CPS16	400	463	350	20
CPS18	450	535	370	20
CPS24	600	684	540	25

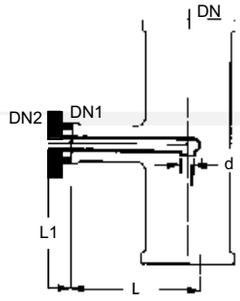
COLUMN COMPONENTS

COLUMN FEED PIPE

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

Cat.Ref.	DN	DN1	DN2	L	L1	d
FP3	80	25	25	100	100	12
FP4	100	25	25	125	100	12
FP6	150	40	25	150	100	19
FP9	225	40	25	175	100	19
FP12	300	40	25	225	100	19
FP16	400	40	25	275	100	19
FP18	450	40	25	300	100	19
FP24	600	50	40	450	100	25

DN refers the nominal diameter of the column.

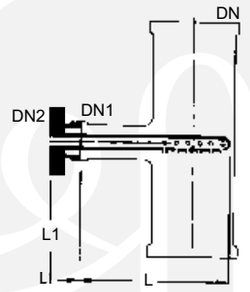


COLUMN FEED SPARGERS

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

Cat.Ref.	DN	DN1	DN2	L	L1	Holes
SPG3	80	25	25	125	100	21x2mm
SPG4	100	25	25	150	100	21x2mm
SPG6	150	40	25	200	100	27x2mm
SPG9	225	40	25	275	100	27x2mm
SPG12	300	40	25	350	100	30x3mm
SPG16	400	40	25	450	100	39x3mm
SPG18	450	40	25	500	100	39x3mm
SPG24	600	50	40	650	100	60x3mm

DN refers the nominal diameter of the column.

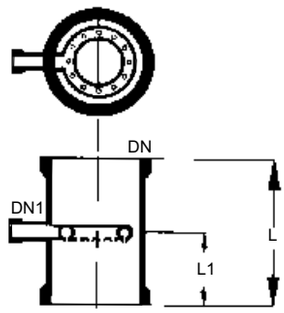


SPRAY FEED SECTION

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

Cat.Ref.	DN	DN1	L	L1	Holes
FR3	80	25	200	100	21x2mm
FR4	100	25	250	125	21x2mm
FR6	150	40	250	125	27x2mm
FR9	225	40	250	125	27x2mm
FR12	300	40	300	150	30x3mm

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



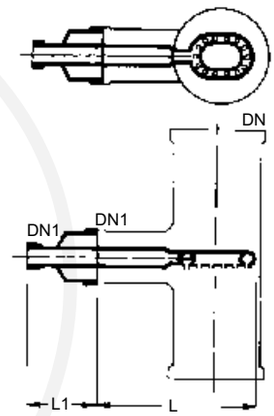
*marked items are available fast.

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
FD6	150	80	25	225	125	27x2mm	PTU6/3
FD9	225	100	25	325	150	27x2mm	PTU9/4
FD12	300	150	25	400	200	30x3mm	PTU12/6
FD16	400	150	50	500	200	39x3mm	PTU16/6
FD18	450	150	50	550	200	39x3mm	PTU18/6
FD24	600	150	50	700	200	60x3mm	PTU24/6

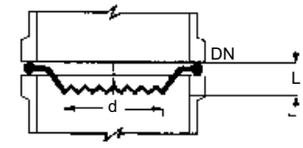
DN refers the nominal diameter of the column.



PTFE REDISTRIBUTORS

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

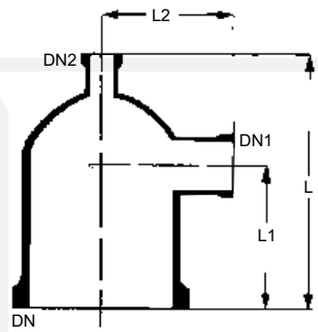
Cat.Ref.	DN	d	L
TL3	80	55	20
TL4	100	80	20
TL6	150	100	20
TL9	225	175	22
TL12	300	215	25
TL16	400	315	25
TL18	450	365	30
TL24	600	420	30



COLUMN COMPONENTS

COLUMN ADAPTORS

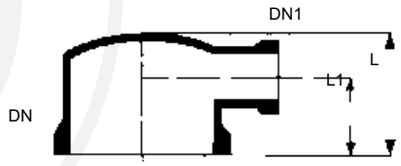
Cat.Ref.	DN	DN1	DN2	L	L1	L2
CA3/1/1	80	25	25	150	75	100
CA3/1.5/1	80	40	25	175	100	100
CA3/2/1	80	50	25	175	100	100
CA4/1/1*	100	25	25	150	75	125
CA4/1.5/1*	100	40	25	175	100	125
CA4/2/1	100	50	25	225	125	125
CA4/3/1	100	80	25	225	125	125
CA6/1/1*	150	25	25	200	100	150
CA6/1.5/1*	150	40	25	200	100	150
CA6/2/1*	150	50	25	250	125	150
CA6/3/1	150	80	25	250	150	150
CA6/4/1	150	100	25	275	150	175
CA9/1.5/1.5*	225	40	40	250	150	175
CA9/2/1.5*	225	50	40	250	150	175
CA9/3/1.5*	225	80	40	300	175	200
CA9/4/1.5	225	100	40	350	175	200
CA9/6/1.5	225	150	40	400	200	250
CA12/1.5/1.5*	300	40	40	300	150	225
CA12/2/1.5*	300	50	40	300	150	225
CA12/3/1.5*	300	80	40	300	150	250
CA12/4/1.5	300	100	40	350	175	250
CA12/6/1.5	300	150	40	425	225	250
CA12/9/1.5	300	225	40	450	225	300
CA16/2/2	400	50	50	400	200	300
CA16/3/2	400	80	50	450	250	300
CA16/4/2	400	100	50	450	250	300
CA16/6/2	400	150	50	550	300	350
CA16/9/2	400	225	50	550	300	350
CA18/2/2	450	50	50	400	200	325
CA18/3/2	450	80	50	450	250	350
CA18/4/2	450	100	50	450	250	350
CA18/6/2	450	150	50	550	300	350
CA18/9/2	450	225	50	550	300	400
CA18/12/2	450	300	50	750	400	400
CA24/2/2	600	50	50	450	200	400
CA24/3/2	600	80	50	500	250	400
CA24/4/2	600	100	50	500	250	400
CA24/6/2	600	150	50	650	300	450
CA24/9/2	600	225	50	650	300	450
CA24/12/2	600	300	50	800	400	500

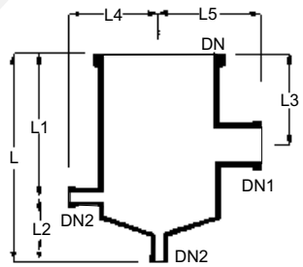


FLAT TOP COLUMN ADAPTORS

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

Cat.Ref.	DN	DN1	L	L1
CA3/1	80	25	100	75
CA3/1.5	80	40	125	100
CA4/1	100	25	100	75
CA4/1.5	100	40	125	100
CA6/1	150	25	150	100
CA6/1.5	150	40	150	100
CA6/2	150	50	200	125
CA6/3	150	80	200	150
CA9/1.5	225	40	200	150
CA9/2	225	50	200	150
CA9/3	225	80	250	175
CA9/4	225	100	250	175
CA12/2	300	50	250	150
CA12/3	300	80	250	150
CA12/4	300	100	300	175
CA12/6	300	150	350	225





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

Cat.Ref.	DN	DN1	DN2	L	L1	L2	L3	L4	L5
CAM4/2/1/1	100	50	25	450	300	150	200	125	125
CAM6/3/1/1	150	80	25	450	300	150	200	150	150
CAM9/3/1/1	225	80	25	450	300	150	200	175	200
CAM12/3/1/1	300	80	25	450	300	150	200	225	250

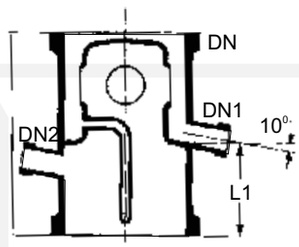
*marked items are available fast.

COLUMN COMPONENTS

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.

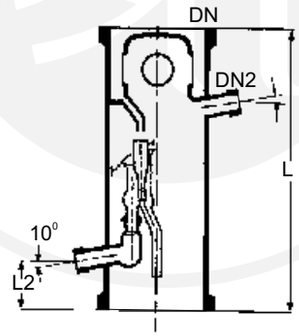


Cat.Ref.	DN	DN1	DN2	L	L1	Free Corss Section Cm2	Max. Product L/hr
RDA3	80	25	25	200	100	20	300
RDA4	100	25	25	250	150	50	500
RDA6	150	25	25	250	150	100	700
RDA9	225	25	25	375	150	150	900
RDA12	300	25	25	375	150	250	1100
RDA16	400	40	40	500	200	350	1300
RDA18	450	40	40	600	275	500	1500

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.



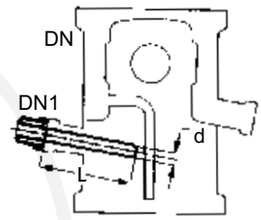
Cat.Ref.	DN	DN1	DN2	L	L1	Free Corss Section Cm2	Max. Product L/hr
RHM3	80	25	25	375	75	20	90
RHM4	100	25	25	400	75	50	180
RHM6	150	25	25	450	100	100	300
RHM9	225	25	25	550	100	150	500
RHM12	300	25	25	700	100	250	650
RHM16	400	40	40	800	150	350	1000
RHM18	450	40	40	900	150	500	1300

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.

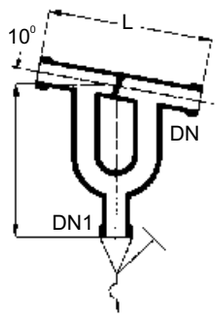
Cat.Ref.	DN	DN1	d	L
TP3	80	25	12	100
TP4	100	25	12	125
TP6	150	25	12	150
TP9	225	25	12	200
TP12	300	25	12	250
TP16	400	40	19	350
TP18	450	40	19	400



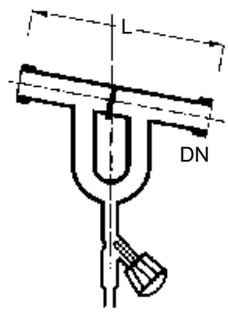
LIQUID SEALS

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
LS1	25	25	200	A
LS1.5	40	25	300	A
LSV1	25	-	200	B



TYPE-A



TYPE-B

* marked items are available fast

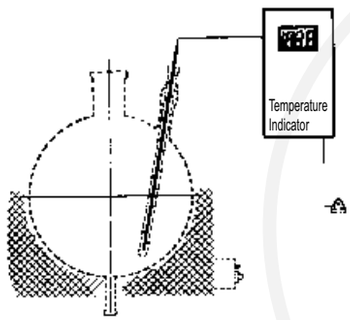
MEASUREMENT AND CONTROL

DIGITAL TEMPERATURE INDICATOR

This instrument is mainly used to monitor the temperature of liquid in a glass vessel in a typical Glass Distillation Unit.

The instrument consists of a Temperature indicator and a Resistance Temperature Detectors (RTD). The instrument works on 230V, 50Hz power supply. This displays the temperature in degree Centigrades in three and half digits of 12.5mm character height.

Cat.Ref.	Vessel size	RTD Length
DTI20	20	400
DTI50	50	500
DTI100	100	600
DTI200	200	700

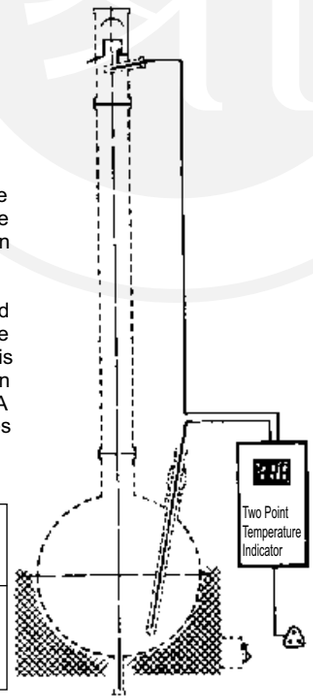


TWO POINT DIGITAL TEMPERATURE INDICATOR

This instrument is mainly used to monitor the temperature of liquid in a glass vessel and temperature of vapours at reflux divider in a typical Glass Distillation Unit.

The instrument consists of a Temperature indicator and two Resistance Temperature Detectors (RTDs). The instrument works on 230V, 50Hz power supply. This displays the the temperature in degree centigrades in three and half digits of 12.5mm character height. A switch is provided to see the two temperatures alternatively.

Cat.Ref. Length	Vessel size	RTD Length for vessel	RTD for reflux divider
DTT20	20	400	200
DTT50	50	500	225
DTT100	100	600	250
DTT200	200	700	300

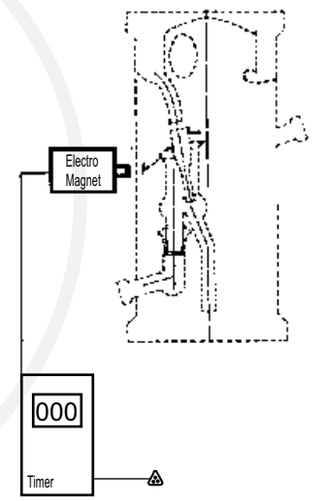


* marked items are available fast

ELECTRO-MAGNETS

Electro - magnets are used to operate Magnetically operated Reflux dividers. When 'On' the magnet attracts the swinging funnel of the reflux divider so that distillate can be taken off.
Electro-magnets are to be mounted outside the glass column, just near to the reflux divider, with the help of adjustable fittings. These are designed to use with Timers to maintain correct ratio between 'Off' and 'On' timings of its activation.
Electro-magnets work on 220V DC power supply, for which a output socket is provided in the Timers.

Cat. Ref.	Type
RPM*	Non-flameproof
RPF	Flameproof



TIMERS

Timers are designed to use with Electro-magnets to provide a correct ratio of reflux and distillate when operating a Magnetically operated reflux divider.

Timers work on a power supply of 230V, 50Hz.

Cat. Ref.	Type
RPM*	Non-flameproof
RPF	Flameproof

COUPLINGS / STRUCTURE AND SUPPORTS / SIGHT GLASS

COUPLINGS

- COMPLETE COUPLINGS
- BACKING FLANGES
- INSERTS
- ADAPTOR BACKING FLANGES
- PTFE "O" RING WITH LOCKING COLLAR
- PTFE BELLOWS - GLASS TO GLASS
- PTFE BELLOWS - GLASS TO METAL
- BELLOW FLANGES
- ADAPTOR BELLOW FLANGES

STRUCTURE AND SUPPORTS

- SUPPORT OF COLUMN
- STRUCTURE TUBES, GALVANISED
- STRUCTURE FITTINGS
- GENERAL DATA
- BASE
- COUPLER
- BEND
- TEE
- DOUBLE BEND
- DOUBLE TEE
- EQUAL BRACKET
- UNEQUAL BRACKET
- CROSS
- SUPPORT
- PLUGS
- STUDS
- STRUCTURE DIMENSIONS
- COLUMN BASE SUPPORT FRAMES
- COUNTER BALANCE SUPPORTS
- GROUTING OF BASE

SIGHT GLASS

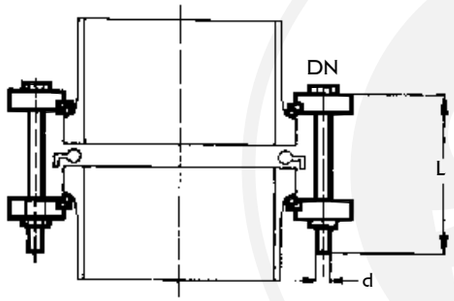
- MS FRAME SIGHT GLASS
- SS 304 FRAME SIGHT GLASS
- SS 316 FRAME SIGHT GLASS

COUPLINGS

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 Cast Iron. Also available in other MOC like Stainless Steel 304 & 316, Siliumin.
For easy & fast opening or closing of reactor vessel nozzle as quick as possible without using tools the QUICK RELEASE COUPLING is ideal solution. The quick release coupling available upto 300DN.

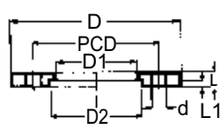
Cat.Ref.	DN	Flanges		Inserts		Nuts - Bolts		
		Cat.Ref.	Qty	Cat.Ref.	Qty	d	L	Qty
CT1*	25	CF1	2nos	CN1	2nos	5/16"	65	3nos
CT1.5*	40	CF1.5	2nos	CN1.5	2nos	5/16"	65	3nos
CT2*	50	CF2	2nos	CN2	2nos	5/16"	75	3nos
CT3*	80	CF3	2nos	CN3	2nos	5/16"	75	6nos
CT4*	100	CF4	2nos	CN4	2nos	5/16"	100	6nos
CT6*	150	CF6	2nos	CN6	2nos	5/16"	100	6nos
CT9*	225	CF9	2nos	CN9	2nos	3/8"	125	8nos
CT12*	300	CF12	2nos	CN12	2nos	3/8"	150	12nos
CT16	400	CF16	2nos	CN16	2nos	3/8"	150	12nos
CT18*	450	CF18	2nos	CN18	2nos	1/2"	150	12nos
CT24	600	CF24	2nos	CN24	2nos	1/2"	150	12nos



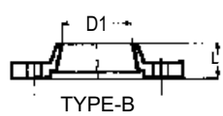
BACKING FLANGES

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.

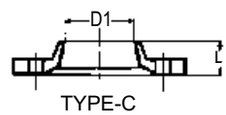
Cat.Ref.	DN	D	D1	D2	PCD	n x dØ	L	L1	Type
CF1	25	92	43	51	70	3 x 9Ø	10	6	A
CF1.5	40	110	58	66	86	3 x 9Ø	10	6	A
CF2	50	120	70	81	98	3 x 9Ø	12	8	A
CF3	80	155	101	112	133	6 x 9Ø	12	8	A
CF4	100	200	134	148	178	6 x 9Ø	12	8	A
CF6	150	275	186	196	254	6 x 9Ø	15	8	A
CF9	225	350	260	282	310	8 x 11Ø	28	8	B
CF12	300	425	342	363	395	12 x 11Ø	34	8	B
CF16	400	525	467	476	495	12 x 12Ø	22	8	A
CF18	450	630	537	557	585	12 x 14Ø	37	8	B
Cf24	600	755	643	690	710	12 x 14Ø	50	5	C



TYPE-A



TYPE-B



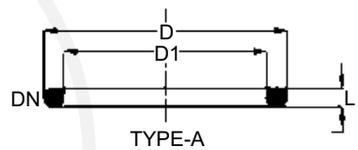
TYPE-C

* marked items are available fast

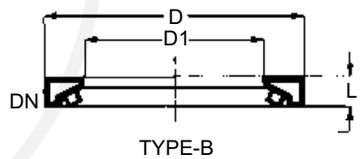
INSERTS

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, Klinger) insert are being introduced for 25DN to 300DN.

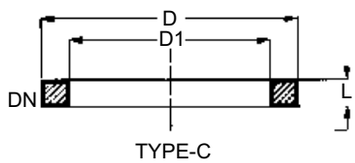
Cat.Ref.	DN	D	D1	L	Type
CN1	25	50	34	10	A
CN1.5	40	65	48	10	A
CN2	50	80	61	8	B
CN3	80	111	90	9	B
CN4	100	147	119	10	B
CN6	150	195	168	10	B
CN9	225	280	240	10	B
CN12	300	361	324	10	B
CN16	400	474	431	12	B
CN18	450	555	500	18	B
CN24	600	684	634	10	C



TYPE-A



TYPE-B



TYPE-C

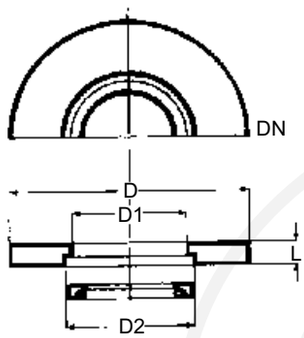
COUPLINGS

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.



Undrilling flanges

Cat.Ref.	DN	D	D1	D2	L
CFA1	25	115	43	51	10
CFA1.5	40	150	58	66	10
CFA2	50	165	70	81	12
CFA3	80	200	101	112	12
CFA4	100	220	134	148	12
CFA6	150	285	186	196	15
CFA9	225	395	260	282	15
CFA12	300	445	342	363	18

Drilled to Table E

Cat.Ref.	PCD	n x dØ
CFA1/E	82	4 x 12Ø
CFA1.5/E	98	4 x 12Ø
CFA2/E	114	4 x 16Ø
CFA3/E	146	4 x 16Ø
CFA4/E	178	8 x 16Ø
CFA6/E	235	8 x 19Ø
CFA9/E	324	12 x 19Ø
CFA12/E	406	12 x 23Ø

Drilled to Table F

Cat.Ref.	PCD	n x dØ
CFA1/F	87	4 x 16Ø
CFA1.5/F	105	4 x 16Ø
CFA2/F	127	4 x 16Ø
CFA3/F	165	8 x 16Ø
CFA4/F	190	8 x 16Ø
CFA6/F	260	12 x 19Ø
CFA9/F	356	12 x 23Ø
CFA12/F	438	16 x 23Ø

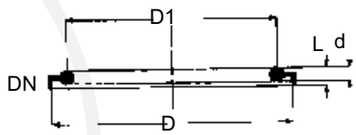
Drilled to ASA 150

Cat.Ref.	PCD	n x dØ
CFA1/A	79	4 x 12Ø
CFA1.5/A	98	4 x 12Ø
CFA2/A	121	4 x 16Ø
CFA3/A	152	4 x 16Ø
CFA4/A	190	8 x 16Ø
CFA6/A	241	8 x 19Ø
CFA9/A	298	8 x 19Ø
CFA12/A	432	12 x 23Ø

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
TR1*	25	42	33	3	5
TR1.5*	40	57	48	3	5
TR2*	50	70	59	3	5
TR3*	80	100	88	3	5
TR4*	100	134	119	4	6
TR6*	150	186	168	4	6
TR9*	225	260	236	4	7
TR12*	300	342	318	4	7
TR16	400	467	435	6	7
TR18*	450	537	490	6	7
TR24	600	686	640	8	10



COUPLINGS

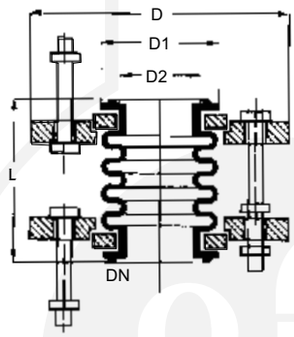
PTFE BELLOWS - GLASS TO GLASS

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

Bellows are supplied alongwith 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"

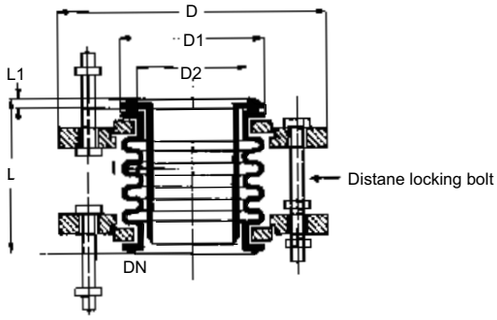
Line bellows
These can withstand a temperature of 200°C under normal atmospheric conditions.

Cat.Ref.	DN	D	D1	D2	L
FBN1*	25	95	41	31	60
FBN1.5*	40	105	56	43	65
FBN2*	50	120	69	55	65
FBN3*	80	155	98	82	65
FBN4*	100	200	132	111	65
FBN6*	150	275	184	162	65
FBN9*	225	350	258	230	65
FBN12	300	420	340	308	65



Vacuum bellows
For pipelines of 80DN 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
VB3*	80	155	98	82	70	5	3.0
VB4*	100	200	132	111	70	5	3.5
VB6*	150	275	184	162	70	5	4.0
VB9*	225	350	253	230	70	5	5.0
VB12	300	420	338	308	70	5	5.0



* marked items are available fast

PTFE BELLOWS - GLASS TO METAL

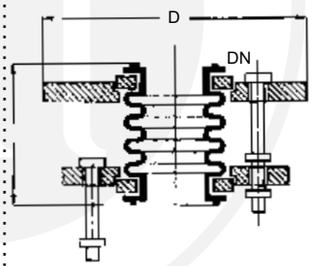
These bellows are used in installation of glass equipment for following purposes :

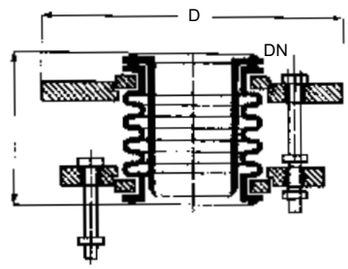
- to minimise the transfer of vibrations from the rotating equipments which are connected to the glass assembly.
- to accomodate the thermal expansion of any metalic (non-glass) equipment which are connected to the glass pipeline.

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
FBF1*	FBF1/E	FBF1/F	FBF1/A	25	115	60
FBF1.5*	FBF1.5/E	FBF1.5/F	FBF1.5/A	40	150	65
FBF2*	FBF2/E	FBF2/F	FBF2/A	50	165	65
FBF3*	FBF3/E	FBF3/F	FBF3/A	80	200	65
FBF4*	FBF4/E	FBF4/F	FBF4/A	100	220	65
FBF6*	FBF6/E	FBF6/F	FBF6/A	150	285	65
FBF9*	FBF9/E	FBF9/F	FBF9/A	225	395	65
FBF12	FBF12/E	FBF12/F	FBF12/A	300	445	65





Vacuum bellows

Cat.Ref. Undrilled	Cat.Ref. Table E	Cat.Ref. Table F	Cat.Ref. ASA 150	DN	D	L
VBF3*	VBF3/E	VBF3/F	VBF3/A	80	200	70
VBF4*	VBF4/E	VBF4/F	VBF4/A	100	220	70
VBF6*	VBF6/E	VBF6/F	VBF6/A	150	285	70
VBF9*	VBF9/E	VBF9/F	VBF9/A	225	395	70
VBF12	VBF12/E	VBF12/F	VBF12/A	300	445	70

COUPLINGS

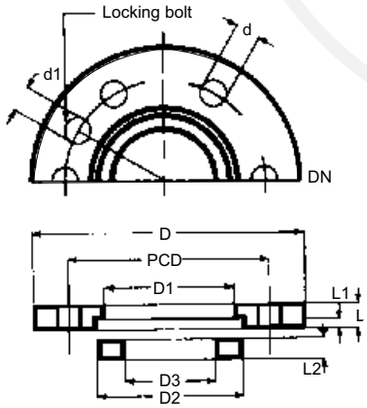
BELLOW FLANGES

Bellow flanges are used to fit a bellow to a glass component. Standard Bellow are made Cast Iron. Cast Iron with Epoxy Coated, Cast Iron with PTFE coated, Aluminum, Silumin, Stainless Steel, 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
BF1*	25	95	43	51	33	7	3	6
BF1.5*	40	110	58	66	45	7	3	6
BF2*	50	120	70	81	57	7	3	6
BF3*	80	155	101	112	84	7	3	6
BF4*	100	200	134	148	113	8	3	6
BF6*	150	275	186	196	164	8	3	6
BF9*	225	350	260	282	234	8	3	6
BF12	300	425	342	363	310	10	5	8

Drilling details

Cat.Ref.	PCD	n x dØ	n x d1Ø
BF1	70	3 x 9Ø	2 x 9Ø
BF1.5	86	3 x 9Ø	2 x 9Ø
BF2	98	3 x 9Ø	2 x 9Ø
BF3	133	6 x 9Ø	2 x 9Ø
BF4	178	6 x 9Ø	2 x 9Ø
BF6	254	6 x 9Ø	2 x 9Ø
BF9	310	8 x 11Ø	2 x 11Ø
BF12	395	12 x 11Ø	2 x 11Ø

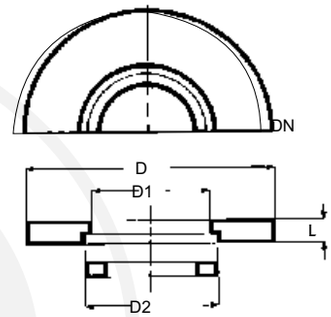


ADAPTOR BELLOW FLANGES

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
BFA1*	25	115	43	51	7
BFA1.5*	40	150	58	66	7
BFA2*	50	165	70	81	7
BFA3*	80	200	101	112	7
BFA4*	100	220	134	148	8
BFA6*	150	285	186	196	8
BFA9*	225	395	260	282	8
BFA12	300	445	342	363	10

Drilled to Table E

Cat.Ref.	pcd	n x dØ
BFA1/E	82	4 x12Ø
BFA1.5/E	98	4 x12Ø
BFA2/E	114	4 x16Ø
BFA3/E	146	4 x16Ø
BFA4/E	178	8 x16Ø
BFA6/E	235	8 x19Ø
BFA9/E	324	12x19Ø
BFA12/E	406	12x23Ø

Drilled to Table F

Cat.Ref.	pcd	n x dØ
BFA1/F	87	4 x 16Ø
BFA1.5/F	105	4 x 16Ø
BFA2/F	127	4 x 16Ø
BFA3/F	165	8 x 16Ø
BFA4/F	190	8 x 16Ø
BFA6/F	260	12 x 19Ø
BFA9/F	356	12 x 23Ø
BFA12/F	438	12 x 23Ø

Drilled to ASA 150

Cat.Ref.	pcd	n x dØ
BFA1/A	79	4 x 16Ø
BFA1.5/A	98	4 x 16Ø
BFA2/A	121	4 x 19Ø
BFA3/A	152	4 x 19Ø
BFA4/A	190	8 x 19Ø
BFA6/A	241	8 x 19Ø
BFA9/A	298	8 x 19Ø
BFA12/A	432	12x23Ø

STRUCTURE AND SUPPORTS

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.

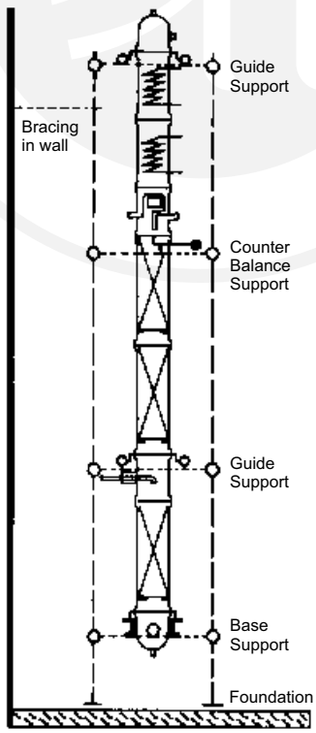
Generally, glass plant and equipment are supported in a rectangular tubular structure. This structure is formed of galvenised mild steel tubing with the cast iron fittings which are described in this catalogue. This type of structure provides enough flexibility for future modifications and is strong 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 which whole weight of the column should be taken. If total loads exceeds the permissible limits, counter balance supports should be used to releive excessive weight.

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, GALVANISED

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.

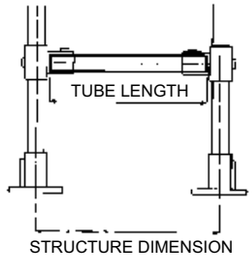
Tube size

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 Dimension	NB (mm) 15*	25*	30*	40*	50*
For Vertical installation					
2500	-	2500	-	-	-
3000	-	3000	3000	-	-
3500	-	3500	3500	-	-
4000	-	-	4000	-	-
6000	-	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 Frames					
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

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



* marked items are available fast

STRUCTURE AND SUPPORTS

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 Stainless Steel 304 & 316 and are suitable to the galvanised tubes described earlier.

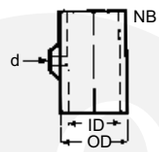
These slidable fittings are provided with grub screws to fix it at required position on a galvanised tube.

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

STRUCTURE FITTINGS -

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"

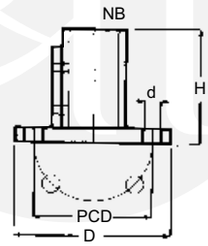


STRUCTURE FITTINGS -

BASE

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

Cat.Ref.	NB	D	H	PCD	dØ
BS25*	25	150	75	110	4 x 14Ø
Bs30*	30	150	75	110	4 x 14Ø
BS40	40	150	75	110	4 x 14Ø
BS50	50	175	75	125	4 x 14Ø

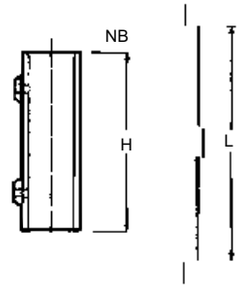


STRUCTURE FITTINGS -

COUPLER

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

Cat.Ref.	NB	H	H1
CL25	25	150	200
CL30	30	150	200
CL40	40	150	200
CL50	50	150	200



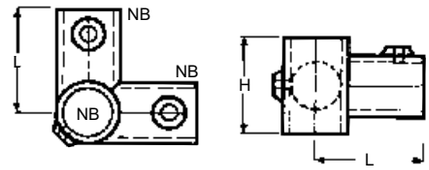
* marked items are available fast

STRUCTURE FITTINGS -

BEND

These are used to build frames on vertical tubes.

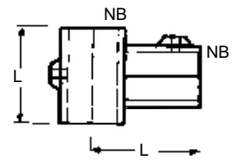
Cat.Ref.	NB	H	L
BN 25*	25	50	55
BN30*	30	65	70
BN40	40	70	80
BN50	50	85	95



STRUCTURE FITTINGS -

TEE

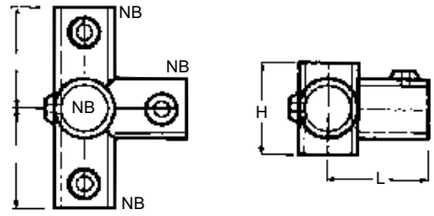
Cat.Ref.	NB	H	L
T25*	25	50	55
T30*	30	65	70
T40	40	70	80
T50	50	85	95



STRUCTURE FITTINGS -

DOUBLE BEND

Cat.Ref.	NB	H	L
BN 25	25	50	55
BN30	30	65	70
BN40	40	70	80
BN50	50	85	95

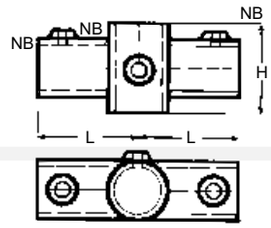


STRUCTURE AND SUPPORTS

STRUCTURE FITTINGS -

DOUBLE TEE

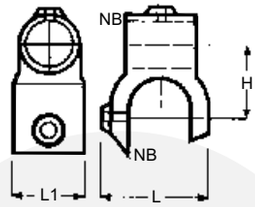
Cat.Ref.	NB	H	L
DT25	25	50	55
DT30	30	65	70
DT40	40	70	80
DT50	50	85	95



STRUCTURE FITTINGS -

EQUAL BRACKET

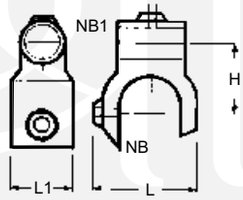
Cat.Ref.	NB	h	L	L1
EBT25*	25	40	65	50
EBT30*	30	52	75	60
EBT40	40	62	85	60
EBT50	50	72	95	60



STRUCTURE FITTINGS -

UNEQUAL BRACKET

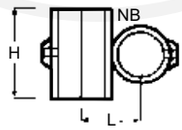
Cat.Ref.	NB	Nb1	h	L	L1
UBT25/15*	25	15	35	65	50
UBT30/15*	30	15	40	75	60
UBT40/25	40	25	50	85	60
UBT50/25	50	25	55	95	60



STRUCTURE FITTINGS -

CROSS

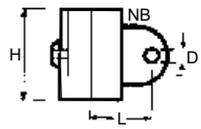
Cat.Ref.	NB	H	L
X25	25	50	45
X30	30	65	55
X40	40	65	70
X50	50	65	85



STRUCTURE FITTINGS -

SUPPORT

Cat.Ref.	NB	h	L	d
SPT15*	15	40	35	13
SPT25*	25	55	50	13
SPT30*	30	55	57	13
SPT40	40	55	62	13
SPT50	50	55	67	13

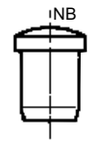


STRUCTURE FITTINGS -

PLUGS

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

Cat. Ref.	NB
PLUG15	15
PLUG25	25
PLUG30	30
PLUG40	40
PLUG59	50

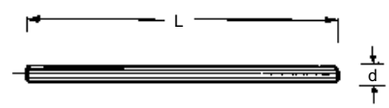


STRUCTURE FITTINGS -

STUDS

These are used as screwed rods with supports

Cat.Ref.	d	L
STUD5/16-150	5/16”	150
STUD3/8-150	3/8”	150
STUD1/2-200	1/2”	200



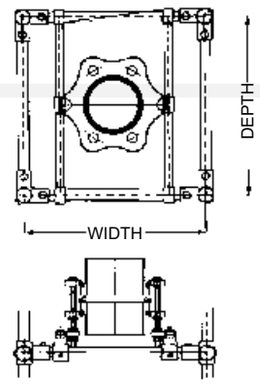
* marked items are available fast

STRUCTURE AND SUPPORTS

STRUCTURE DIMENSIONS

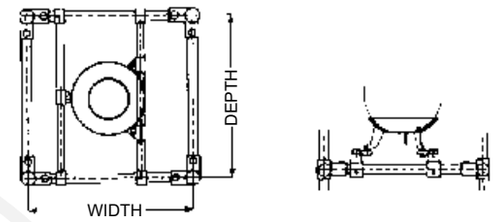
FOR COLUMNS

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



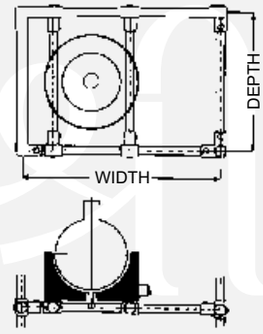
FOR VESSELS (IN VESSEL HOLDERS)

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



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



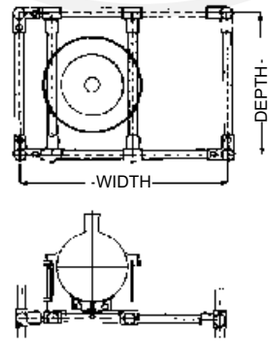
COLUMN BASE SUPPORT FRAMES

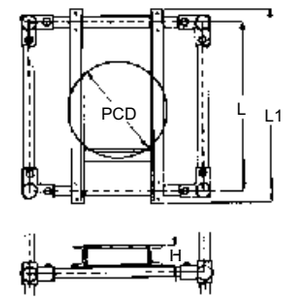
These channel frames are used as fixed support in erection of columns. These are supplied with full threaded jacking rods and U bolts.

Cat.Ref.	PCD	L1	L	H
FCSH225	310	1000	800	75
FCSH300	395	1000	800	75
FCSH400	495	1200	1000	75
FCSH450	585	1200	1000	100
FCSH600	710	1400	1200	100

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





STRUCTURE AND SUPPORTS

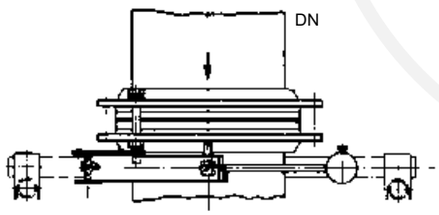
COUNTER BALANCE SUPPORTS

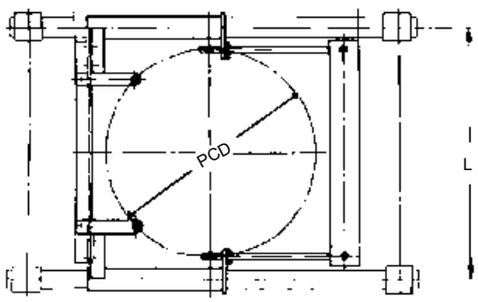
When the total weight of the column is more and it can not be supported on fix support at the bottom, excessive weight is releived by counter balance supports. The maximum load which can be supported on fix support and minimum force require to support the sealing of coupling are as under.

DN of Column	Permissible weight (kgs)	Force require for sealing (Kgs)
225	200	25
300	380	35
400	500	55
450	700	70
600	1000	110

The counter weight acts through two levers on the lower backing flange. The maximum lever ratio is 1:10. More than one counter balance supports can be used to relieve the excessive load by keeping minimum force require to support the sealing of coupling.

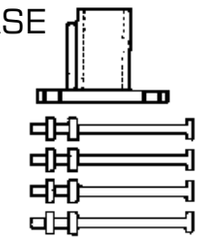
Cat.Ref.	PCD	L
LCB225	310	800
LCB300	395	800
LCB400	495	1000
LCB450	585	1000
LCB600	710	1200



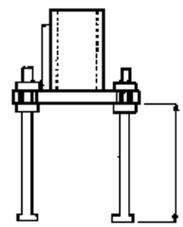


GROUTING OF BASE

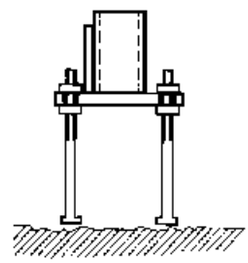
1. Take one Cast Iron BASE and four foundation Bolts, each with 2 nuts.



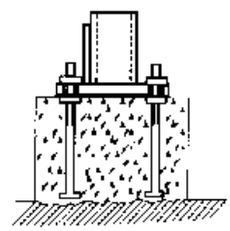
2. Fit the bolts in BASE so that base is raised upto 150mm from head of bolts.



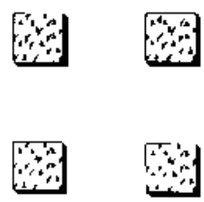
3. Put this assembly on the floor and prepare a rough surface for proper bonding of grouting.



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



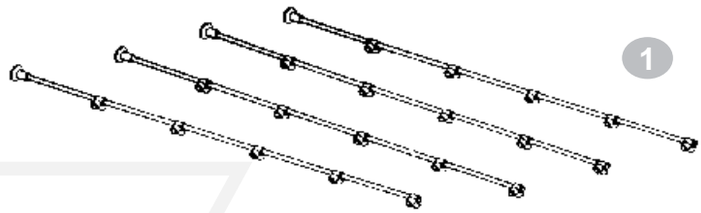
5. Prepare separate block for each BASE instead of making one big common block. For all BASES.

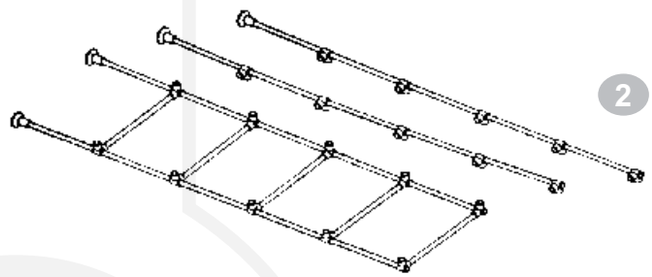


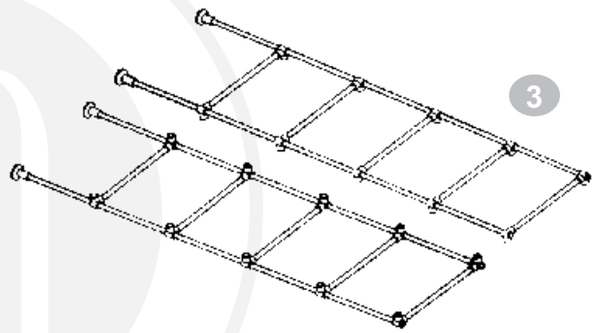
STRUCTURE AND SUPPORTS

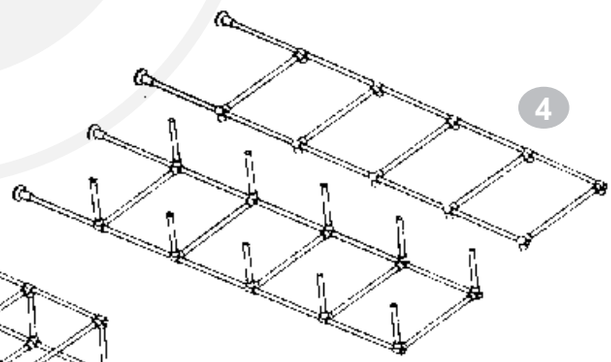
ASSEMBLING OF STRUCTURE

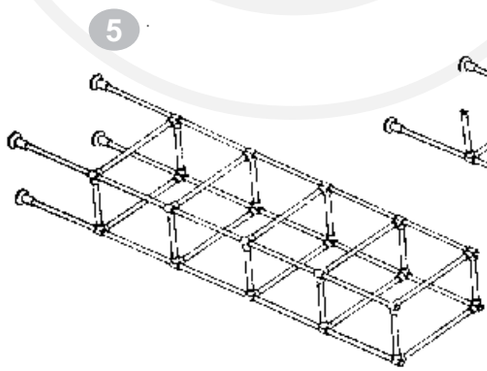
1. Mark the position of required fittings on all the Vertical tubes, slide them in correct sequence and lightly Tighten.
2. Assemble one side frame of the structure by adding the cross tubes between two vertical tubes.
3. Assemble other side frame of the structure by adding the cross tubes between other 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.

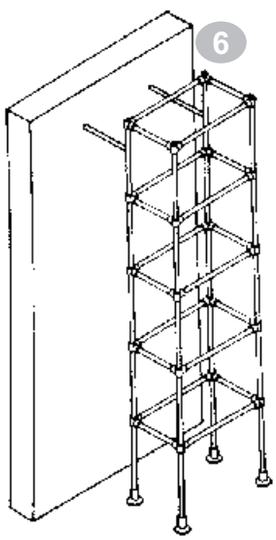


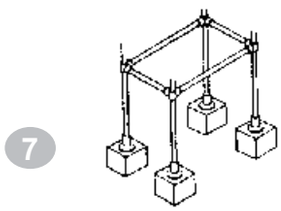


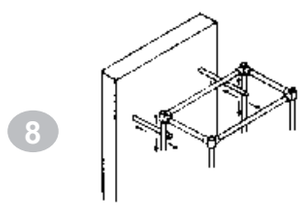


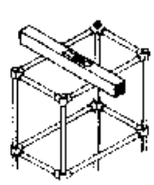


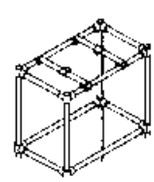












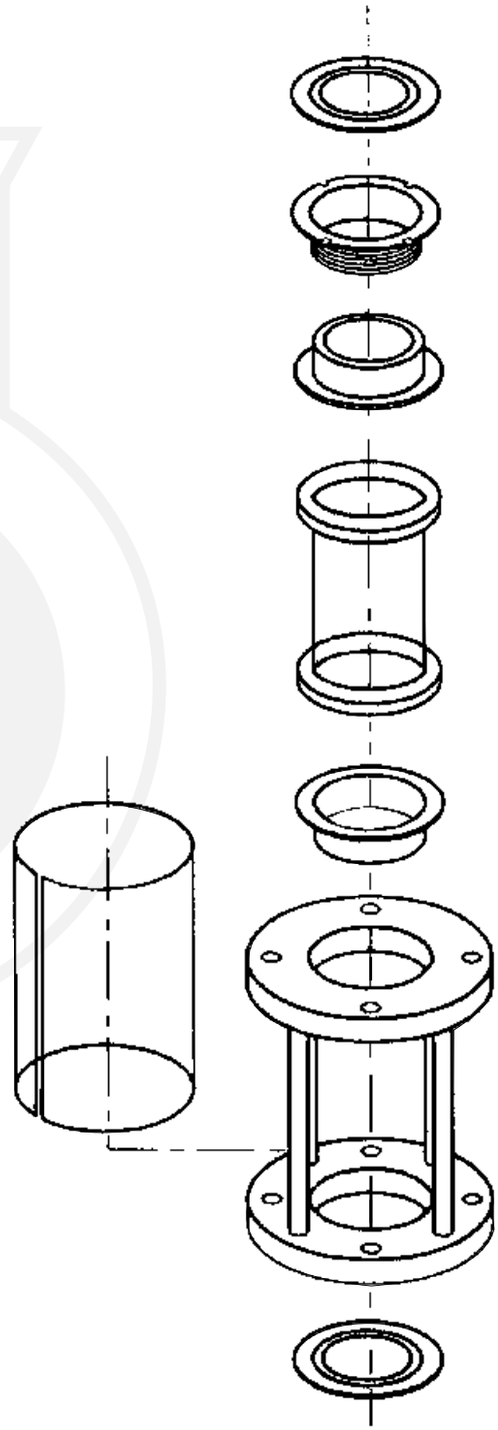
SIGHT GLASS

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.

A sight glass consists of one glass pipe section, one metal frame, a pair of PTFE bushes and washers and an acrylic cover. Borosilicate pipe section is highly heat resistant, has excellent chemical resistance and has low thermal expansion. Metal frame is composed of two flanges which are welded with studs so that the stresses and vibrations of the pipeline do not transfer to the glass pipe section. Its check nut keeps the glass pipe section in compression and provides ease in replacement.

PTFE bushes on both sides of glass pipe section ensures that liquid in the pipeline does not come in contact with metal frame. PTFE washers are used as gaskets while fitting the sight glass in the pipeline. Acrylic cover covers the glass pipe section and protects it from outer damages.

Sight glass can be supplied with MS/SS304/SS316 frame with any standard drilling.



MS FRAME SIGHT GLASS

DN	L	L1	Cat.Ref. Table E	Cat.Ref. Table F	Cat.Ref. Table ASA
25	192	150	SG1/E	SG1/F	SG1/A
40	192	150	SG1.5/E	SG1.5/F	SG1.5/A
50	192	150	SG2/E	SG2/F	SG2/A
80	192	150	SG3/E	SG3/F	SG3/A
100	192	150	SG4/E	SG4/F	SG4/A
150	192	150	SG6/E	SG6/F	SG6/A

SS 304 FRAME SIGHT GLASS

DN	L	L1	Cat.Ref. Table E	Cat.Ref. Table F	Cat.Ref. Table ASA
25	192	150	SG1/E/304	SG1/F/304	SG1/A/304
40	192	150	SG1.5/E/304	SG1.5/F/304	SG1.5/A/304
50	192	150	SG2/E/304	SG2/F/304	SG2/A/304
80	192	150	SG3/E/304	SG3/F/304	SG3/A/304
100	192	150	SG4/E/304	SG4/F/304	SG4/A/304
150	192	150	SG6/E/304	SG6/F/304	SG6/A/304

SS 316 FRAME SIGHT GLASS

DN	L	L1	Cat.Ref. Table E	Cat.Ref. Table F	Cat.Ref. Table ASA
25	192	150	SG1/E/316	SG1/F/316	SG1/A/316
40	192	150	SG1.5/E/316	SG1.5/F/316	SG1.5/A/316
50	192	150	SG2/E/316	SG2/F/316	SG2/A/316
80	192	150	SG3/E/316	SG3/F/316	SG3/A/316
100	192	150	SG4/E/316	SG4/F/316	SG4/A/316
150	192	150	SG6/E/316	SG6/F/316	SG6/A/316

STANDARD UNITS

STANDARD UNITS

- SIMPLE DISTILLATION UNIT
- REACTION UNIT
- FRACTION DISTILLATION UNIT
- REACTION DISTILLATION UNIT
- LIQUID-LIQUID EXTRACTION UNIT
- SOLID-LIQUID EXTRACTION UNIT
- ASSEMBLIES OVER GLASS LINED REACTOR
- GAS SCRUBBER
- CYLINDRICAL MIXING REACTOR
- JACKETED MIXING REACTOR
- MULTI PURPOSE UNIT

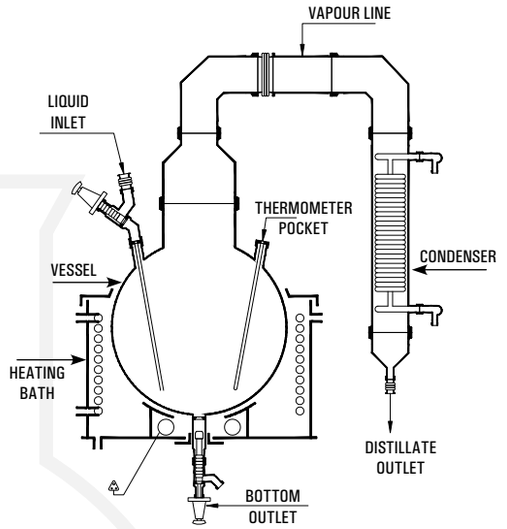
STANDARD UNITS

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.

Unit Cat.Ref.	Reactor Capacity	Bath KW	Vapour Line	Condenser M^2
SDU20	20 L	4.0	80 DN	0.35
SDU50	50 L	6.0	100 DN	0.50
SDU100	100 L	9.0	150 DN	1.50
SDU200	200 L	12.0	150 DN	1.50
SDU300	300 L	18.0	225 DN	2.50
SDU500	500L	24.0	300 DN	4.00



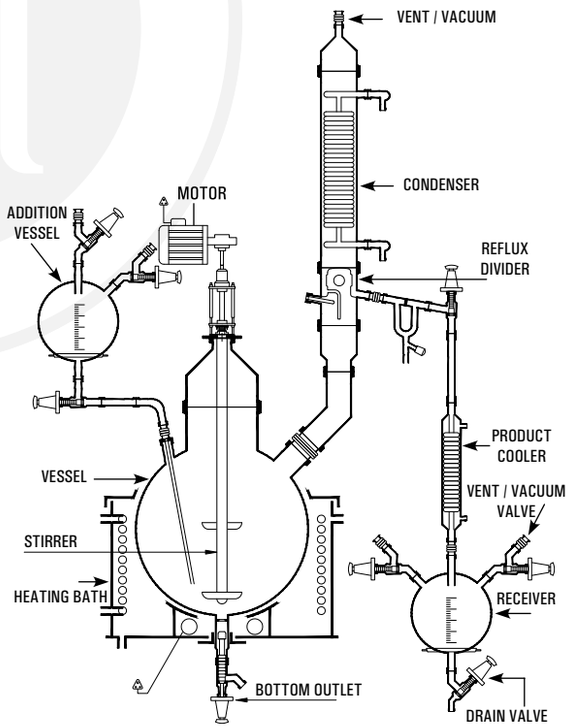
REACTION UNIT

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 & 500 L and is suitable for operation under atmospheric pressure and full vacuum.

Unit Cat.Ref	Reactor Cap.	Bath KW	Addition Vessel	Vapour Line	Condenser HTA M^2	Cooler HTA M^2	Receiver Size
RDU20	20 L	4.0	2 L	80 DN	0.35	0.10	5 L
RDU50	50 L	6.0	5 L	100 DN	0.50	0.20	10 L
RDU100	100 L	9.0	10 L	150 DN	1.50	0.35	20 L
RDU200	200 L	12.0	20 L	150 DN	1.50	0.35	20 L
RDU300	300 L	18.0	20 L	225 DN	2.50	0.50	20 L
RDU500	500 L	24.0	50 L	300 DN	4.00	0.70	50 L



STANDARD UNITS

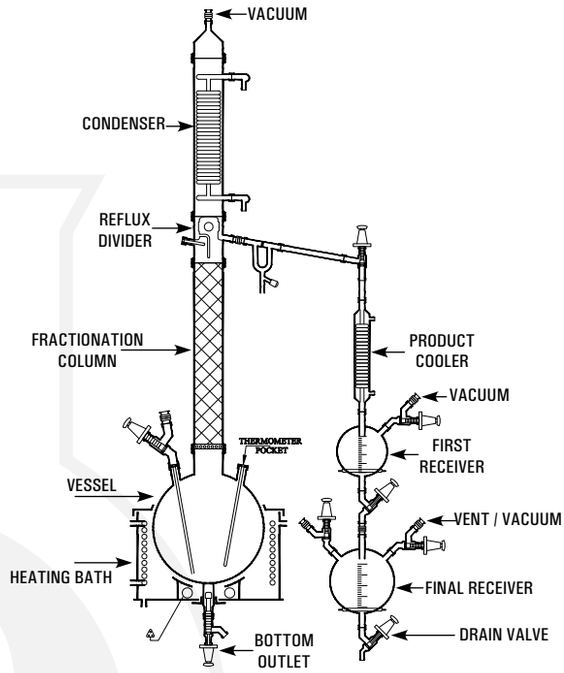
FRACTIONAL DISTILLATION UNIT

This is essentially a compact batch-type fractional distillation unit in which the reboiler consists of a vessel mounted in a heating bath and with a packed column above. The vapours from top is condensed and can be refluxed as per requirement.

The top product is sub-cooled and collected in receivers. The bottom product is finally drained from the reboiler through a drain valve.

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

Unit Cat.Ref	Reactor Capacity	Bath KW	Addition Vessel	Vapour Line	Condenser HTA M^2	Cooler HTA M^2	Receiver Size
FDU20	20 L	4.0	2 L	80 DN	0.35	0.10	5L
FDU50	50 L	6.0	5 L	100 DN	0.50	0.20	10L
FDU100	100 L	9.0	10 L	150 DN	1.50	0.35	20L
FDU200	200 L	12.0	20 L	150 DN	1.50	0.35	20L
FDU300	300 L	18.0	20 L	225 DN	2.50	0.50	20L
FDU500	500 L	24.0	50 L	300 DN	4.00	0.70	50 L

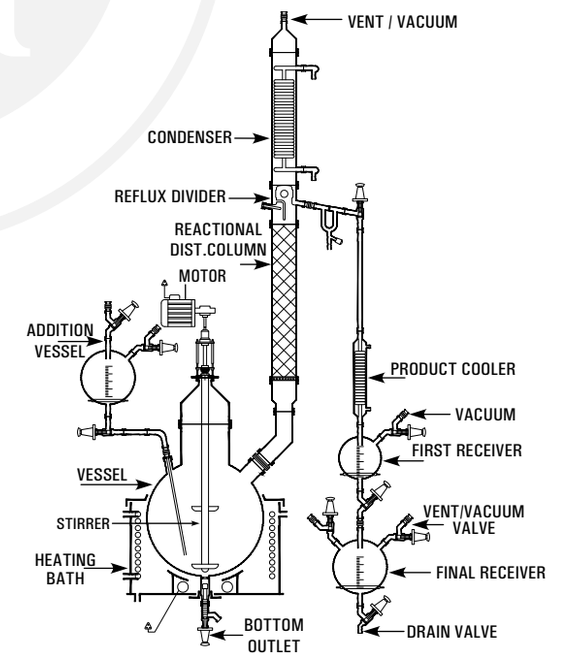


REACTION DISTILLATION UNIT

This is a versatile unit and can be used as Reaction Distillation Unit, Fractional Distillation Unit or a combination of both. All features of Reaction Distillation Unit and Fractional Distillation Unit are incorporated.

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.

Unit Cat.Ref	Reactor Capacity	Bath KW	Addition Vessel	Vapour Line	Condenser HTA M^2	Cooler HTA M^2	Receiver Size
FRU20	20 L	4.0	2 L	80 DN	0.35	0.10	2L, 5L
FRU50	50 L	6.0	5 L	100 DN	0.50	0.20	5L, 10L
FRU100	100 L	9.0	10 L	150 DN	1.50	0.35	10L, 20L
FRU200	200 L	12.0	20 L	150 DN	1.50	0.35	10L, 20L
FRU300	300 L	18.0	20 L	225 DN	2.50	0.50	20L, 20L
FRU500	500 L	24.0	50 L	300 DN	4.00	0.70	50L, 50L



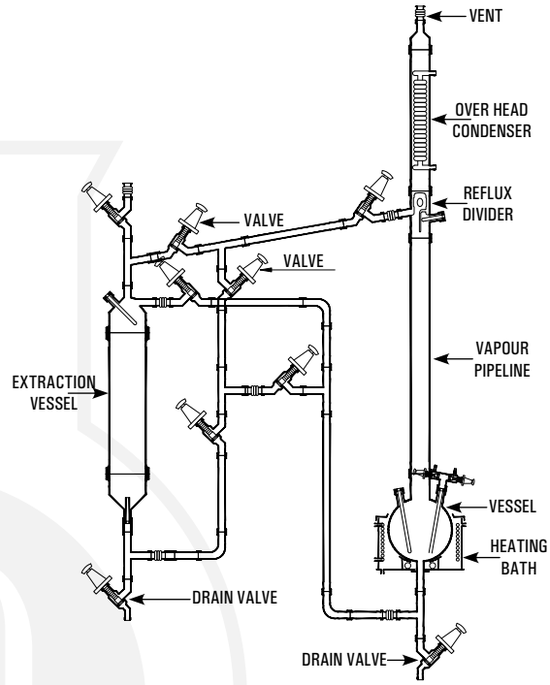
STANDARD UNITS

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.



Unit Cat.Ref.	Reactor Capacity	Bath KW	Vapour Line	Extraction Vessel	Condenser M^2
LLU10	10 L	3.00	40mmx1m	10 L	0.35
LLU20	20 L	4.00	50mmx1m	20 L	0.50
LLU50	50 L	6.00	80mmx1m	50 L	1.50
LLU100	100 L	9.00	100mmx1m	100 L	1.50
LLU200	200 L	12.00	150mmx1m	200 L	2.25
LLU300	300 L	18.00	225mmx1m	300 L	4.00

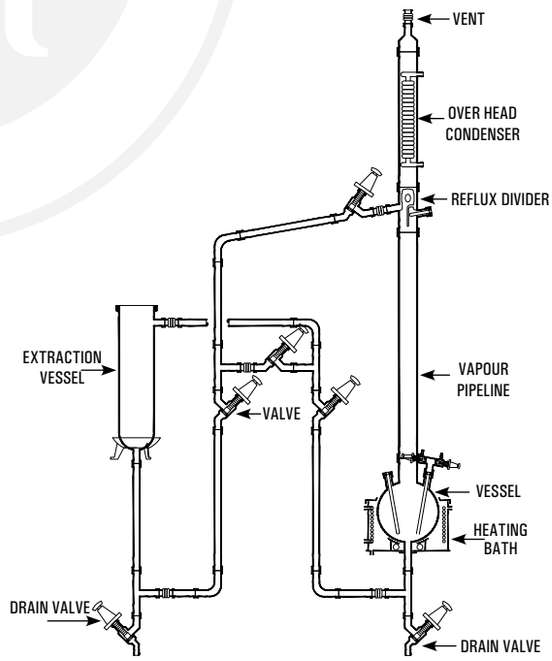
SOLID-LIQUID EXTRACTION UNIT

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.



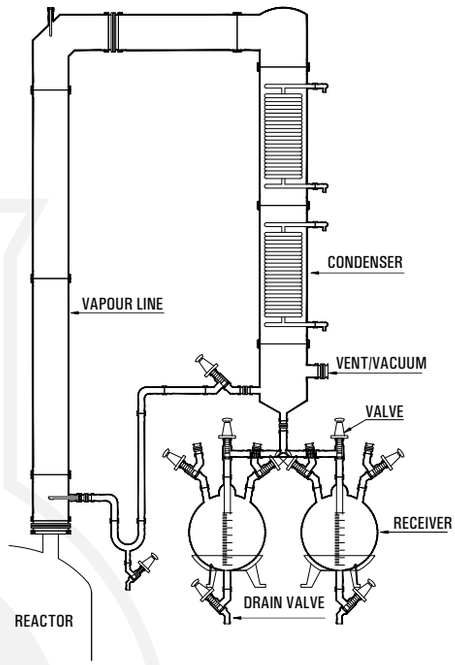
Unit Cat. Ref.	Reactor Capacity	Bath KW	Vapour Line	Extraction Vessel	Condenser M^2
SLU10	10 L	3.00	40mmx1m	10 L	0.35
SLU20	20 L	4.00	50mmx1m	20 L	0.50
SLU50	50 L	6.00	80mmx1m	50 L	1.50
SLU100	100 L	9.00	100mmx1m	100 L	1.50
SLU200	200 L	12.00	150mmx1m	200 L	2.25
SLU300	300 L	18.00	225mmx1m	300 L	4.00

STANDARD UNITS

ASSEMBLIES OVER GLASS LINED REACTOR

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, Reaction 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 preferred due to large scale of operation. A typical fractional distillation unit type assembly over GLR is shown in adjacent figure.

Cat.Ref.	Reactor Cap.	Vapour column	Condenser HTA M^2
GRU 250	250 L	80mmX1.5m	1.5X2
GRU 500	500 L	100mmX2m	1.5X2
GRU 1000	1000 L	100mmX2m	2.5X2
GRU 2000	2000 L	150mmX3m	2.5X3
GRU 3000	3000 L	150mmX2m	4.0X2



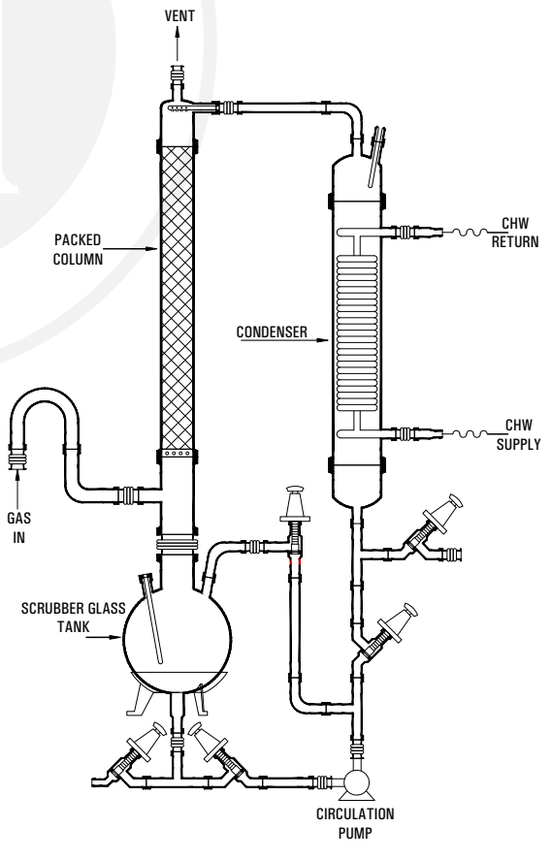
GAS SCRUBBER

Shree Sai Scientific offer Pilot Plant Gas Scrubber for various gases likes HCl, Cl2, SO2, Br2, HBr, NOx etc or any other corrosive gases. These scrubbers use the media as water / Aq. NaOH / any other suitable solvent which can neutralise the exhaust gases. Our Pilot plant scrubber are ranging from 20L vessel capacity to 500L vessel capacity and scrubber diameter from 80DN to 300DN.

We can also design and offer big size scrubber in Glass up to 800DN (i.e. 400/450/600/800DN). Our scrubber will be having inbuilt Cooler to remove the heat of absorption. We also offer mini Blower of PP/FRP on request along with the Pilot Plant Scrubber.

Pilot Plant Gas scrubber are mainly used in pharmaceutical, chemical, refinery & other industries. Glass scrubber offer process visibility as well as excellent corrosion resistance. Being a Glass Scrubber pressure drop across the scrubber will be minimized.

Cat.Ref.	Size	Vessel	Condenser (M^2)
PGS3	80DN	20 L	0.5
PGS4	100DN	50 L	1.5
PGS6	150DN	100 L	2.5
PGS8	200DN	200 L	5
PGS12	300DN	300 L	8



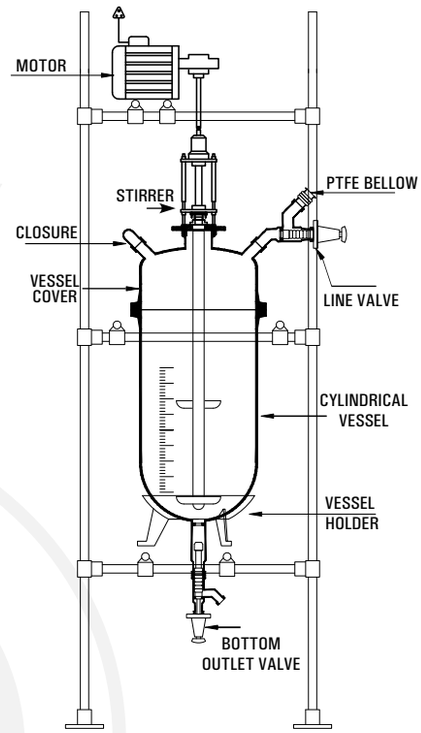
MOBILE MIXING SYSTEM

Cylindrical Mixing Reactor

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)
CGR 20	VZ 20/12	20
CGR 50	VZ 50/16	50
CGR 100	VZ 100/18	100
CGR 150	VZ 100/18	150
CGR 200	VZ 200/18	200
CGR 300	VZ 300/24	300

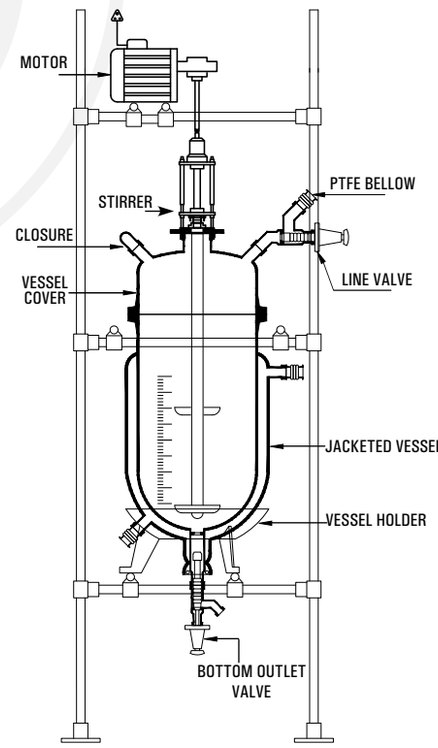


Jacketed Mixing Reactor

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

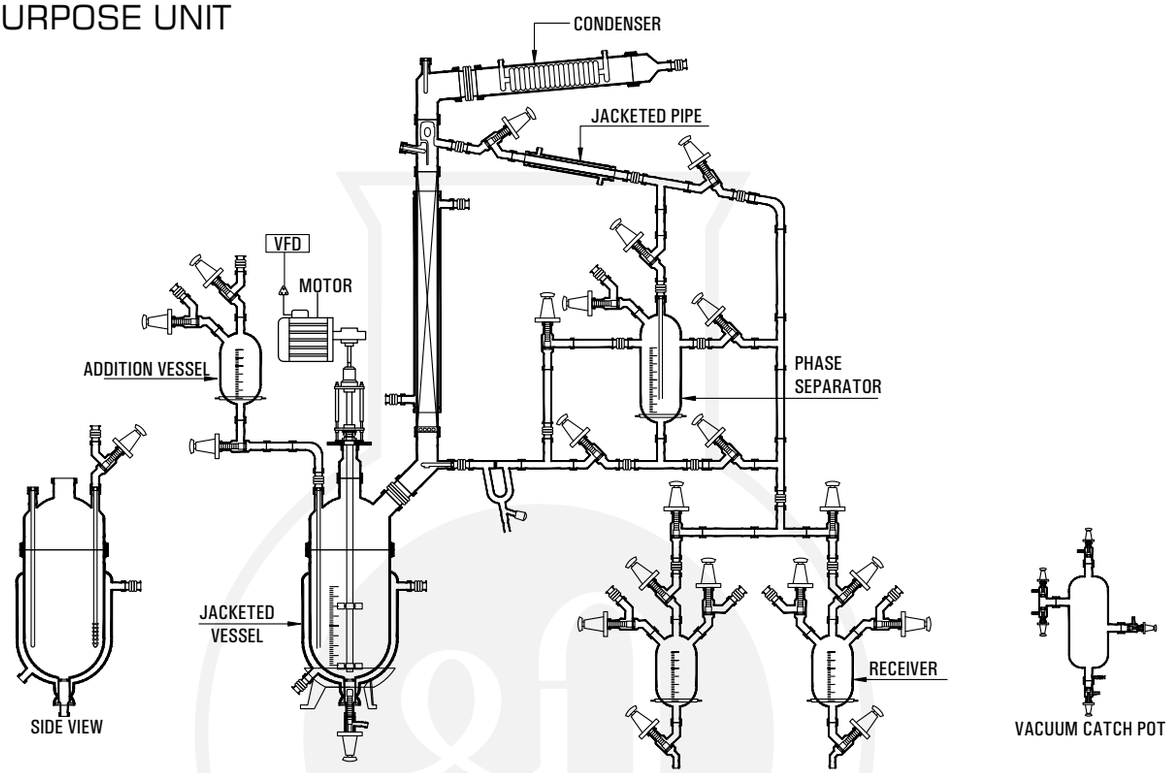
1. Stirrer Drive: Non-Flameproof or Flameproof Motor, 192 RPM with speed regulator.
2. Stirrer material of construction: Glass or PTFE Lined.
3. Stirrer shape: Glass Impeller Stirrer with PTFE Blades, Vortex Stirrer, propeller stirrer & anchor stirrer.
4. Stirring Assembly: Stirring Assembly with bellow seal or with mechanical seal.
5. Supporting Structure : Carbon Steel, Epoxy coated Carbon Steel, Stainless Steel 304 & Stainless Steel 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)
JGR 5	VZD 5/6	5
JGR 10	VZD 10/9	10
JGR 20	VZD 20/12	20
JGR 30	VZD 30/12	30
JGR 50	VZD 50/16	50



STANDARD UNITS

MULTI PURPOSE UNIT



Shree Sai Scientific 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.

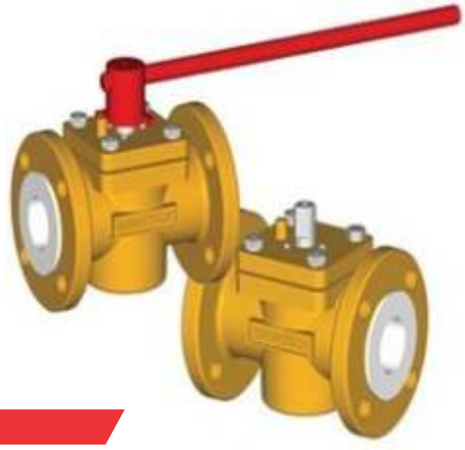
Available with

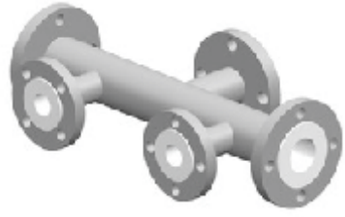
Jacketed full glass reactor/ Cylindrical full glass reactor with Oil heating cooling bath / Spherical full glass reactor with Oil heating cooling bath
Multipurpose glass distillation overhead
Stainless steel / MS epoxy coated / MS painted frame supporting
Flame proof / Non flame proof / cGMP / non GMP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

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

SHREE SAI SCIENTIFIC

PTFE & M.S. PTFE Lined





INDUSTRIAL GLASS

SHREE SAI SCIENTIFIC

A-37/A, B/h Sakar Complex, Sardar Estate, Vadodara-390 019.
T 0265 - 2514122 **M** 989 855 3025
E shreesaiscientific@gmail.com **W** www.shreesaiscientific.com