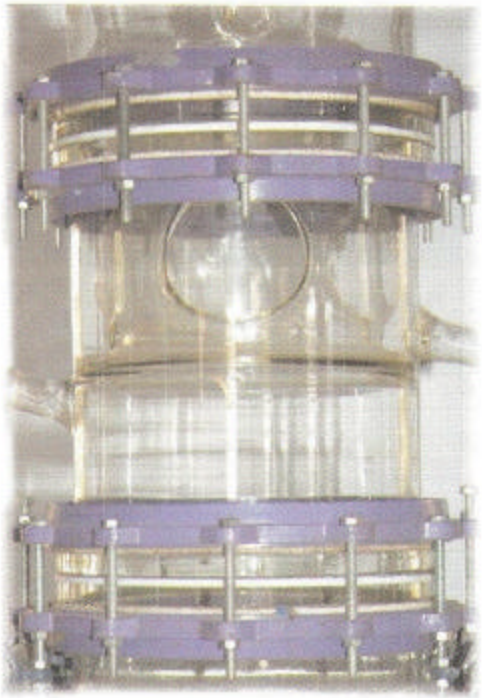
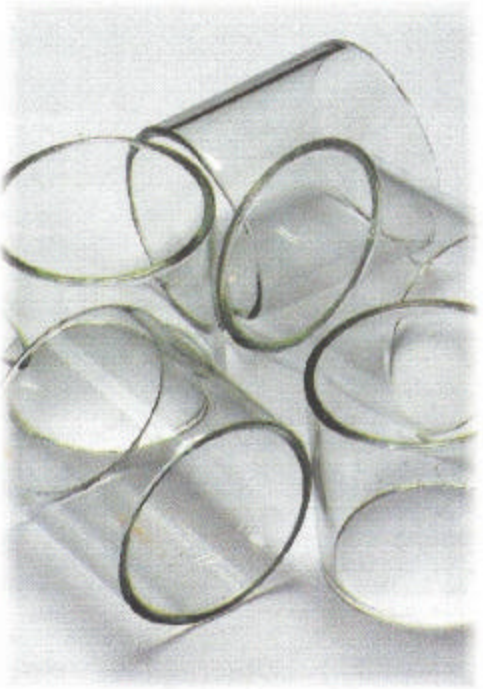
Borosilicate 3.3 Process Glass Components





ISO 9001 : 2000 Certified

BVR Engineered Systems

(A Business Value Resources Group Enterprise)

Profile

BVR is an ISO 9001:2000 certified vibrant organization managed by seasoned and qualified professional engineers. We specialize in design, fabrication, engineering, installation & commissioning of Process plants & equipments meant for the chemical & pharmaceutical industry. All the equipments are designed, fabricated, selected, tested & installed as per prevalent international standards like **ASME Section VIII Division 1, ISO & relevant European Norms like ISO 3585, 3586, ENBS 1595 , AD2000 Merkblatt etc. and Sound Engineering Practices (SEP).** We provide total lifecycle management of the units from designing, engineering, installation, commissioning & spare part supplies. Our units can be supplied with the most advanced real-time automation systems like SCADA.

Moreover the corrosion resistant process assemblies & equipments made up of Borosilicate 3.3 Glass are available with CE Marking (we are the only enterprise with this capability in India in this product segment) ; designed & made in compliance with the relevant directives namely - The PED - 97/23/EC , The Machine Directive - 98/37/EC , The European Low Voltage Directive - 73/23/EEC , The EMC Directive - 89/336/EEC.

Our Mission **: To produce the best value of our customers' money with deliverables par excellence by developing innovative products, prompt services and continuous quality improvement by empathising customer needs. Our goal is to become a dependable business associate for them.**

Our Vision **: To be a company that people choose to do business with because we genuinely care about our customers and empathise their needs and are recognized as a dependable resource providing enterprise in the industrial market place - providing outstanding products, value and customer service.**

Our Shared Values :

Innovatination as a tool for development : We embrace the spirit of innovation that acts to realize opportunities to transform our vision into reality.

Empathy & ***Respect*** - Be aware of others' needs and understand the importance of good communication.

Integrity & Trust – We will be honest, transparent & reliable in our day-to-day interaction with customers. We honour our word and keep our commitments, we say what we mean and mean what we say.

Commitment to Service - We put our customers first. We respond to our internal customers and treat them with the same courtesy and respect as our external customers. We facilitate, enable, and problem-solve.

Excellence : We are committed to excellence in all that we do. There will be no place for mediocrity.

Quality : The hallmark of our internal and external outputs and processes will be quality.This will pervade every aspect of our functioning.

Community : We will be responsible and involved members of the communities in which we live and work. We will seek to promote their well being at all times.

Chief Executive Officer : Dr. S.Biswas (BE-Mech, DBA)

Professional Member : AIMA

Member : ASME

Affiliate Member (Professional) : Chartered Institute of Marketing, UK

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Associates in : UK, Germany, Italy, Egypt, USA, UAE, Singapore

ISO 9001 : 2000 Certified

BVR Engineered Systems

(A Business Value Resources Group Enterprise)

Quality Policy

BVR is committed to being the preferred global supplier for development, manufacturing & engineering of Process glass equipments & plants. To achieve our strategic vision we must meet and exceed customer requirements and deliver the best value for their money in our deliverables. We will realize this goal by establishing and maintaining outstanding Quality and Quality Assurance Systems through trained manpower and operating as per the following guiding principle framework :

Customer Focused

- Strive to exceed customers' need and expectations.
- Make commitments we fully understand and believe we can meet.
- Meet all commitments to customers on schedule.

Performance Driven

- Verify that our products and services meet agreed requirements.
-
- Monitor, benchmark and continuously improve our products, services, enterprise & team performance and strive to make our deliverables "World-Class" consistently.

Learning Organisation

Inculcating a culture of continuous learning of best practices & systems and un-learning outdated concepts.

Building knowledge capital on a continuous basis.

DATE: 01-03-2005

(Subhajit Biswas)
CEO

Borosilicate 3.3 Glass Equipments & Plant Components

Available with CE marking ; designed , engineered & manufactured in compliance with the PED 97/23/EC ; Machine Directive 98/37/EC ; LVD 73/23/EEC ; EMC 89/336/EEC & SEPs.

(I) Basic Technical Information

The chemical composition and properties of Borosilicate glass 3.3 characterised by their high heat-resistance and chemical stability, is as defined by the international standard DIN ISO 3585. 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 resistance
- Smooth pore free surface.
- Transparency
- Catalytic inertness.
- No effect on taste and odour.
- Physiological inertness.

Products made from Borosilicate 3.3 glass are smooth, non-porous and perfectly transparent, with no catalytic action, and are corrosion-resistant even in demanding operating conditions up to 300°C without sudden changes of temperature.
Borosilicate 3.3 glass, which we use is an environment-friendly product and is completely harmless from an ecological point of view.

Approximate Chemical composition of Borosilicate 3.3 glass

Amount (% by mass)

SiO_2	80,4
B_2O_3	13,0
Al_2O_3	2,4
$Na_2O + K_2O$	4,2

Chemical Properties of Borosilicate 3.3 Glass

Products made from Borosilicate 3.3 glass are chemically stable, practically inert and characterised by high resistance to the effects of water, water vapour, acids and salt solutions and relatively high resistance to alkalis.

Glass gets etched by hydrofluoric acid and concentrated Phosphoric acid and corroded by hot concentrated aqueous NaOH solution. Constant alternation of acid and alkaline environments increases corrosion.

The chemical resistance of Borosilicate 3.3 glass is specified by the **DIN ISO 3585** standard and is evaluated precisely by the international standard testing methods defined by ISO and DIN ISO standards. Chemical resistance of Borosilicate 3.3 glass

Hydrolytic resistance at 98 °C (in accordance with ISO 719)	:	**Hydrolytic Resistance grain class ISO 719-HGB1**
Hydrolytic resistance at 121 °C (in accordance with ISO 720)	:	**Hydrolytic Resistance grain class ISO 720-HGA1**
Acid Resistance (in accordance with ISO 1776)	:	**Sodium oxide (Na_2O) < 100 µg per 1 dm^2 of glass when the glass "as a material" is tested (including preliminary acid treatment)**
Effects of a boiling aqueous solution of (in accordance with ISO 695)	:	**Alkali resistance class ISO 695-A2 or better mixed alkalis**

Physical Properties

The physical properties of Borosilicate 3.3 glass, are shown below, as per ISO 3585 standard.

Mean coefficient of linear thermal expansion (ISO 7991) A20/300	=	**$3.3 \times 10^{-6}\ K^{-1}$**
Density ?	=	**$2.23\ g.cm^{-3}$**
Thermal conductivity (at 100 °C) w	=	**$1.2\ W.m^{-1}.K^{-1}$**
Mean Specific heat capacity at constant pressure cp between 20 and 200 ^{0}C	=	**$0.8\ kJ.Kg^{-1}.K^{-1}$**

Mechanical strength

The mechanical properties and service life of products made from Borosilicate 3.3 glass are largely determined by the condition of the surface, especially its finish & integrity , i.e. the depth of damage to the surface in handling and secondary heat treatment.

Scratch hardness of glass on Mohs scale	=	**6**
Allowable tensile stress with flame polished surface without any scratch or damage or alteration during service.	=	**10 Mpa**
Allowable tensile stress with grounded or flame polished surface where alteration and scratches are possible during service.	=	**7 Mpa**
Allowable compressive stress	=	**100 Mpa**

WORKING PRESSURE FOR GLASS PIPELINES VESSELS

The glass system is designed as per **BS EN 1595 , EN PED 97/23/EC , AD2000 Merkblatt & ASME Sec. VIII Div.1** and the permissible internal working pressure (MAWP) depends on the nominal diameter of the glass components and on working temperature. In case of assembled units comprising of vessels, filters, heat exchangers, etc. the overall permissible internal pressure is limited by the lowest pressure, which one of the components of the assembly can withstand.

WORKING TEMPERATURE

Borosilicate glass retains its mechanical strength over a range of temperature 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 surface, which depends on the external surroundings too. Provided borosilicate glass is not subject to rapid changes in temperature, creating undue thermal shock, it can be operated safety at temperatures up to 250 °C. The high resistance of products made from Borosilicate 3.3 glass to sudden changes of temperature - their heat resistance - is due to a low coefficient of linear thermal expansion, a relatively low modulus of tensile elasticity E and relatively high thermal conductivity. It must be realized that assembled plants are composed not only of borosilicate glass, but also have other materials such as PTFE the recommended max. operating temperature is 200°C. Operating temperatures may have to be modified so as to compensate for the effects of other factors such as pressure, thermal cycling, rapid heating cooling etc.

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

At sub-zero temperature, the tensile strength of borosilicate glass tends to increase and equipment can be used with safety at temperatures as low as -50°C.
Our technical cell would be glad to furnish you any other information you might be looking for. Please contact us at **consult@bizvalueresources.com** for this.

We can supply you total assembled pilot plants designed and engineered as per your requirements. Also all components for plants are available in the major designs prevalent in the international market. You can have a look at the components & equipments, which are available as standard products by following the links given from this page.

(II) Design & Manufacturing Practices

We strictly adhere to international standards & Sound Engineering Practices (SEP) for the design, fabrication, assembling & testing of our products. **For properties of glass we follow DIN ISO 3585, for tolerances & compatibility of parts we follow DIN ISO 3587 & 4704. For general design & testing we follow BS EN 1595 ; relevant CE Directives like EN PED 97/23/EEC , Machine Directive, LVD, EMC ; AD2000 Merkblatt ; ASME Sec. VIII Div.1 and for pressure testing criteria we follow ASME Sec VIII, UG-99 or 100.**

GMP regulations call for special care in both the planning and selection of the components together with the materials of construction used for them, a design without any dead space, which ensures that components drain fully and can be cleaned easily and effectively. We fully comply with such requirements by maintaining the shape of the components, the way they are installed and selection of suitable valves. Where the external surfaces of complete assemblies have to comply with clean room requirements, appropriate stainless steel coupling and support material can be supplied.

Our Standard glass flange buttresses **VSAFE** are especially engineered flat type and affects a highly reliable flange joint against leakages & breakages. We also produce high quality flange buttresses as per all other prevalent international makes available in the market and thus can supply spare parts for units & plants of all other makes too.

(III) STANDARD COMPONENTS

PIPELINE COMPONENTS

VALVES

VESSELS

STIRRER & BATHS

HEAT EXCHANGERS

COLUMN COMPONENTS

STRUCTURE & SUPPORTS

COUPLINGS

Pipeline components

Pipe Sections

Spacers

PTFE Spacers

Pipe Reducers

Pipe Bend

'U' Bend

'U' Bend with Bottom Outlet

Pipe Equal Tee

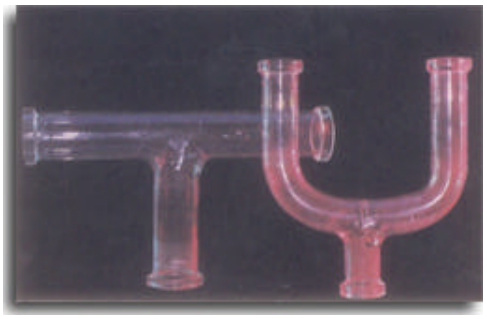
Pipe Unequal Tee

'Y' Pieces

Equal Cross

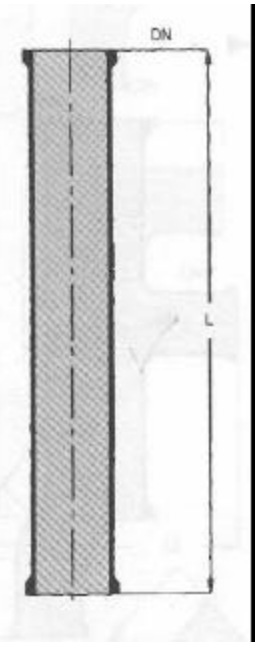
Hose connectors

Pipe Closures



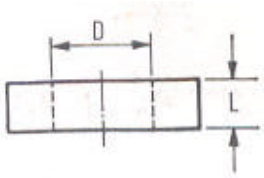
Pipe Sections

DN Length L	15 (0.7)	25(1)	40(1.5)	50(2)	80(3)	100(4)
75(3.0)	PS 07/75	PS 1/75	--	--	--	--
100(4.0)	PS 07/100	PS 1/100	PS 1.5/100	PS 2/125	--	--
125(5.0)	PS 07/125	PS 1/125	PS 1.5/125	PS 2/125	PS 3/125	--
150(6.0)	PS 07/150	PS 1/150	PS 1.5/150	PS 2/150	PS 3/150	PS 4/150
175(6.9)	PS 07/175	PS 1/175	PS 1.5/175	PS 2/175	PS 3/175	PS 4/175
200(7.9)	PS 07/200	PS 1/200	PS 1.5/200	PS 2/200	PS 3/200	PS 4/200
300(11.8)	PS 07/300	PS 1/300	PS 1.5/300	PS 2/300	PS 3/300	PS 4/300
400(15.8)	PS 07/400	PS 1/400	PS 1.5/400	PS 2/400	PS 3/400	PS 4/400
500(19.7)	PS 07/500	PS 1/500	PS 1.5/500	PS 2/500	PS 3/500	PS 4/500
700(27.6)	PS 07/700	PS 1//700	PS 1.5/700	PS 2/700	PS 3/700	PS 4/700
1000(39.4)	PS 07/1000	PS 1/1000	PS 1.5/1000	PS 2/1000	PS 3/1000	PS 4/1000
1500(59.0)	PS 07/1500	PS 1/1500	PS 1.5/1500	PS 2/1500	PS 3/1500	PS 4/1500
2000(78.7)	PS 07/2000	PS 1/2000	PS 1.5/2000	PS 2/2000	PS 3/2000	PS 4/2000
3000(118.0)	–	PS 1/3000	PS 1.5/3000	PS 2/3000	PS 3/3000	PS 4/3000



DN Length L	150 (6)	225 (9)	300 (12)	450 (18)	600 (24)
75(3.0)	–	–	--	--	--
100(4.0)	–	–	--	--	--
125(5.0)	–	–	--	--	--
150 (6.0)	PS 6/150	–	--	--	--
175(6.9)	PS 6/175	–	--	--	--
200(7.9)	PS 6/200	PS 9/200	--	--	--
300(11.8)	PS 6/300	PS 9/300	PS 12/300	PS 18/300	--
400(15.8)	PS 6/400	PS 9/400	PS 12/400	PS 18/400	--
500/19.7)	PS 6/500	PS 9/500	PS 12/500	PS 18/500	PS 24/500
700(27.6)	PS 6/700	PS 9/700	PS 12/700	PS 18/700	--
1000(39.4)	PS 6/1000	PS 9/1000	PS 12/1000	PS 18/1000	PS 24/1000
1500(59.0)	PS 6/1500	PS 9/1500	PS 12/1500	PS 18/1500	PS 24/1500
2000(78.7)	PS 6/2000	PS 9/2000	PS 12/2000	PS 18/2000	--
3000(118.0)	PS 6/3000	–	--	--	--

Spacers



Cat ref	SS 07/5	SS 07/10	SS 07/15	SS 07/20	SS 07/25
D	15(0.7)	15(0.7)	15(0.7)	15(0.7)	15(0.7)
L	5(0.2)	10(0.4)	15(0.6)	20(0.8)	25(1)

Cat ref	S S 1/5	SS 1/10	SS 1/15	SS 1/20	SS 1/25
D	25 (1)	25 (1)	25 (1)	25 (1)	25 (1)
L	5 (0.2)	10 (0.4)	15 (0.6)	20 (0.8)	25 (1)

Cat ref	SS 1.5/5	SS 1.5/10	SS 1.5/15	SS 1.5/20	SS 1.5/25
D	40 (1.5)	40 (1.5)	40 (1.5)	40 (1.5)	40 (1.5)
L	5 (0.2)	10 (0.4)	15 (0.6)	20 (0.8)	25 (1)

Cat ref	SS 2/5	SS 2/10	SS 2/15	SS 2/20	SS 2/25
D	50 (2)	50 (2)	50 (2)	50 (2)	50 (2)
L	5 (0.2)	10 (0.4)	15 (0.6)	20 (0.8)	25 (1)

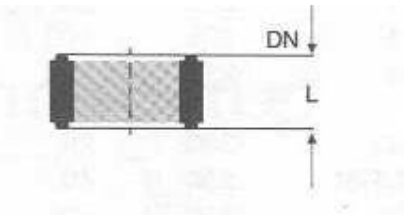
Cat ref	SS 3/10	SS 3/15	SS 3/20	SS 3/25
D	80 (3)	80 (3)	80 (3)	80 (3)
L	10 (0.4)	15 (0.6)	20 (0.8)	25 (1)

Cat ref	SS 4/10	SS 4/15	SS 4/20	SS 4/25
D	100 (4)	100 (4)	100 (4)	100 (4)
L	10 (0.4)	15 (0.6)	20 (0.8)	25 (1)

Cat ref	SS 6/10	SS 6/15	SS 6/20	SS 6/25
D	150 (6)	150 (6)	150 (6)	150 (6)
L	10 (0.4)	15 (0.6)	20 (0.8)	25 (1)

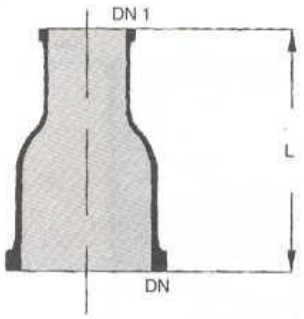
PTFE Spacers

DN L	25 Cat. Ref.	40 Cat. Ref.	50 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



Pipe Reducers

Cat ref	PR 1/07
DN	25 (1)
DN1	15 (0.7)
L	75 (3)



Cat ref	PR 1.5/07	PR 1.5/07
DN	40 (1.5)	50 (2)
DN1	15 (0.7)	40 (1.5)
L	100 (4)	100 (4)

Cat ref	PR 2/07	PR 2/1	PR 2/1.5
DN	50 (2)	50 (2)	50 (2)
D1	15 (0.7)	25 (1)	40 (1.5)
L	100 (4)	100 (4)	100 (4)

Cat ref	PR 3/1	PR 3/1.5	PR 3/2
DN	80 (3)	80 (3)	80 (3)
DN1	25 (1)	40 (1.5)	59 (2)
L	125 (5)	125 (5)	125 (5)

Cat ref	PR 4/1	PR 4/1.5	PR 4/2	PR 4/3
DN	100 (4)	100 (4)	100 (4)	100 (4)
DN1	25 (1)	40 (1.5)	50 (2)	80 (2)
L	150 (6)	150 (6)	150 (6)	150 (6)

Cat ref	PR 6/1	PR 6/1.5	PR 6/2	PR 6/3	PR 6/4
DN	150 (6)	150 (6)	150 (6)	150 (6)	150 (6)
DN1	25 (1)	40 (1.5)	50 (2)	80 (3)	100 (4)
L	200 (8)	200 (8)	200 (8)	200 (8)	200 (8)

Cat ref	PR 9/1	PR 9/1.5	PR 9/2	PR 9/3	PR 9/4	PR 9/6
DN	225 (9)	225 (9)	225 (9)	225 (9)	225 (9)	225 (9)
DN1	25 (1)	40 (1.5)	50 (2)	80 (3)	100 (4)	150 (6)
L	250 (10)	250 (10)	250 (10)	250 (10)	250 (10)	250 (10)

Cat ref	PR 12/1	PR 12/1.5	PR 12/2	PR 12/3	PR 12/4	PR 12/6	PR 12/9
DN	300 (12)	300 (12)	300 (12)	300 (12)	300 (12)	300 (12)	300 (12)
DN1	25 (1)	40 (1.5)	50 (2)	80 (3)	100 (4)	150 (6)	225 (9)
L	300 (12)	300 (12)	300 (12)	300 (12)	300 (12))	300 (12)	300 (12)

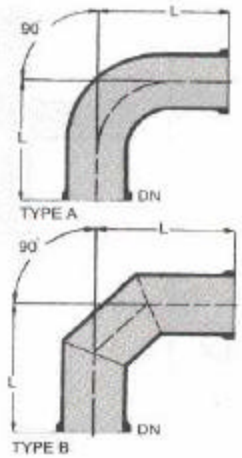
Cat ref	PR 18/1	PR 18/3	PR 18/4	PR 18/6	PR 18/9	PR 18/12
DN	450 (18)	450 (18)	450 (18)	450 (18)	450 (18)	450 (18)
DN1	50 (2)	80 (3)	100 (4)	150 (6)	255 (9)	300 (12)
L	375 (15)	375 (15)	375 (15)	375 (15)	375 (15)	375 (15)

Cat ref	PR 24/1.5	PR 24/2	PR 24/3	PR 24/4	PR 24/6	PR 24/9	PR 24/12	PR 24/18
DN	600 (24)	600 (24)	600 (24)	600 (24)	600 (24)	600 (24)	600 (24)	600 (24)
DN1	40 (2)	50 (2)	80 (3)	100 (4)	150 (6)	225 (9)	300 (12)	450 (18)
L	400 (16)	400 (16)	400 (16)	400 (16)	400 (16)	425 (17)	425 (17)	450 (18)

Pipe Bend

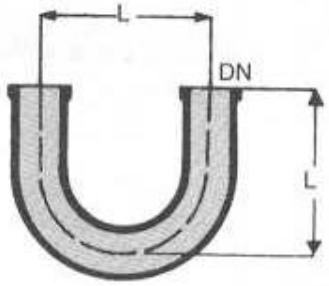
Cat ref	PB 90/07	PB 90/1	PB 90/1.5	PB 90/2	PB 90/3	PB 90/4
DN	150 (6)	25 (1)	40 (1.5)	50 (2)	80 (3)	100 (4)
L	50 (2)	100 (4)	150 (6)	150 (6)	200 (8)	250 (10)
Type	A	A	A	A	B	B

Cat ref	PB 90/6	PB 90/9	PB 90/12
DN	150 (6)	255 (9)	300 (12)
L	250 (10)	375 (15)	450 (18)
Type	B	B	B



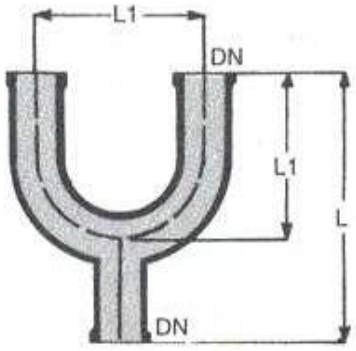
'U' Bend

Cat ref	PU/07	PU/1	PU/1.5	PU/2	PU/3
DN	15 (0.7)	25 (1)	40 (1.5)	50 (2)	80 (3)
L	75 (3)	150 (6)	175 (7)	175 (7)	225 (9)



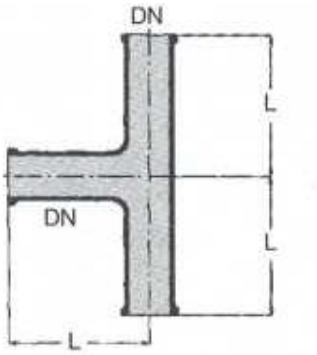
'U' Bend with Bottom Outlet

Cat ref	PU/07	PU/1	PU/1.5	PU/2
DN	15 (0.7)	25 (1)	40 (1.5)	50 (2)
L	125 (5)	250 (10)	275 (11)	275 (11)
L1	75 (3)	150 (6)	175 (7)	175 (7)



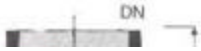
Pipe Equal Tee

Cat ref	PTL/1	PTL/1.5	PTL/2
DN	25 (1)	40 (1.5)	50 (2)
L	100 (4)	150 (6)	150 (6)



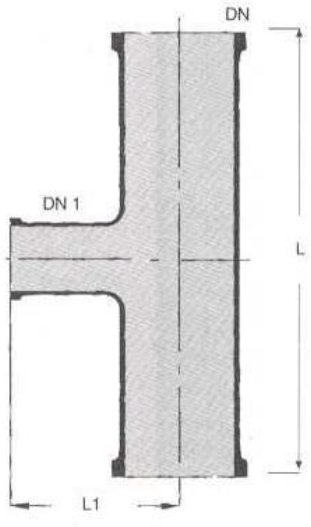
Pipe Unequal TEE

Cat ref	PTU 1/07
DN	25 (1)



Cat ref	PTU 3/1	PTU 3/1.5	PTU 3/2
DN	80 (3)	80 (3)	80 (3)

L L1	250 (9) 110 (4.4)	250 (9) 125 (5)	250(9) 125 (5)	300 (12) 150 (6)



Cat ref	PTU 6/1	PTU 6/1.5	PTU 6/2	PTU 6/3	PTU 6/4
DN	150 (6)	150 (6)	150 (6)	150 (6)	150 (6)
DN1	25 (1)	40 (1.5)	50 (2)	80 (3)	100 (4)
L	250(9)	250(9)	250(9)	300(12)	300(12)
L1	150 (6)	150 (6)	150 (6)	175 (7)	200 (8)

Cat ref	PTU 9/1	PTU 9/1.5	PTU 9/2	PTU 9/3	PTU 9/4	PTU 9/6
DN	225 (9)	225 (9)	225 (9)	225 (9)	225 (9)	225 (9)
DN1	25 (1)	40 (1.5)	50 (2)	80 (3)	100 (4)	150 (6)
L	300(12)	300(12)	300(12)	300(12)	450 (18)	450(18)
L1	185 (7.5)	185 (7.5)	185 (7.5)	210 (8.4)	250 (10)	275 (11)

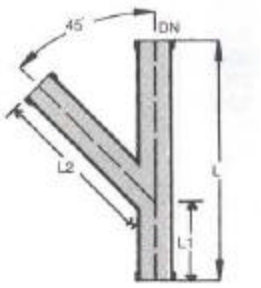
Cat ref	PTU 12/1.5	PTU 12/2	PTU 12/3	PTU 12/4	PTU 12/6
DN	300 (12)	300 (12)	300 (12)	300 (12)	300 (12)
DN1	40 (1.5)	50 (2)	80 (3)	100 (4)	150 (6)
L	400 (16)	400 (16)	400 (16)	400 (16)	450(18)
L1	230 (9)	230 (9)	230 (9)	275 (11)	275(11)

Cat ref	PTU 18/3	PTUN 18/3	PTU 18/4	PTU 18/6	PTU 18/9
DN	450 (18)	480 (18)	450 (18)	450 (18)	450 (18)
DN1	80 (3)	80 (3)	100 (4)	150 (6)	150 (6)
L	400 (16)	400 (16)	400 (16)	600 (20)	800 (32)
L1	320 (12.8)	320 (12.8)	320 (12.8)	380 (15)	400 (16)

Cat ref	PTU 24/4	PTU 24/6	PTU 24/9	PTU 24/12
DN	600 (24)	600 (24)	600 (24)	600 (24)
DN1	100 (4)	150 (6)	225 (9)	300 (12)
L	600 (24)	600 (24)	800(32)	800 (32)
L1	450 (18)	450 (18)	525 (21)	525 (21)

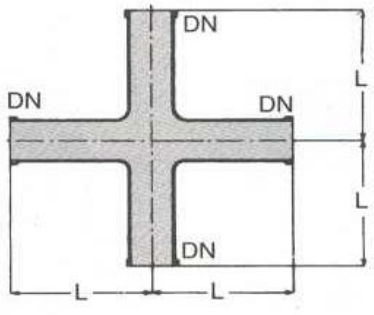
'Y' Pieces

Cat ref	PY/07	PY/1	PY/1.5	PY/2	PY/3	PY/4
DN	15 (0.7)	25 (1)	40(1.5)	50 (2)	80 (3)	100 (4)
L	100 (4)	200 (8)	180 (7)	205 (8)	255 (10)	355 (14)
L1	20 (0.9)	20 (0.9)	25 (1)	30 (1.25)	40 (1.6)	55 (2.25)



Equal Cross

Cat ref	PX/07	PX/1	PX/1.5	PX/2	PX/3	PX/4	PX/6
DN	15 (0.7)	25 (1)	40 (1.5)	50 (2)	80 (3)	100 (4)	150 (6)
L	50 (2)	100 (4)	150 (65)	150 (6)	200 (8)	250 (10)	300 (12)

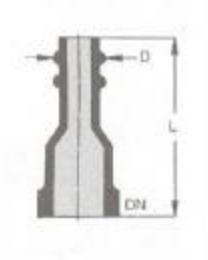


Hose Connectors

Cat ref	PHC 07/.4	PHC 07/.5
DN	15 (0.7)	15 (0.7)
D	10 (0.4)	13 (0.5)
L	50 (2)	50 (2)

Cat ref	PHC 1/.5	PHC 1/.75	PHC 1/1
DN	25 (1)	25 (1)	25 (1)
D	13 (0.5)	20 (0.8)	25 (1)
L	90 (3.5)	90 (3.5)	90 (3.5)

Cat ref	PHC 1.5/5	PHC 1.5/8	PHC 1.5/1	PHC 1.5/1.5
DN	40 (1.5)	40 (1.5)	40 (1.5)	40 (1.5)
D	13 (0.5)	20 (0.8)	26 (1)	40 (1.5)
L	100 (4)	100 (4)	100 (4)	100 (4)



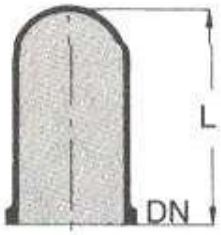
Cat ref	PHC 2/.8	PHC 2/1	PHC 2/1.5	PHC 2/2
DN	50 (2)	50 (2)	50 (2)	50 (2)
D	20 (0.8)	26 (1)	40 (1.5)	50 (2)
L	100 (4)	100 (4)	100 (4)	100 (4)

[k]D is bore of mating hose.

Pipe Closures

Cat ref	PBE/07	PBE/1	PBE/1.5	PBE/2	PBE/3	PBE/4
DN	15 (0.7)	25 (1)	40 (1.5)	50 (2)	80 (3)	100 (4)
L	40 (1.5)	50 (2)	75 (3)	75 (3)	100 (4)	125 (5)

Cat ref	PBE/6	PBE/9	PBE/12	PBE/18	PBE/24
DN	150 (6)	225 (9)	300 (12)	450 (18)	600 (24)
L	125 (5)	150 (6.0)	150 (6)	250 (10)	250 (10)



Valves

Line Valves

Drain Valves

Angle Valves

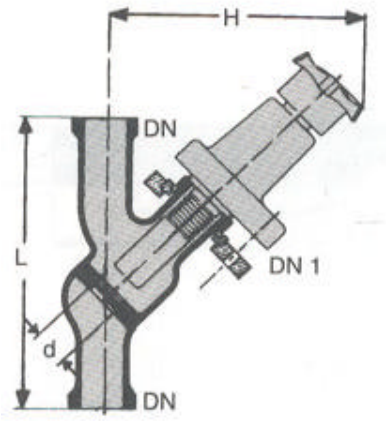
Vacuum Stopcocks

Diaphragm Valves

Flush Bottom Valves

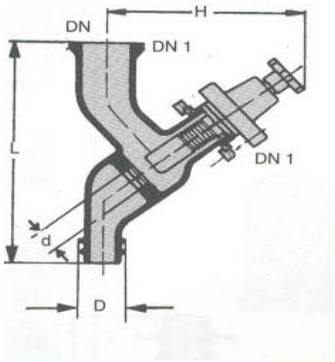
Non Return Valves

ine Valves



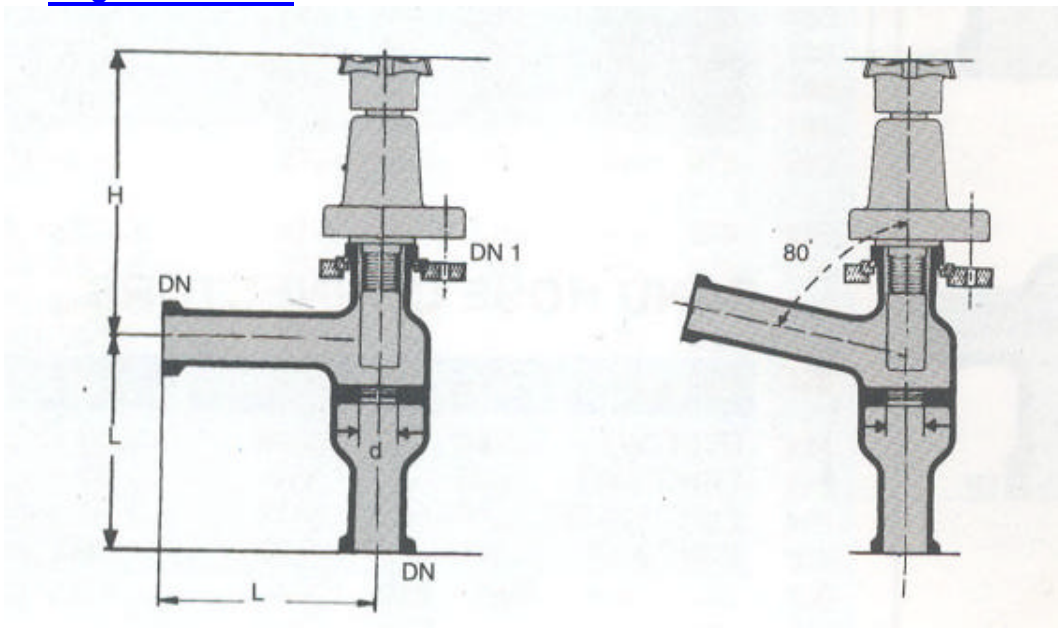
Cat ref	PV07	PV1	PV1.5/1	PV1.5	PV2
DN	15 (0.7)	25 (1)	40 (1.5)	40 (1.5)	50 (2)
L	175(6.9)	175(6.9)	225(8.85)	225(8.85)	300(11.81)
H	175(6.9)	175(6.9)	175(6.9)	200(7.85)	220(8.65)
d	18(0.7	18(0.7)	18 (0.7)	26(1.02)	38(1.5)
Max. Working Pressure ***Kg/cm$_g^2$(psig)***	3.5 (51)	3.5 (51)	3.5(51)	3.5 (51)	3.5 (51)

rain Valves



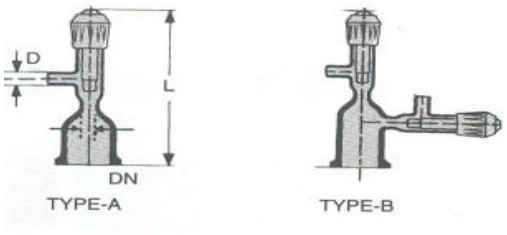
Cat ref	PVD 1	PVD 1.5/1	PVD 1.5	PVD 2
DN	25 (1)	40 (1.5)	40 (1.5)	50 (1)
d	18 (0.7)	18 (0.7)	26 (1.02)	38(1.5)
L	175(6.9)	225(8.85)	225(8.85)	300(11.8)
H	175(6.9)	225(8.85)	225(8.85)	225(8.85)
Type of buttress end	**Flat**	**Flat**	**Flat**	**Flat**
Max. Working Pressure ***Kg/cm$_g^2$(psig)***	3.5 (51)	3.5 (51)	3.5 (51)	3.5 (51)

Angle Valves



Cat ref	DN	DN1	d	L	H	Degree
PVE 1	25	25	18	100	175	90
PVE 1/80	25	25	18	100	175	80
PVE 1.5	40	40	26	150	200	90
PVE 2	50	50	38	150	220	90

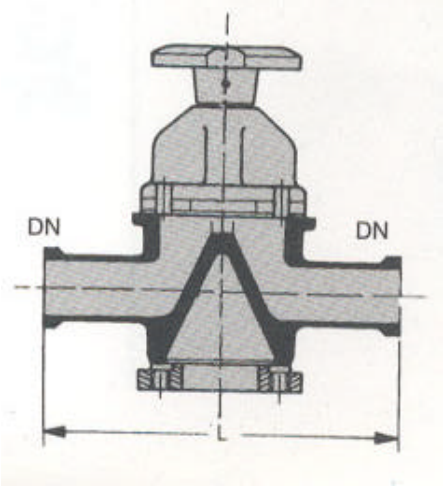
Vacuum Stopcocks



Cat. Ref.	DN	D	d	L	Type
VST 1	25	11	10	150	A
VST 1.5	40	11	10	150	A
VSTR 1	25	11	10	150	B
VSTR 1.5	40	11	10	150	B

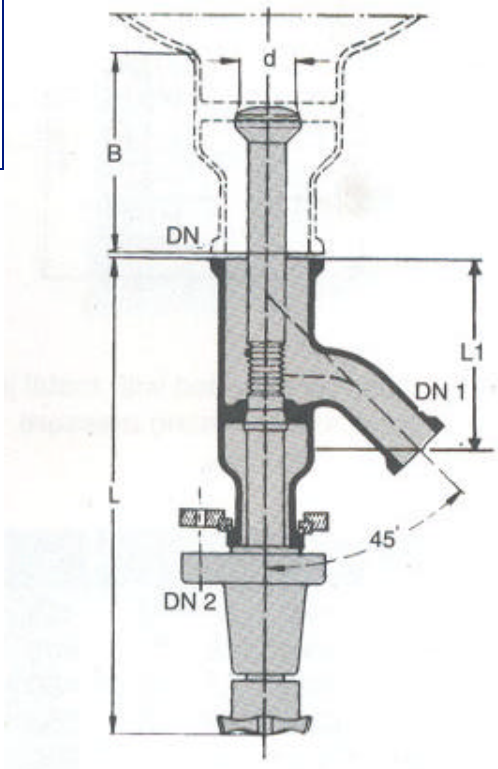
iaphragm Valves

Cat. Ref.	DVS 1	DVS 1.5
D	25 (1)	40 (1.5)
L	162 (6.4)	185 (7.25)
L1	50 (2)	55 (2.25)
L2	90 (3.5)	115 (4.5)
Max. Working Pressure *Kg/cm$_g^2$(psig)*	3.5 (51)	3.5 (51)



lush Bottom Valves

Cat. Ref.	BAL 1.5	BAL 2
DN	40 (1.5)	50
DN1	25 (1)	40(1.5)
L	260 (10.2)	260(10.2)
L1	105 (4.1)	105(4.1)
B	190(7.5)	190(7.5)
d	26(1)	38(1.5)



Vessels

Single Neck with Bottom Outlet

Two Neck with Bottom Outlet

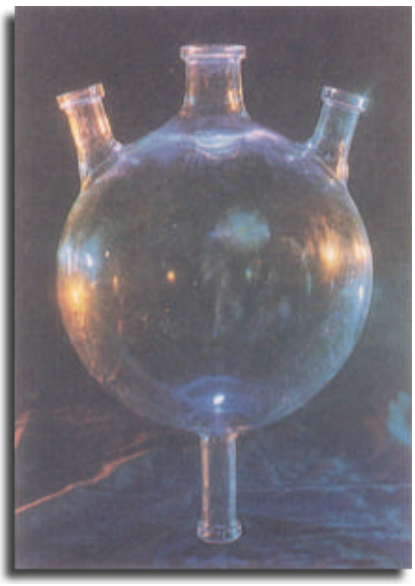
Three Neck with Bottom Outlet

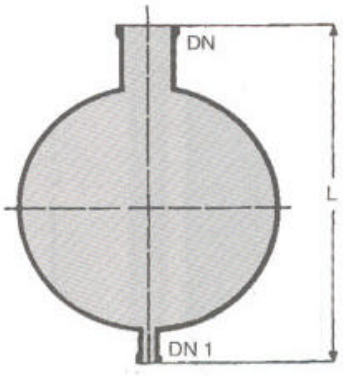
Four Neck with Bottom Outlet

Five Neck with Bottom Outlet

Reaction Vessel Cylindrical

Thermometer Pocket



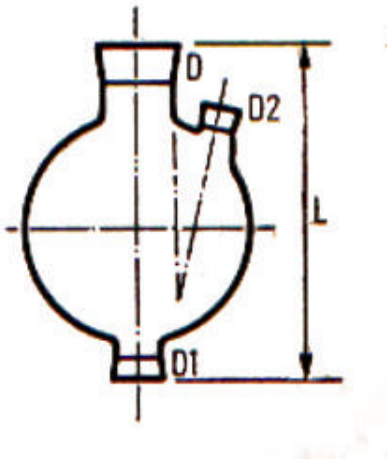


ingle Neck with Bottom Outlet

Cat. Ref	Nominal Capacity	L	DN	DN1
VA 5	5 L	375	40	25
VA 10	10L	450	40	25
VA 20	20 L	525	80	25
VA 50	50 L	725	100	40
VA 100	100 L	825	150	40
VA 200	200 L	1075	225	40

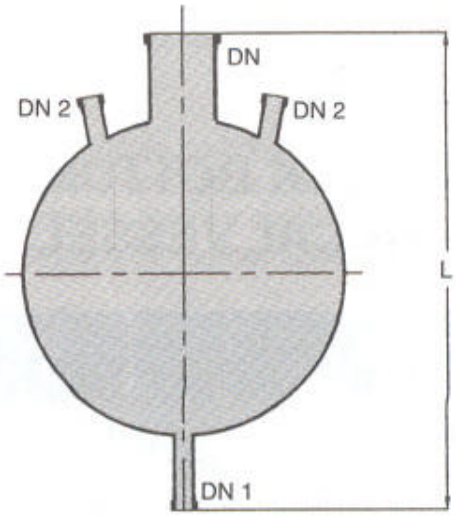
wo Neck with Bottom Outlet

Cat. Ref.	VS 50/B	VS 100/B	VS 200/B
D	100 (4)	150 (6)	225 (9)
D1	40 (1.5)	40 (1.5)	40 (1.5)
D2 at 10	40 (1.5)	40 (1.5)	40 (1.5)
L	735 (29)	825 (32.5)	1080 (42.5)
Nom. Cap. (lit.)	**50**	**100**	**200**



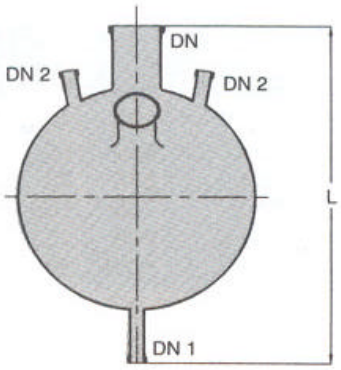
ıree Neck with Bottom Outlet

Cat. Ref.	Nominal Capacity	L	DN	DN1	DN2
VSM 5	5 L	425	40	25	25
VSM 10	10 L	500	40	25	25
VSM 20	20 L	575	80	25	25
VSM 50	50 L	825	100	40	40
VSM 100	100 L	925	150	40	40
VSM 200	200 L	1175	225	40	40



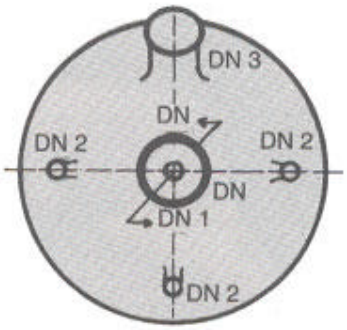
ɔur Neck with Bottom Outlet

Cat. Ref.	Nominal Capacity	L	DN	DN1	DN2	DN3
VSPL 5	5 L	425	40	25	25	40
VSPL 10	10 L	500	40	25	25	40
VSPL 20	20 L	575	80	25	25	40
VSPL 50	50 L	825	100	40	40	100
VSPL 100	100 L	925	150	40	40	100
VSPL 200	200 L	1175	225	40	40	100

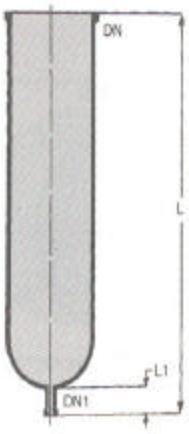


ive Neck with Bottom Outlet

Cat. Ref.	Nominal Capacity	L	DN	DN1	DN2	DN3
VSL 5	5 L	425	40	25	25	40
VSL 10	10 L	500	40	25	25	40
VSL 20	20 L	575	80	25	25	40
VSL 50	50 L	825	100	40	40	100
VSL 100	100 L	925	150	40	40	100
VSL 200	200 L	1175	225	40	40	100



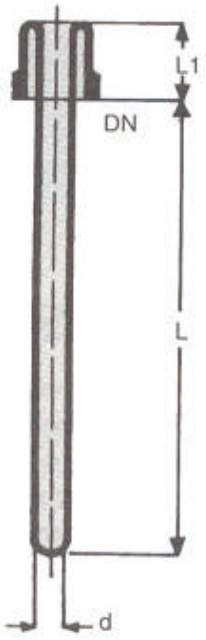
Reaction Vessel Cylindrical



Cat. Ref.	VZ 5/6	VZ 10/6	VZ 20/9	VZ 30/12	VZ 50/12	VZ 100/18	VZ 150/18	VZ 200/18	VZ 400/24
DN	150 (6)	150(6)	225(9)	300(12)	300 (12)	450(18)	450(18)	450(18)	600(24)
DN 1	25 (1)	25(1)	25(1)	40(1.5)	40(105)	40 (1.5)	40 (1.5)	40 (1.5)	40 (1.5)
L	460 (18.1)	700(28)	750(29.5)	635 (25)	915(36)	900(36)	1400(56)	1500(60)	1650(66)
L1	60 (2.4)	60(2.4)	60(2.4)	65(2.5)	65(2.5)	65(2.5)	65(2.5)	65(2.5)	65(2.5)
ɒminal Cap. (lit.)	5	10	20	30	50	100	150	200	400

ıermometer Pocket

Cat. Ref.	TP 1/100	TP 1	TP 1/300	TP 1.5
DN	25 (1)	25 (1)	25 (1)	25 (1)
L	100 (4)	140 (5.5)	330 (13)	140 (5.5)
L1	50 (2)	50 (2)	50 (2)	50 (2)



Stirrers, Drives, Heating Cooling Units

Stirrers with Teflon Blades

Vortex Stirrers

Propeller Stirrers

Chuck & seal Assembly with Teflon Bellow and Plate

Chuck with Mechanical Seal

Heating Mantle

Heating Bath

Cooling Bath

Vessel Holder

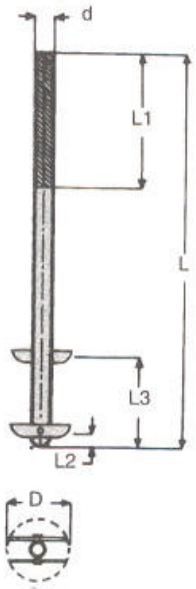
Vessel Holder Ring

Dip Pipe

Stirrer Drive Motor

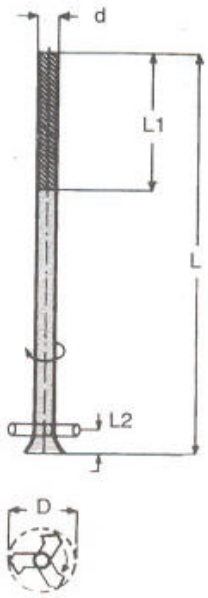
tirrers with Teflon Blades

Cat. Ref.	Vessel	L	L1	L2	L3	d	D
STB20	20	800	350	25	–	25	100
STB50	50	1050	350	25	200	47	120
STB100	100	1200	350	30	250	47	175
STB200	200	1500	350	30	325	47	200



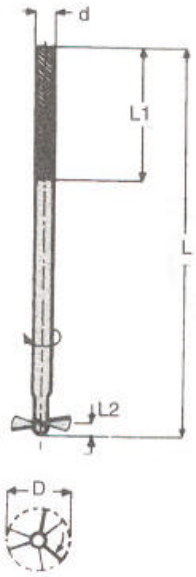
ortex Stirrers

Cat. Ref	STV50	STV100	STV200
vessel size	50 litre	100 litre	200 litre
Reaction vessel size	VZ30/12	VZ50/12	VZ100/18
d	95 (3.75)	140 (5.4)	190 (7.5)
d1	50 (2)	65 (2.5)	70 (2.75)
L	1050 (40)	1200 (47.25)	1500 (59)
L1	400 (16)	400 (16)	400 (16)

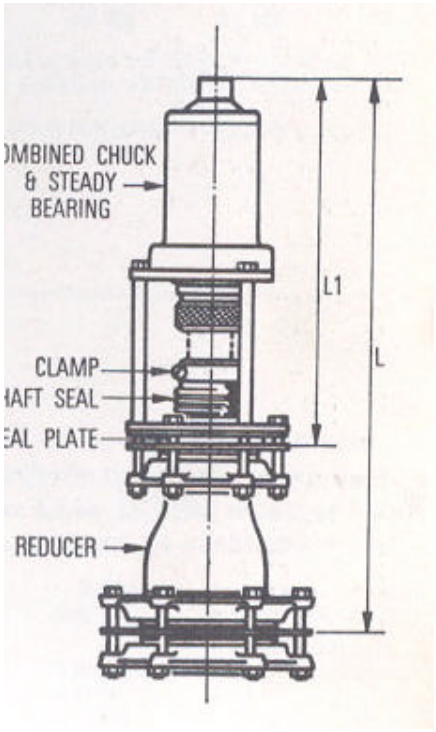


ropeller Stirrers

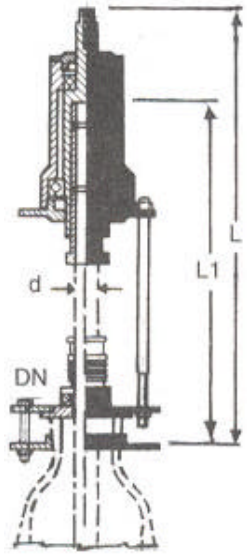
Cat. Ref.	Vessel	L	L1	L2	d	D
STP50	50	1050	400	50	47	95
STP100	100	1200	400	65	47	145
STP100	200	1500	400	65	47	210



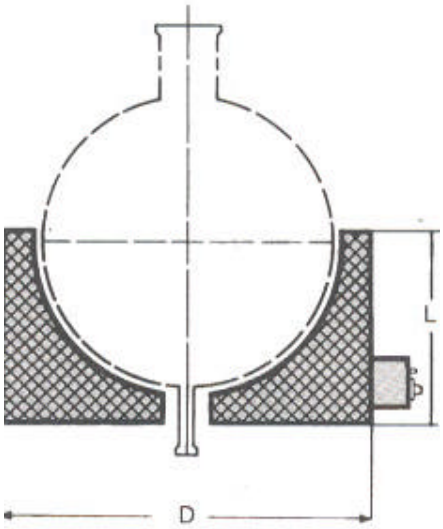
nuck & seal Assembly with Teflon Bellow and Plate



huck with Mechanical Seal

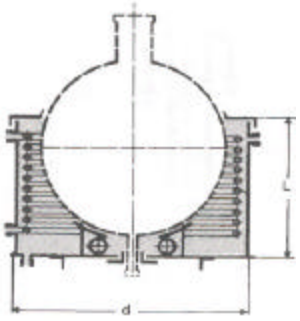


eating Mantle



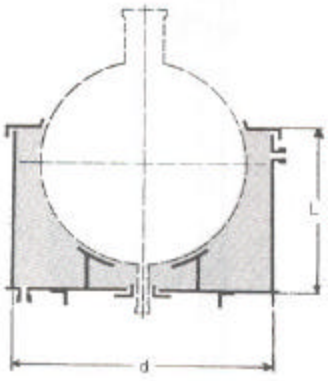
eating Bath

at. Ref.	Vessel size	d	L	Watts	HTA Vessel	HTA Coils
BH 20	20 L	480	340	2x1500	0.25	0.4
SBH50	50 L	615	415	2x2000	0.5	0.6
BH100	100 L	720	535	2x3000	0.7	1
BH200	200 L	900	620	2x4000	1	1.5



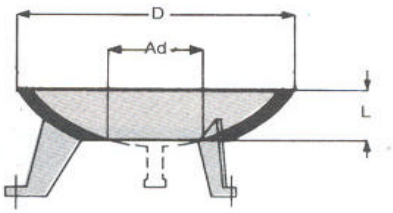
ooling Bath

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



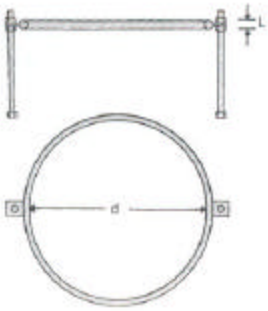
essel Holder

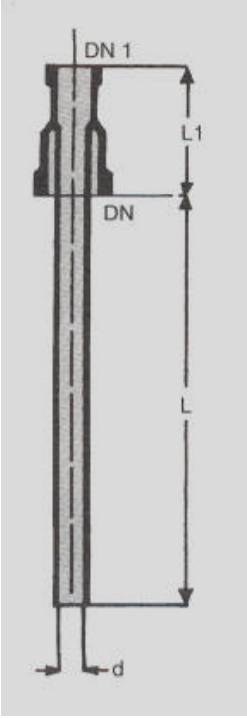
Cat. Ref.	VSS 20	VSS 50	VSS 100	VSS 200
Vessel size	20 L	50 L	100 L	200 L
D (PCD)	330 (13)	405 (16)	410 (16.4)	700 (25.5)



essel Holder Ring

Cat. Ref.	VSS 5	VSS 10
Vessel Size	5L	10L
C (PCD)	248 (9.75)	318 (12.5)



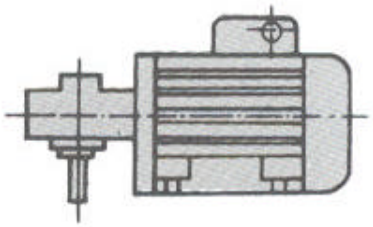


ip Pipe

ıt. ref.	DP 100	DP 330	DP 450	DP 510	DP 635	DP 750	DP 850	DP 1000	DP 1300
D	40 (1.5)	40 (1.5)	40 (1.5)	40 (1.5)	40 (1.5)	40 (1.5)	40 (1.5)	40 (1.5)	40 (1.5)
D1	25 (1)	25 (1)	25 (1)	25 (1)	25 (1)	25 (1)	25 (1)	25 (1)	25 (1)
d	25 (1)	25 (1)	25 (1)	25 (1)	25 (1)	25 (1)	25 (1)	25 (1)	25 (1)
L	100 (4)	330 (13)	450 (17.75)	510 (20)	635 (25)	750 (29.5)	850 (33.4)	1000 (39.4)	1300 (51.1)
L1	115 (4.5)	115 (4.5)	115 (4.5)	115 (4.5)	115 (4.5)	115 (4.5)	115 (4.5)	115 (4.5)	115 (4.5)

tirrer Drive Motor

Cat. Ref.	HP	RPM
FSD.5	0.5	192



Heat Exchanger

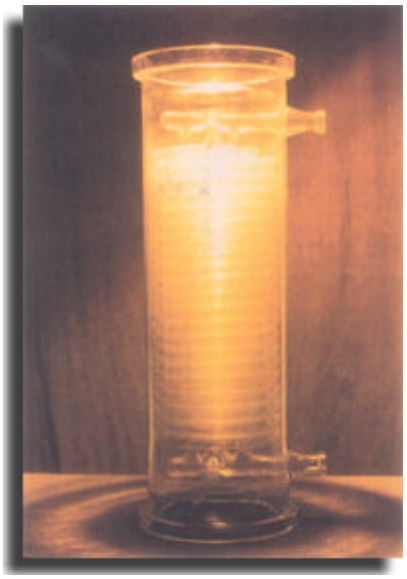
1) Shell & Coil Type

(A) Condensers

(B) Boilers

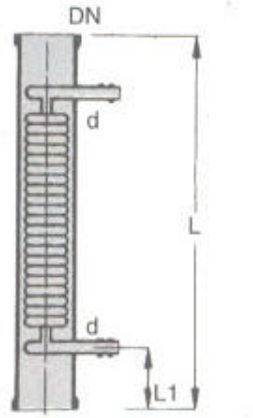
(C) Heat Exchangers

(D) Product coolers

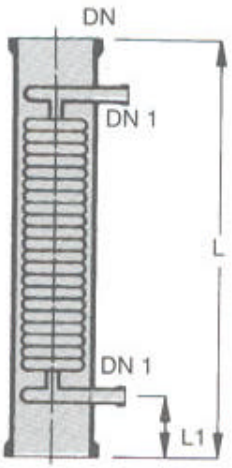


2) Shell & Tube Heat Exchangers

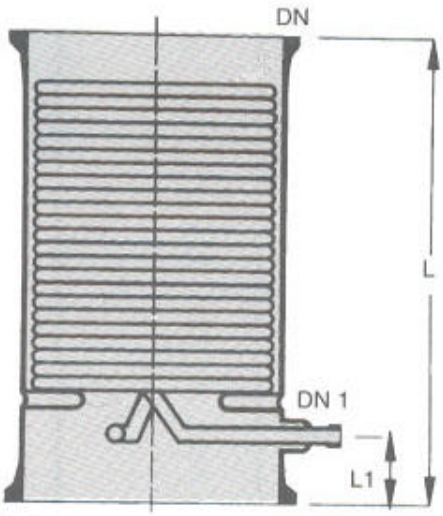
ondensers



TYPE-A



TYPE-B



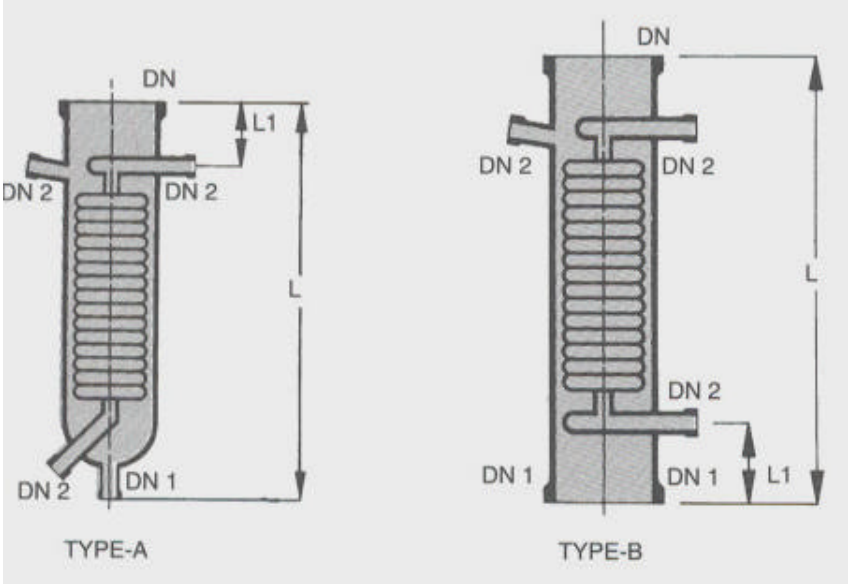
TYPE-B

Cat. Ref.	HE 1.5/2	HE 2/3	HE 3/3	HE 4/5	HE 6/10
m^2 (ft^2)	0.2 (2)	0.3 (3.5)	0.3 (3.5)	0.5 (5)	1 (10)
cm^2 (in^2)	4.5 (0.7)	5 (0.8)	5 (0.8)	30 (4.68)	52 (8)
kg (lb)	0.91	1.7 (3.75)	1.7 (3.75)	4.54 (10)	6.8 (15)
litre	1	1.5	1.5	4.5	9
L mm (in)	610 (24)	610 (24)	610 (24)	610(24)	610 (24)
L1 mm (in)	100 (4)	100 (4)	100 (4)	100(4)	100 (4)
DN mm (in)	40 (1.5)	50 (2)	80 (3)	100(4)	150 (6)
DN1 mm	To suite 16mm bore hose	To suite 16 mm bore hose	To suite 16 mm bore hose	To suite 19 mm bore hose	25 (1)
Type	A	A	A	A	B

Cat. Ref.	HE 6/15	HE 9/25	HE 12/25
m^2 (ft^2)	1.5 (15)	2.5 (25)	2.5 (25)
cm^2 (in^2)	52 (8)	132 (20.5)	210 (32.5)
kg (lb)	10 (22)	14 (30)	21 (45)
litre	11	24	38
L mm (in)	850 (33.6)	800(32)	610 (24)
L1 mm (in)	100 (4)	100 (4)	125(5)
DN mm (in)	150 (6)	225 (9)	300 (12)
DN1 mm (in)	25 (1)	25 (1)	25 (1)
Type	B	B	B

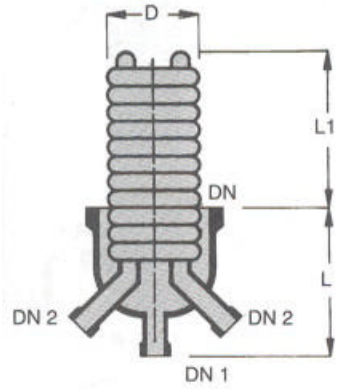
Cat. Ref.	HE 12/40	HE 18/60	HE 18/80	HE 24/120
m^2 (ft^2)	4 (40)	6(60)	8 (80)	12 (120)
cm^2 (in^2)	258 (40)	820 (127)	820 (127)	1520 (236)
kg (lb)	30 (64)	45.4 (100)	54 (120)	122 (270)
litre	40	100	107	265
L mm (in)	900 (35.4)	760 (30)	915 (36)	1250 (49.2)
L1 mm (in)	125 (5)	150 (6)	150 (6)	300 (12)
DN mm (in)	300 (12)	450 (18)	450 (18)	600 (24)
DN1 mm (in)	25 (1)	40 (1.5)	40 (1.5)	50 (2)
Type	B	C	C	C

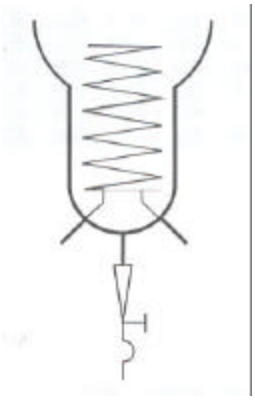
Boilers



Cat. Ref.	DN	DN1	DN2	L	L1	Type	Actual H.T.A. m.	Free Cross Area cm.	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

mmersion Heat Exchanger

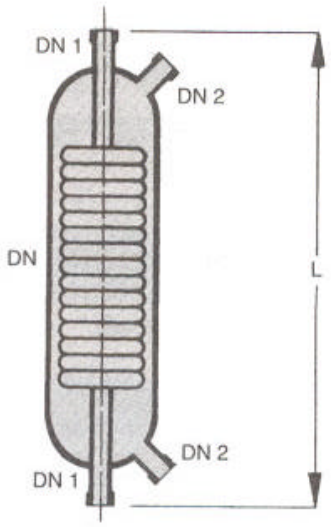




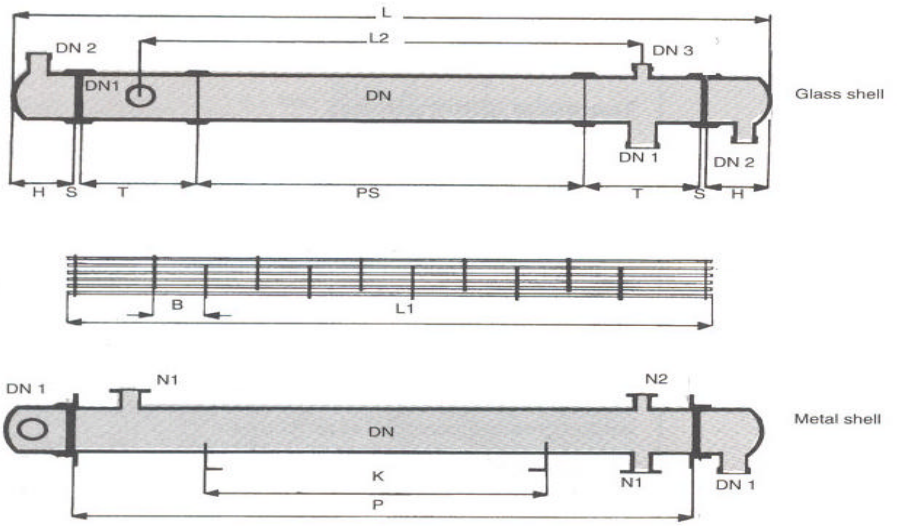
Cat. Ref.		HEM4	HEM6
ssel sizes	litre	20	50, 100 & 200
at transfer area	m^2 (ft^2)	0.15 (1.5)	0.5 (5)
ater throughput at 2.1 kg/cm^2	l/h (UKgal/h)	1364 (300)	1364 (300)
ax steam pressure	kg/cm^2 (lbf/in^2)	3.5 (50)	3.5 (50)
ssel opening	mm (in)	2.7 (40)	2.7 (40)
	DN	100 (4)	150 (6)
	DN1	40 (1.5)	40 (1.5)
	DN2	25 (1)	25 (1)
	L	130 (9)	175 (7)
	L1	255 (10)	200 (8)

roduct coolers

Cat. Ref.	DN	DN1	DN2	L	HTA m^2
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



Shell & Tube Heat Exchangers



etal Shell

ell & Tube heat exchangers offer large surface area in combination with efficient heat transfer and compactness. These widely used in industries for various duties like cooling, heating, condensation, evaporation etc.

lient Features :

Universal corrosion resistance an excellent alternative to expensive MOCs like graphite, hastelloy, copper titanium, tantalum and ıer exotic metals.

Excellent heat transfer as fouling does not occur on smooth glass surfaces.

Flexibility of installation vertical/horizontal.

Easy replacement of tubes for repair and cleaning.

Available in wide range of HTAs.

Ease of installation due to light weight.

Economical.

Suitable for applications where large HTAs are required in limited space.

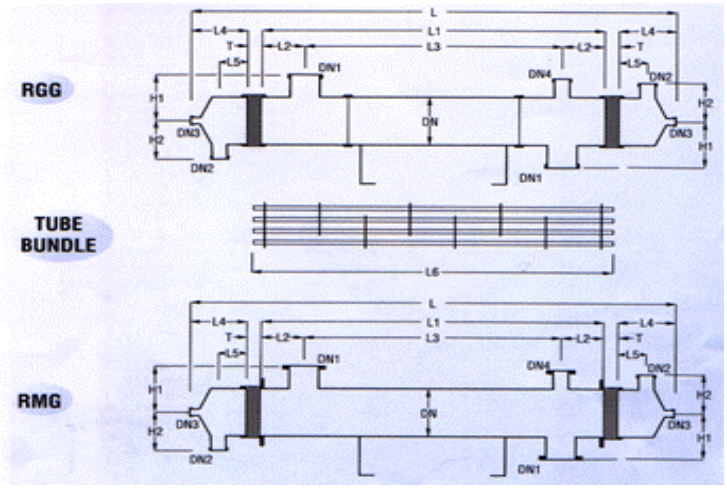
nstruction Features :

e glass tubes are sealed individually into PTFE tube sheet with special PTFE sockets and packing. This unique ferrule type aling arrangement permits easy replacement and cleaning of tubes. Baffles on shell side ensure improved heat transfer by reased turbulance. Further details of construction an be seen in the diagram.

PE:
ree basic versions are available :

	Material Of Construction			
lodel	**Shell**	**Tube**	**Header**	**Duty**
GG	Glass	Glass	Glass	For heat transfer between two
GM	Glass	Glass	Steel/FRP	For heat transfer between
MG	Steel/FRP	Glass	Glass	For heat transfer between

nensional Specifications :



	125	125	125	125	175	175	175	175	175	175	175	175
	1980	2580	3180	3780	2000	2600	3200	3900	1930	2530	3330	3930
	50				60				75			
o. of Tubes	37				73				151			
o. of Baffles	11	15	19	23	7	9	13	17	5	7	9	11

nge 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 & modes are suitable for full vacuum on both side. Maximum limiting pressures are tabulated here below :

		Maximum Permissible Pressure Range, Kg/cm2(g)		
lodel	Side	150DN	225DN	300DN
GG	Shell Tube	2.0 2.0	1.0 1.0	1.0 1.0
GM	Shell Tube	2.0 3.5	1.0 3.5	1.0 3.5
MG	Shell Tube	3.5 2.0	3.5 1.0	3.5 1.0

The above ranges of applications are admissible limiting values. In actual practice we can recommend the right selection on the basis of prevalent temperature – pressure parameters.

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 ensures economy and operational reliability for the user. For approximate sizing some typical heat transfer coefficients are given here below :

		Overall Heat Transfer Coefficient (U-Values)	
Media	Use	kcal/m²hrk	W/m²k
Steam water	condensation	350-550	410-640
Water - water	cooling	250-350	290-410s
Water - water	cooling	30-60	35-70

Column Components

Column Sections

Packing Support

Rasching Ring

Spray Feed Section

Column Feed Pipes

Spray Feed Pipe (ring sparger)

Column Adapter

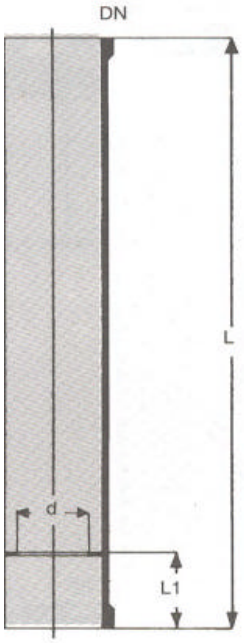
Reflux Divider (Manually operated)

Reflux Divider (Magnetically operated)

Magnet & Timer

Liquid Seal

lumn Sections



Cat. Ref.	CS 3/1000	CS 4/1000
D	80 (3)	100 (4)
L	1000 (39.4)	1000 (39.4)
L1	100 (4)	125 (5)

Cat. Ref.	CS 6/1000	CS 9/1000	CS 12/1000
D	150 (6)	225 (9)	300 (12)
L	1000 (39.4)	1000 (39.4)	1000 (39.4)
L1	125 (5)	125 (5)	125 (5)

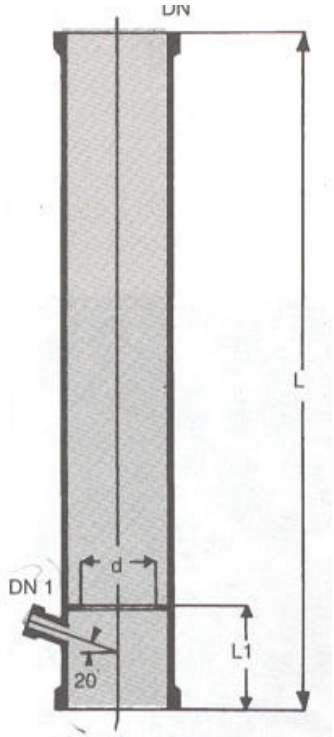
Cat. Ref.	CS 18/1000	CS 18/1500
D	450 (18)	450 (18)
L	1000 (39.4)	1500 (59)
L1	155 (6.1)	155 (6.1)

lumn Section with Thermometer Branch

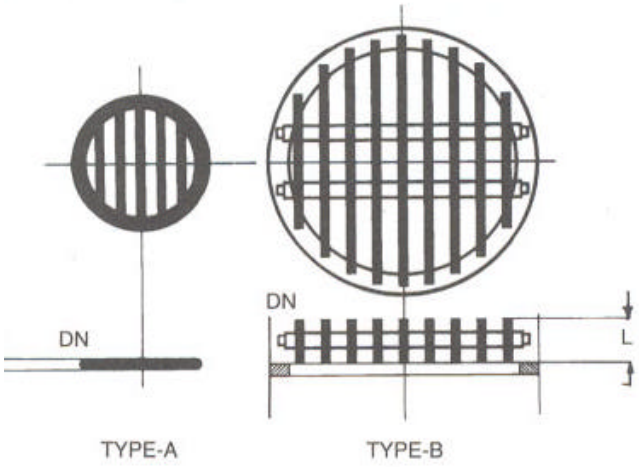
Cat. Ref.	CSTN 3/1000	CSTN 4/1000
DN	80 (3)	100 (4)
DN1	25 (1)	25 (1)
L	1000 (39.4)	1000 (39.4)
L1	145 (5.75)	145 (5.75)

Cat. Ref.	CSTN 6/1000	CSTN 9/1000	CSTN 12/1000
DN	150 (6)	225 (9)	300 (12)
DN1	25 (1)	25 (1)	25 (1)
L	1000 (39.4)	1000 (39.4)	1000 (39.4)
L1	145 (5.75)	145 (5.75)	150 (6)

Cat. Ref	CST 18/1000	CST 18/1500
DN	450 (18)	450 (18)
DN1	25 (1)	25 (1)
L	1000 (39.4)	1500 (59)
L1	155 (6.1)	155 (6.1)

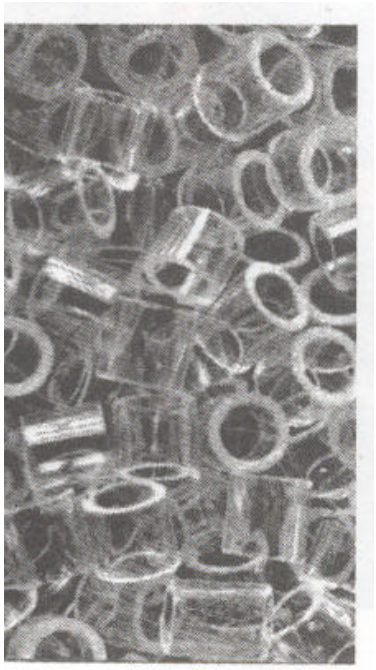


cking Support



at. ef.	DN	L	Cross Section Area	Max. Load Kgs.	Minimum Packing Size	Type
P3	80	10	45%	10	12	A
P4	100	12	55%	15	15	A
P6	150	12	55%	30	25	A
P9	225	19	60%	50	25	A
P12	300	19	65%	75	25	A
D16	400	70	70%	150	25	B
D18	450	70	70%	200	25	B
D24	600	95	70%	300	40	B

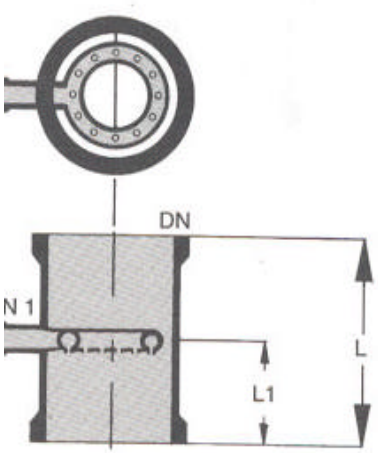
ass Rasching Rings



Cat. Ref.	FC15	FCB25	FCB40	FCB50
Nom dia mm(	15 (0.5)	25 (1)	40 (1.5)	50 (2)
Wt./Litre (kg)	0.44	0.27	0.29	0.32

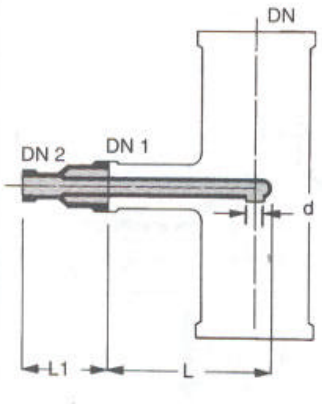
ray Feed Section

Cat. Ref.	FR4	FR6	FR9	FR12
D	100 (4)	150 (6)	225 (9)	300 (12)
D1	25 (1)	25 (1)	25 (1)	25 (1)
d	2 (0.08)	2 (0.8)	2 (0.8)	3 (0.118)
lo. of holes	20	27	27	30
L	250 (9.8)	250 (9.8)	250 (9.8)	300 (11.75)
L1	125 (5)	125 (5)	125 (5)	150 (6)



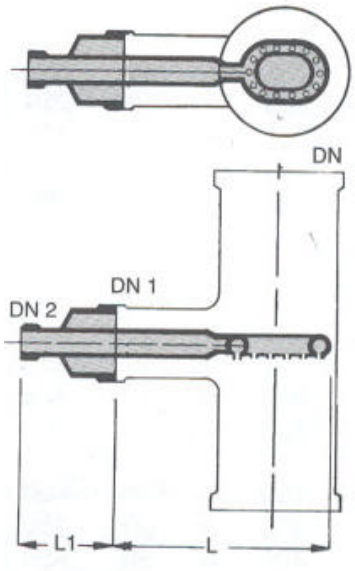
lumn Feed Pipes

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



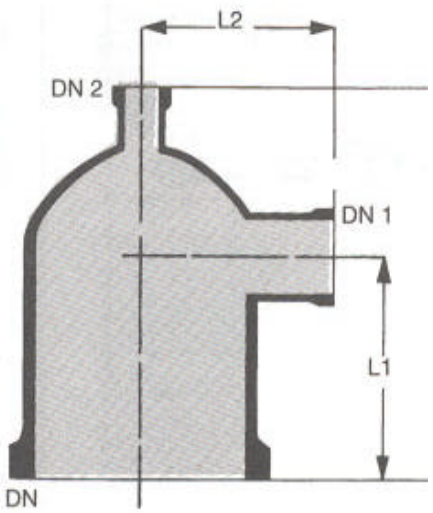
ray Feed Pipe (Ring sparger)

t. Ref.	DN	DN1	DN2	L	L1	Holes Sizes	Tee Suitable
FD6	150	80	25	225	125	27x2mm	PTU6/3
FD9	225	100	25	325	150	27x2mm	PTU9/4
D12	300	150	25	400	200	30x3mm	PTU12/6
D16	400	150	50	500	200	39x3mm	PTU16/6
D18	450	150	50	550	200	39x3mm	PTU18/6
D24	600	150	50	700	200	60x3mm	PTU24/6



lumn Adapter

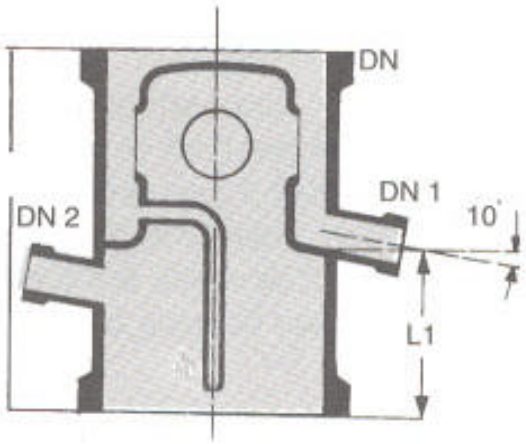
Cat. Ref.	DN	DN1	DN2	L	L1	L2
CA 3/1/1	80 (3)	25 (1)	25 (1)	180 (7)	90 (3.6)	95 (3.75)
CA 3/1.5/1	80 (3)	40 (1.5)	25 (1)	180 (7)	90 (3.6)	110 (4.25)
CA 4/1/1	100 (4)	25 (1)	25 (1)	205 (8)	100 (4)	110 (4.25)
CA 4/1.5/1	100 (4)	40 (1.5)	25 (1)	205 (8)	100 (4)	120 (4.75)
CA 4/1.5/1.5	100 (4)	40 (1.5)	40 (1.5)	205 (8)	100 (4)	120 (4.75)
CA 4/2/1	100 (4)	50 (2)	25 (1)	230 (9)	125 (5)	125 (5)
CA 4/2/1.5	100 (4)	50 (2)	40 (1.5)	230 (9)	125 (5)	125 (5)
CA 6/1/1.5	150 (6)	40 (1.5)	25 (1)	240 (9.5)	125 (5)	145 (5.75)
CA 6/2/1	150 (6)	50 (2)	25 (1)	240 (9.5)	125 (5)	150 (6)
CA 6/3/1	150 (6)	80 (3)	25 (1)	255 (10)	125 (5)	165 (6.5)
CA 6/4/1	150 (6)	100 (4)	25 (1)	305 (12)	150 (6)	205 (8)
CA 6/1.5/1.5	150 (6)	40 (1.5)	40 (1.5)	240 (9.5)	125 (5)	145 (5.75)
CA 6/2/1.5	150 (6)	50 (2)	40 (1.5)	240 (9.5)	125 (5)	150 (6)
CA 6/1.5/2	150 (6)	40 (1.5)	50 (2)	255 (10)	125 (5)	145 (5.75)
CA 6/2/2	150 (6)	50 (2)	50(2)	255 (10)	125 (5)	150 (6)
CA 9/1.5/1	225(9)	40(1.5)	25 (1)	330 (13)	150 (6)	185 (7.25)
CA 9/2/1	225(9)	50 (2)	25(1)	330 (13)	150 (6)	190 (7.5)
CA 9/1.5/1.5	225(9)	40 (1.5)	40 (1.5)	330 (13)	150 (6)	185 (7.25)
CA 9/2/1.5	225(9)	50 (2)	40 (1.5)	330 (13)	150 (6)	190 (7.5)
CA 9/3/1.5	225(9)	80 (3)	40 (1.5)	405 (16)	230 (9)	205 (8)
CA 9/4/1.5	225(9)	100 (4)	40 (1.5)	405(16)	230 (9)	240 (9.5)
CA 9/6/1.5	225(9)	150 (6)	40 (1.5)	405 (16)	230 (9)	265 (10.5)
CA 9/2/2	225(9)	50(2)	50(2)	355 (14)	150 (6)	190 (7.5)
CA 12/1.5/1	300 (12)	40 (1.5)	25 (1)	380 (15)	190 (7.5)	220 (8.75)
CA 12/1.5/1.5	300 (12)	40 (1.5)	40 (1.5)	380 (15)	190 (7.5)	220 (8.75)
CA 12/2/1.5	300 (12)	50 (2)	40 (1.5)	380 (15)	190 (7.5)	230 (9)
CA 12/4/1.5	300 (12)	100 (4)	40 (1.5)	430 (17)	230 (9)	280 (11)
CA 12/6/1.5	300 (12)	150 (6)	40 (1.5)	430 (17)	230 (9)	305 (12)
CA 12/2/2	300 (12)	50 (2)	50 (2)	405 (16)	190 (7.5)	230 (9)
CA 12/3/1.5	300 (12)	80 (3)	40 (1.5)	430 (17)	230 (9)	240 (9.5)
CA 12/3/2	300 (12)	80 (3)	50 (2)	430 (17)	230 (9)	240 (9.5)
CA 12/4/2	300 (12)	100 (4)	50 (2)	430 (17)	230 (9)	280 (11)
CA 12/6/2	300 (12)	150 (6)	50 (2)	430 (17)	230 (9)	305 (12)
CA 18/ 2/1	450 (18)	50 (2)	25 (1)	710 (28)	380 (15)	305 (12)
CA 18/6/2	450 (18)	150 (6)	50 (2)	710 (28)	380 (15)	380 (15)
CAN 18/6/2	450 (18)	150 (6)	50 (2)	550 (21.75)	300 (11.75)	380 (15)
CA18/9/2	450 (18)	225 (9)	50 (2)	760 (30)	380 (15)	405 (16)



Reflux Divider ((Manually operated)

at. ef.	RDA3	RDA4	RDA6	RDA9	RDA12	RDA18	RDA24
)N	80 (3)	100 (4)	150 (6)	225 (9)	300 (12)	450 (18)	800 (24)
N1	25 (1)	25 (1)	25 (1)	25 (1)	25 (1)	40 (1.5)	50 (2)
N2	25 (1)	25 (1)	25 (1)	25 (1)	25 (1)	40 (1.5)	40 (1.5)
L	190 (7.5)	255 (10)	255 (10)	300 (15)	300 (15)	610 (24)	1000 (39.4)
.1	115 (4.5)	145	145	150 (6)	150 (6)	275 (10.75)	405 (16)
.2	82 (3.25)	(5.75)	(5.75)	115 (4.5)	110	150 (6)	400 (15.75)
		95 (3.75)	100 (4)		(4.25)		

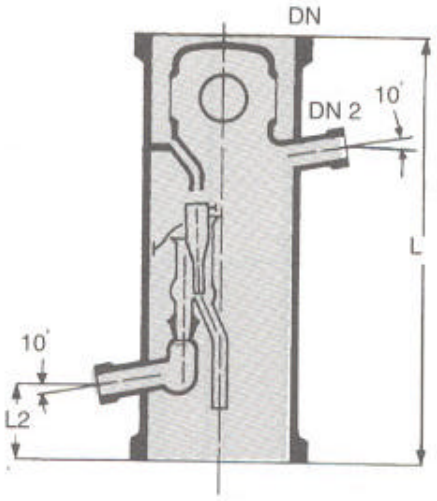
ıt. Ref.	RDA3/4	RDA4/6
DN	80 (3)	100 (4)
DN1	100 (4)	150 (6)
DN2	25 (1)	25 (1)
L	255 (10)	255 (10)
L1	145 (5.75)	145 (5.75)
L2	100 (4)	100 (4)



eflux Divider (Magnetically operated)

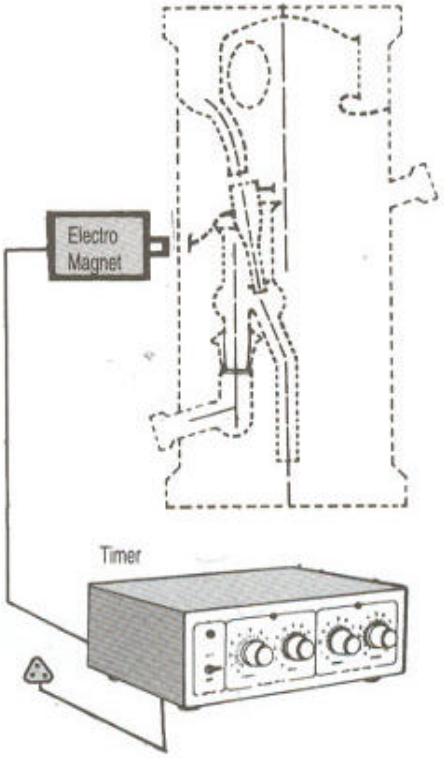
Cat. Ref.	RHM3	RHM4	RHM6	RHM9	RHM12
D	80 (3)	100 (4)	150 (6)	225 (9)	300 (12)
D1	25 (1)	25 (1)	25 (1)	25 (1)	25 (1)
L	380	455	455	560	685 (27)
L1	(15)	(18)	(18)	(22)	115 (4.5)
ow rate l/h	75 (3)	90 (3.5)	90 (3.5)	100 (4)	360
	80	120	180	240	

Cat. Ref.	RHM18
D	450 (18)
D1	40 (1.5
L	915 (36)
L1	165 (6.5
Flow rate l/h	450



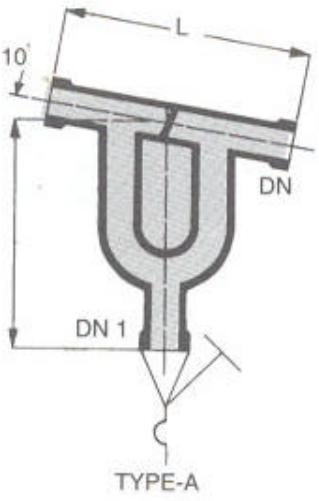
gnet & Timer

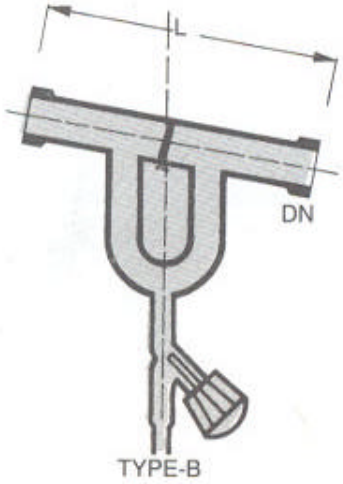
Cat. Ref.	Type
RPM	Non-flameproof
RPF	Flameproof



quid Seal

Cat. Ref.	LS1	LS1.5
D	25 (1)	40 (1.5)
D1	25 (1)	25 (1)
L	160 (6.25)	315 (12.5)
L1	205 (8)	305 (12)





VR structures are designed to support plant and other equipment comprising components xclusively or principally in borosilicate glass 3.3. Because of the special requirements esulting from the use of this material, structures are now available in the form of a proven nodular system that not only meets standard requirements but also provides or facilitates olutions for problems of a very special nature.

asically these structures consist of steel tubing in three different diameters, which is onnected using the appropriate fittings. As a result, the structures cannot only be ismantled and reassembled whenever required but they can also be modified and added to uite easily. The modular system also includes components for establishing fixed points, upporting spherical and cylindrical vessels and horizontal cylindrical components plus a ide range of supports, to mention just the most important items. The result is an extremely exible system.

lease contact us for further specific requirements.

esign of tubular structures

he diameter of structure tubing to be used plus minimum dimensions, i.e. width and depth f tubular structures are determined by the nominal size (cylindrical glass components) or iameter (spherical vessels) and the weight of the components they are designed to upport.

upport structures must be sufficiently rigid to prevent any bending of the individual tubes in xcess of the permissible amount and the subsequent transfer of external stress to the glass omponents. This is achieved by incorporating additional bracing.

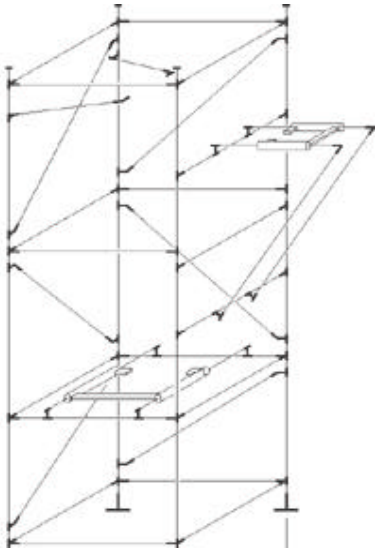
he establishment of fixed points is of particular importance. They are formed by combining light duty support frame or heavy duty support frame with a coupling, a support plate or a upport element (vessel holder, angle bracket, etc.). Fixed points have to carry the entire eight of a unit or column and should therefore, be located at the lowest point (in the case f a vessel holder) or lowest possible point (in the case of a support plate) in the installation.

Please note: Assembly of the glass components must always be started from the fixed point.

Glass units and their structures expand at different rates as a result of change in temperature. The unit must, therefore, be able to expand above the fixed point without restraint.

Guides giving lateral support must always be provided for units and columns.

Guide elements should not be bolted rigidly to the unit or plant during operation.



here supports are used in a structure for individual components or assemblies, these hould be installed in such a way that the glass components are subject n the main to ompressive forces. It has to be taken into consideration, that normally an additional fixed oint is created at such points.

Please note: Glass components must be able to expand freely from a fixed point, therefore a bellow is generally fitted between two fixed points.

there is the risk of vibration generated in the vicinity of glass units being transferred to the ubular structure, appropriate preventive measures should be taken.

he structure components described can also be used to support platforms and walkways or the use of plant operators and maintenance staff. They are connected directly to the lant support structure, which results in a particularly compact design. The decking of these latforms and walkways is in the form of grids or embossed metal sheets.

latforms and walkways is in the form of grids or embossed metal sheets.

upporting Horizontal Pipeline

oth horizontal and vertical pipelines must be supported at certain intervals to avoid ubjecting them to additional stress due to bending or lateral movement (e.g. on either side f bellows). For details please contact us.

Base

Bend

Tee

Double Bend

Double Tee

Equal Bracket

Unequal Bracket

Cross

Support

Column Base Support

Structure Support Pipe

Note : All support fittings are made up of the following materials

1) Epoxy coated Cast Iron.
2) Stainless Steel

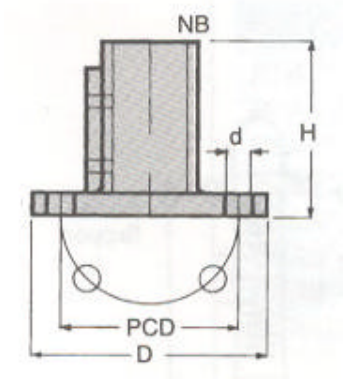
Structure Pipe

1) Galvanised Steel
2) Stainless Steel

ase

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

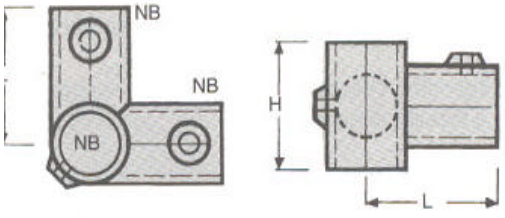
Cat.Ref.	NB	D	H	PCD	d
BS25*	25	150	75	110	4 x 14Ø
BS30*	30	150	75	110	4 x 14Ø
BS40	40	150	75	110	4 x 14Ø
BS50	50	175	75	125	4 x 14Ø



end

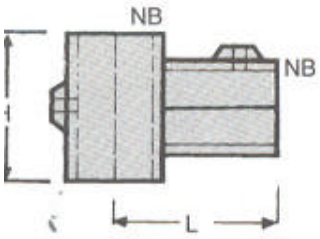
These are used to build frames on vertical tubes.

Cat.Ref.	NB	H	L
BN25*	25	50	55
BN30*	30	65	70
BN40	40	70	80
BN50	50	85	95



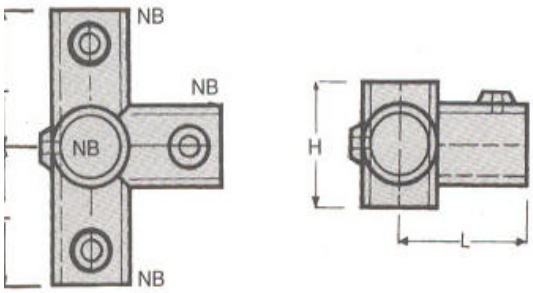
ee

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



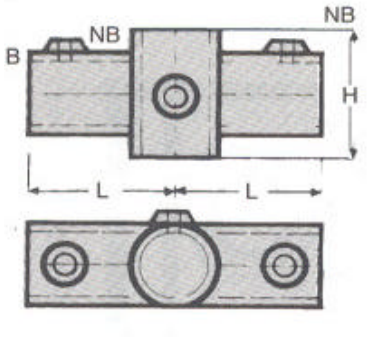
ouble Bend

Cat.Ref.	NB	H	L
DBN25	25	50	55
DBN30	30	65	70
DBN40	40	70	80
DBN50	50	85	95



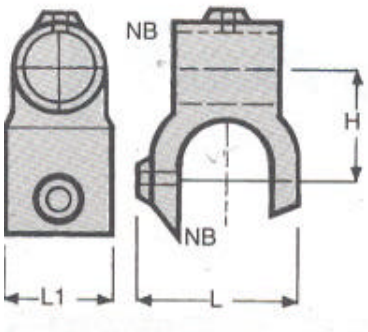
ɔuble Tee

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



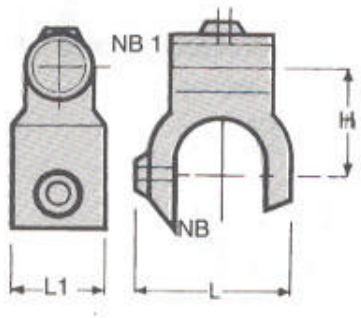
ɥual Bracket

ɔat.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



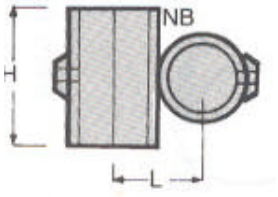
ıequal Bracket

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



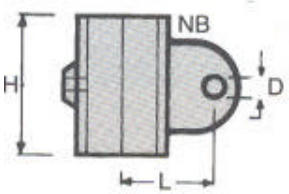
ross

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



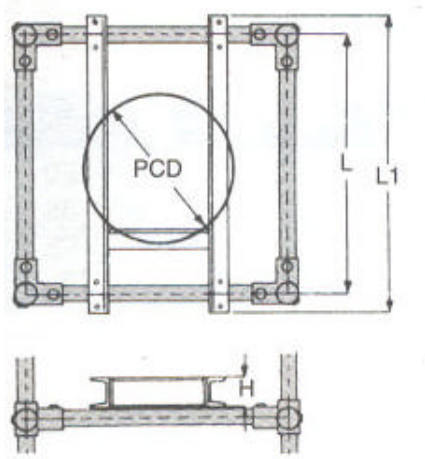
ıpport

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



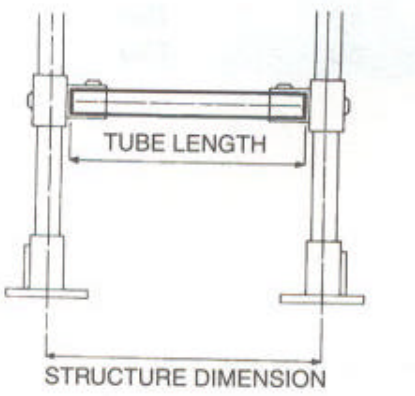
olumn Base Support

Column DN	PCD	L1	L	H
225	310	1000	800	75
300	395	1000	800	75
400	495	1200	1000	75
450	585	1200	1000	100
600	710	1400	1200	100



tructure Support Pipe

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



Structure Dimension	NB (mm) 15	25	30	40	50
ır Vertical Installation					
2500	-	2500	-	-	-
3000	-	3000	3000	-	-
3500	-	3500	3500	-	-
4000	-	-	4000	-	-
6000	-	6000	6000	6000	6000
ır 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
ır Supports					
400	435	435	445	455	465
500	535	535	545	555	565
600	635	635	645	655	665
800	835	835	845	855	865
1000	1035	1035	1045	1055	1065
1200	1235	1235	1245	1255	1265
1500	1535	1535	1545	1555	1565

STRUCTURE DIMENSIONS

For columns

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

For vessels (In Heating Bath)

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

For vessels (In Heating Mantle)

Size (Litres)	Recommended tube size NB (mm)	Structure size Depth X Width
20	25	400 x 600
50	25	500 x 800
100	25,30	600 x 800
200	30	800 x 1000

For vessels (In Vessel Holder)

Size (Litres)	Recommended tube size NB (mm)	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

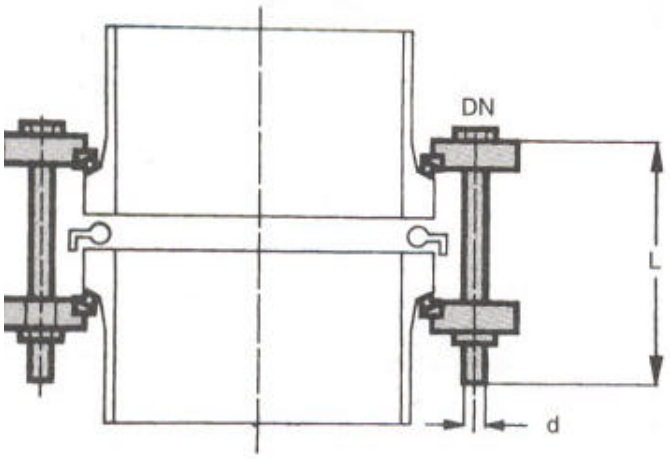
ASSEMBLING OF STRUCTURE

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 horizontal frames in correct level.
10. Assemble the support tubes at their positions.

Couplings , Bellows & Sight Glasses

ɔuplings : These are available as per different international designs And made up of the following materials

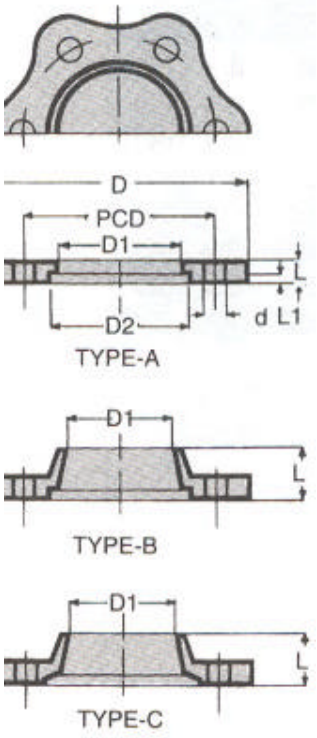
1) From 15DN to 300DN Cast Iron & Aluminium alloy both, sizes higher than this only Cast Iron.
2) Stainless Steel – all sizes.
3) Plastic – upto 150DN



		Flanges		Inserts		Nuts - Bolts		
Cat. Ref.	DN	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

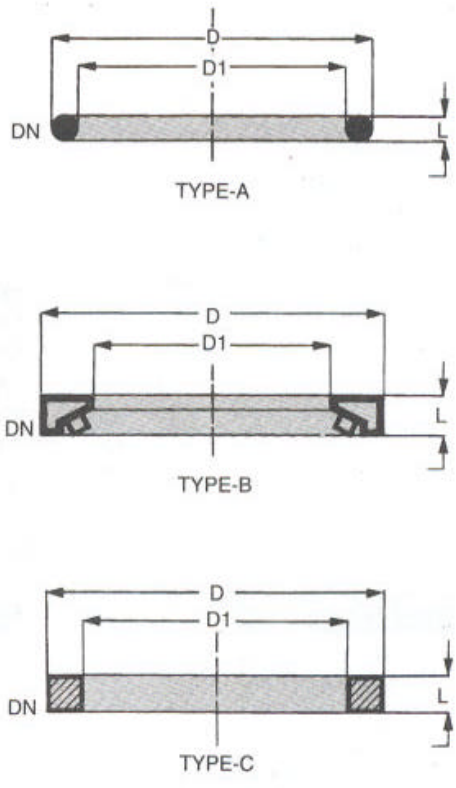
Flange

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	185	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 14Ø	22	8	A
CF18	450	630	537	557	858	12 x 14Ø	37	8	B
CF24	600	755	643	690	712	12Ø	50	5	C

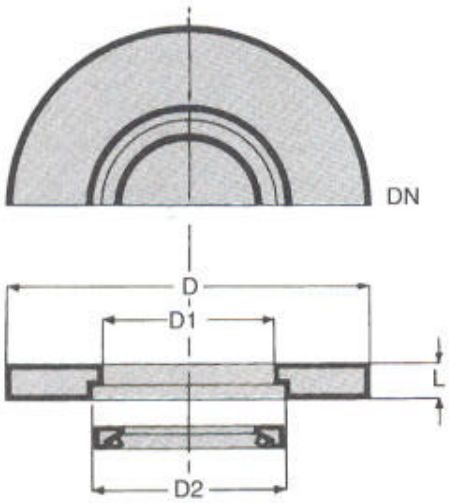


nsert (O-ring)

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



dapter Backing Flange

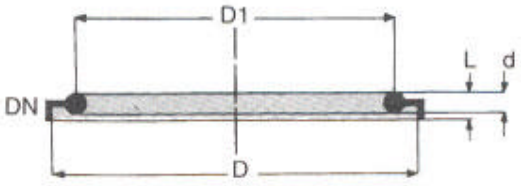


drilling flanges						Drilled to Table E		
Cat. Ref.	DN	D	D1	D2	L	Cat. Ref.	PCD	n x dØ
CFA1	25	115	43	51	10	CFA1/E	82	4 x 12Ø
CFA1.5	40	150	58	66	10	CFA1.5/E	98	4 x 12Ø
CFA2	50	165	70	81	12	CFA2/E	114	4 x 16Ø
CFA3	80	200	101	112	12	CFA3/E	146	4 x 16Ø
CFA4	100	220	134	148	12	CFA4/E	178	8 x 16Ø
CFA6	150	285	186	196	15	CFA6/E	235	8 x 19Ø
CFA9	225	395	260	282	15	CFA9/E	324	12x 19Ø
CFA12	300	445	342	363	18	CFA12/E	406	12 x 23Ø

illed to Table F			Drilled to Table ASA 150		
Cat. Ref.	PCD	n x dØ	Cat. Ref.	PCD	n x dØ
CFA1/F	87	4 x 16Ø	CFA1/A	79	4 x 12Ø
CFA1.5/F	105	4 x 16Ø	CFA1.5/A	98	4 x 12Ø
CFA2/F	127	4 x 16Ø	CFA2/A	121	4 x 16Ø
CFA3/F	165	8 x 16Ø	CFA3/A	152	4 x 16Ø
CFA4/F	190	8 x 16Ø	CFA4/A	190	8 x 16Ø
CFA6/F	260	12 x 19Ø	CFA6/A	241	8 x 19Ø
CFA9/F	356	12 x 23Ø	CFA9/A	298	8 x 19Ø
CFA12/F	438	16 x 23Ø	CFA12/A	432	12 x 23Ø

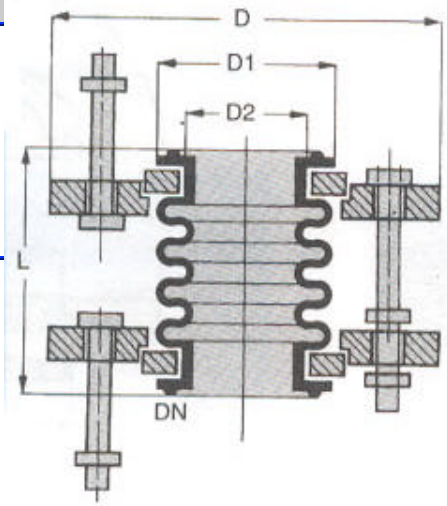
eflon Gasket

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



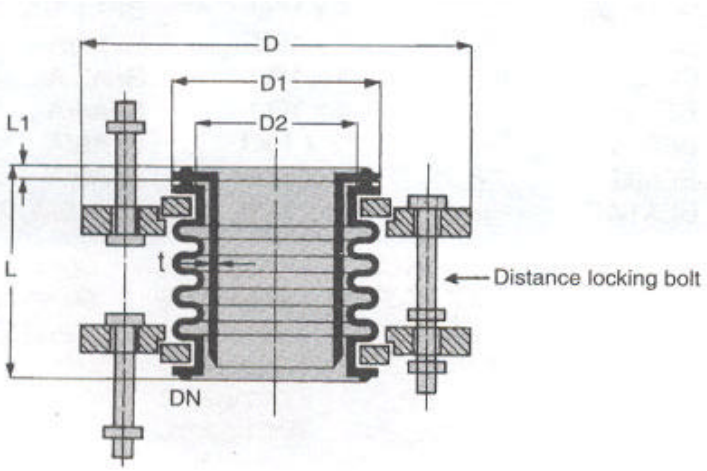
ellow with Flange

Cat. Ref.	DN	D	D1	D2	L
FBN1	25	95	41	31	60
FBN 1.5	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



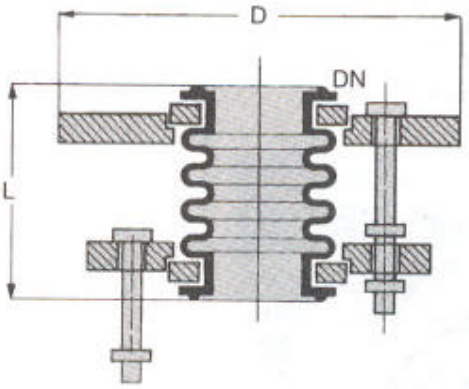
acuum Bellow

Cat. Ref.	DN	D	D1	D2	L	L1	t
VB3	80	155	98	82	70	5	3.0
VB4	100	200	132	132	70	5	3.5
VB6	150	275	184	184	70	5	4.0
VB9	225	350	253	253	70	5	5.0
VB12	300	420	338	338	70	5	5.0



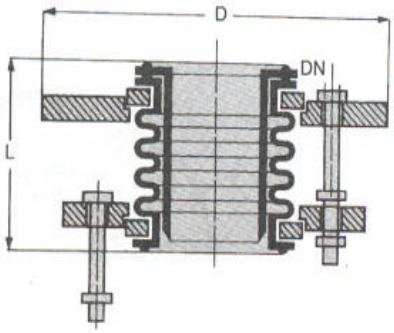
dapter Bellow with Flange

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	445	445	65



acuum Bellow with Flange

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

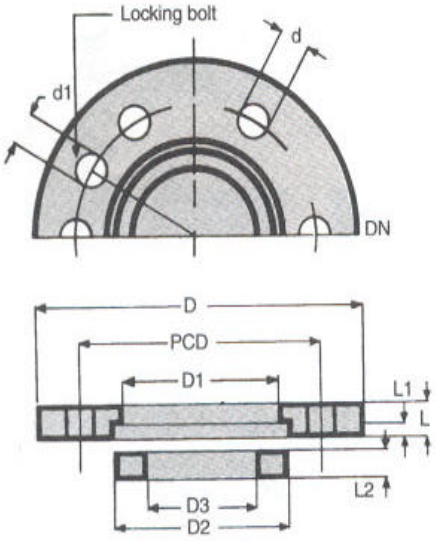


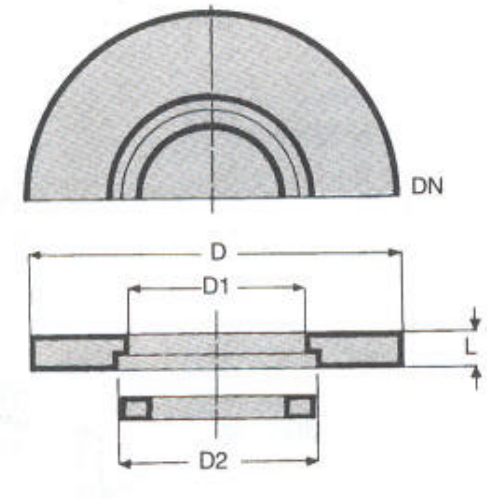
ellow Flanges

at. 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

illing Details

at. 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	175	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





dapter Bellow Flange

ndrilling 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	10	220	134	148	8
BFA6	150	285	186	196	8
BFA9	225	395	260	282	8
BFA12	300	445	342	363	10

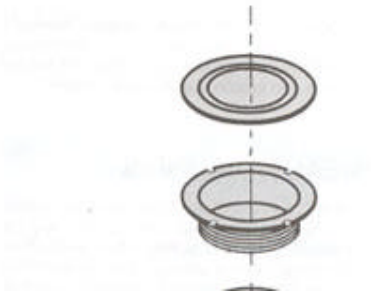
rilled to Table E		
Cat. Ref.	pcd	n x dØ
BFA1/E	82	4 x 12Ø
BFA1.5/E	98	4 x 12Ø
BFA2/E	114	4 x 16Ø
BFA3/E	146	4 x 16Ø
BFA4/E	178	8 x 16Ø
BFA6/E	235	8 x 19Ø
BFA9/E	324	12 x 19Ø
BFA12/E	406	12 x 23Ø

rilled 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

rilled to Table 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	12 x 23Ø

ight Glass

S FRAME SIGHT GLASS					
N	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
00	192	150	SG4/E	SG4/F	SG4/A
50	192	150	SG6/E	SG6/F	SG6/A



S 304 FRAME SIGHT GLASS					
N	L	L1	Cat. Ref. Table E	Cat. Ref. Table F	Cat. Ref. Table ASA
5	192	150	SG1/E/304	SG1/F/304	SG1/A/304
0	192	150	SG1.5/E/304	SG1.5/F/304	SG1.5/A/304
0	192	150	SG2/E/304	SG2/F/304	SG2/A/304
0	192	150	SG3/E/304	SG3/F/304	SG3/A/304
00	192	150	SG4/E/304	SG4/F/304	SG4/A/304
50	192	150	SG6/E/304	SG6/F/304	SG6/A/304

S 316 FRAME SIGHT GLASS					
N	L	L1	Cat. Ref. Table E	Cat. Ref. Table F	Cat. Ref. Table ASA
5	192	150	SG1/E/316	SG1/F/316	SG1/A/316
0	192	150	SG1.5/E/316	SG1.5/F/316	SG1.5/A/316
0	192	150	SG2/E/316	SG2/F/316	SG2/A/316
0	192	150	SG3/E/316	SG3/F/316	SG3/A/316
00	192	150	SG4/E/316	SG4/F/316	SG4/A/316
50	192	150	SG6/E/316	SG6/F/316	SG6/A/316

S 316 FRAME SIGHT GLASS					
N	L	L1	Cat. Ref. Table E	Cat. Ref. Table F	Cat. Ref. Table ASA
5	192	150	SG1/E/316	SG1/F/316	SG1/A/316
0	192	150	SG1.5/E/316	SG1.5/F/316	SG1.5/A/316
0	192	150	SG2/E/316	SG2/F/316	SG2/A/316
0	192	150	SG3/E/316	SG3/F/316	SG3/A/316
00	192	150	SG4/E/316	SG4/F/316	SG4/A/316
50	192	150	SG6/E/316	SG6/F/316	SG6/A/316