Version 2.3 [08.2012]

Humanity • Communication • Scalability

Glass Reactor System

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Introduction to HCS Glass Reactor System

HCS Scientific & Chemical Pte Ltd (Singapore) specializes in designing, fabricating and manufacturing of biological and chemical testing instrument, pharmaceutical glass equipment. Our core manufacturing capabilities are glass reactor series, rotary evaporator series, chemical glass pipes, glass condenser series and thermostat bath series. **Applications** for such borosilicate glass process equipment are widely used in research and development, agricultural, bio-technology, pharmaceutical, food and chemical industries.

The Glass Reactor is a generic term for a type of vessel widely used in the process industries. It is used for a variety of process operations such as dissolution of solids, product mixing, chemical reactions, batch distillation, crystallization, extraction and polymerization.

A typical glass reactor consists of a glass vessel with an agitator and integral heating/cooling system. The borosilicate glass vessels come with sizes from 50ml up to 200L. Liquids or solids are feed via connections at the top cover of the reactor. Vapors are discharged through the connections at the top and the wastes are usually discharged out from the bottom.

The advantages of the glass reactor lie with its versatility and visibility. A single vessel system can carry out a sequence of different operations without the need to break containment which is useful when processing toxic or highly potent compounds.

HCS offers pilot plant reactor system in glass or glass lined steel for batch production purposes.

Glass reactor system with vacuum applications allow operation at low overpressures. The permitted pressure is defined by the vessel diameter.

All glass products is made of high quality borosilicate 3.3 glass tubing according to the British Standards.

Application of Glass Reactor

- Vacuum Distillation
- Multi-component reactions
- Gas introduction into liquid phase
- Extraction of multi phase mixture
- Crystallization
- Reflux
- Multiple chemical reactions liquid/liquid, liquid/solid
- Low temperature chemistry
- Cell Culture

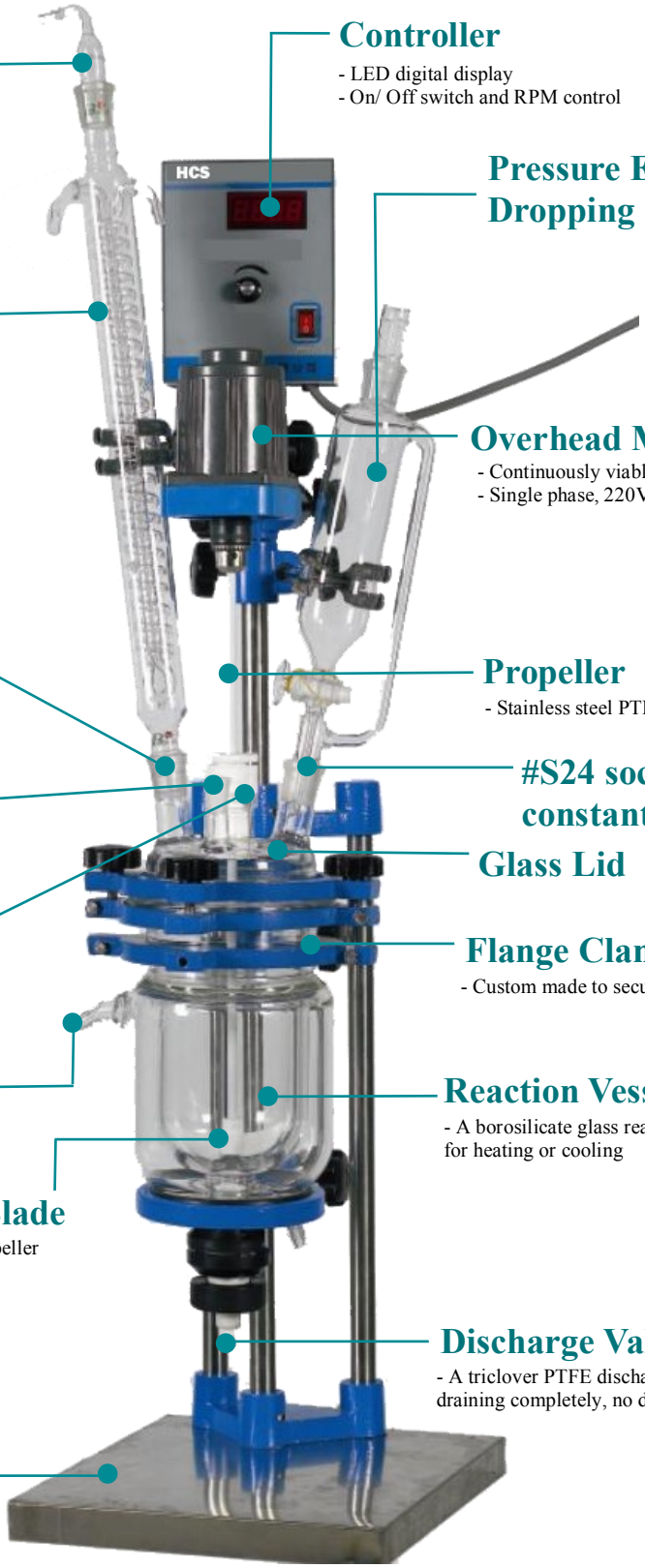
Custom Reaction Vessels and Pilot Plants

We design and fabricate glass reaction system for your needs.

We are capable of manufacturing glass reactor system according to your design. Our team of highly skilled glass technologists and product specialists has many years of experience in project development. Whether you require a large multi-vessel process pilot system or a single bench top vessel, we are able to fabricate according to your needs.

Types of Glass Reactor System

HCS Bio Glass Reactor (50ml—2L)



Adaptor for Vacuum

Controller
- LED digital display
- On/ Off switch and RPM control

Pressure Equalising Dropping Funnel

Coil Condenser

Overhead Motor
- Continuously viable agitator speed, 50-800rpm
- Single phase, 220V, 50Hz

#S24 socket for coil condenser

Propeller
- Stainless steel PTFE coated

#S14 socket for thermometer

#S24 socket for constant pressure funnel

Glass Lid

#34 flange for stirrer gland

Flange Clamp
- Custom made to secure the glass dome and vessel

Hose Connection
- 13mm, connected to the heating or cooling circulator via flexible hoses

Reaction Vessel (50ml—2L)
- A borosilicate glass reaction vessel with jacket for heating or cooling

Stirring Blade
- PTFE anchor impeller

Discharge Valve
- A triclover PTFE discharge valve provide self-draining completely, no dead angle at the bottom

Support Stand
- custom made stainless steel 304 & aluminum alloy frame

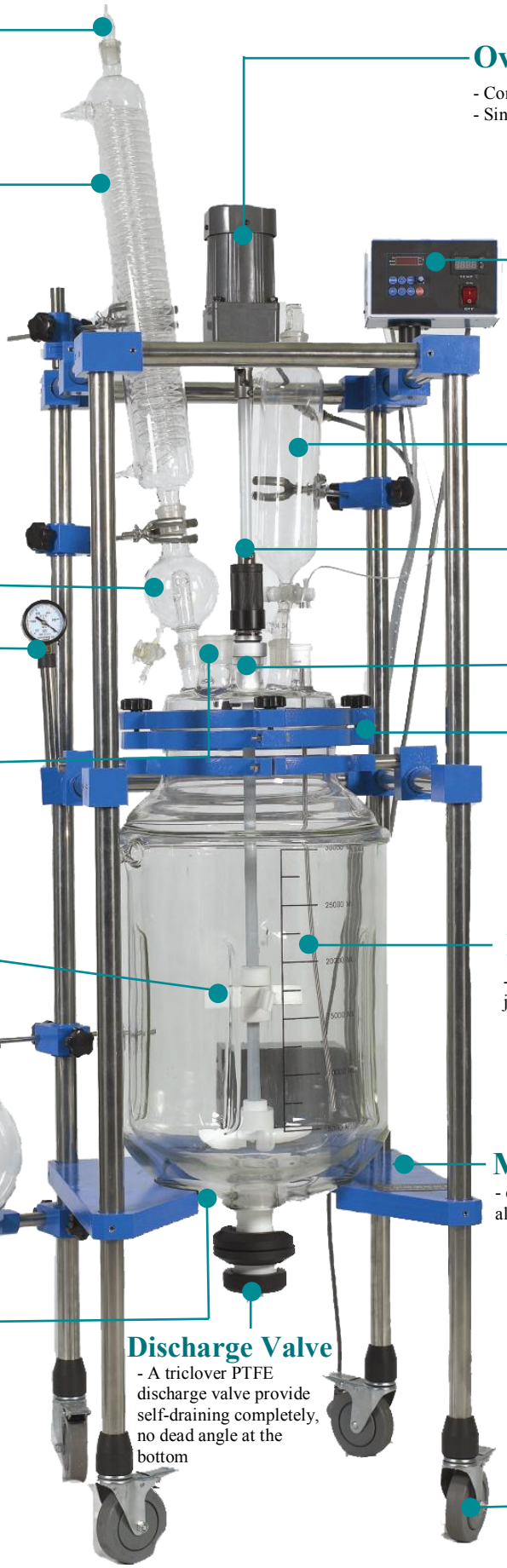
HCS Bio Glass Reactor (50ml—2L)

Standard Options	DL-1L
Propeller Stirrer	Anchor, Pitched blade
	Retreat curve impeller
Coil Condenser	Coil Condenser with vacuum adaptor
Gas release/inlet Valve	Cone with PTFE stopcock

Optional Items	DL-1L
Explosion Proof	Controller with RPM display
Baffle Vessel	2/3/4 bar baffle
Triple Jacketed Reaction Vessel	For vacuum

Parameters Spec	DL-1L
Reactor Material	Borosilicate glass, thickness 5-7mm
Glass Reactor	Double Jacketed 1 liter
Pressure	-1.0 (FV) to 0.5 bar (-14.5 to 7.2 psi)
Temperature	-60°C to +200°C (normal condition) * For >200°C available upon request
Glass Lid Diameter	150mm
Necks	4+1
Motor Power	40W
Rotation Speed	50-800rpm
Torque	30Ncm
Vacuum	-0.096Mpa (-13.92psi)
Power Supply	220V/50Hz
Vessel Size IDxH	113x100(mm)
Vessel Size ODxH	150x130(mm)
Coolant In Vessel	1L
Overall Size LxWxH	320x350x800(mm)
Net Weight	6kg

HCS Standard Glass Reactor—Mobile (3- 30L)



Adaptor for Vacuum

Coil Condenser

Overhead Motor
- Continuously viable agitator speed, 50-600rpm
- Single phase, 220V, 50Hz

Controller
- LED digital display
- On/ Off switch and RPM control

Pressure Equalising Dropping Funnel

Propeller
- Stainless steel PTFE coated

Vapor Duct Reflux Splitter

Vacuum Gauge

#50 flange for stirrer gland

Flange Clamp
- Custom made to secure the glass dome and vessel

#34 socket for charge

Blade
- PTFE anchor impeller

Reaction Vessel (3-30L)
- A borosilicate glass reaction vessel with jacket for heating or cooling

Mobile Support Stand
- custom made stainless steel 304 & aluminum frame

Collection Flask

Hose Connection
- 13mm, connected to the heating or cooling circulator via flexible hoses

Discharge Valve
- A triclover PTFE discharge valve provide self-draining completely, no dead angle at the bottom

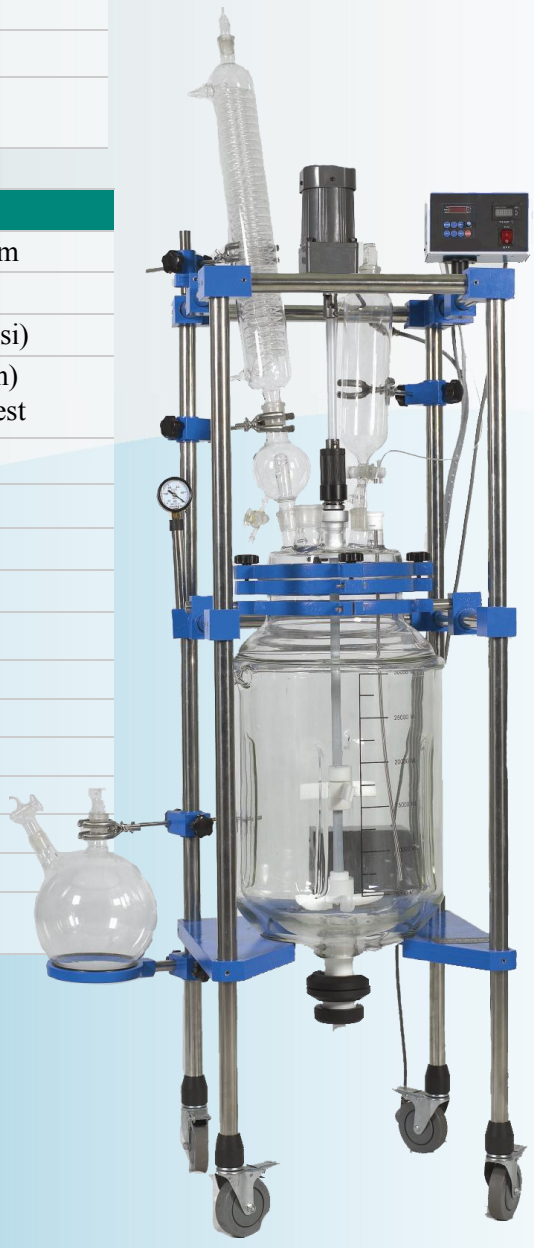
Lockable swivel castors
- 4 heavy duty lockable swivel castors

HCS Standard Glass Reactor—Mobile (3- 30L)

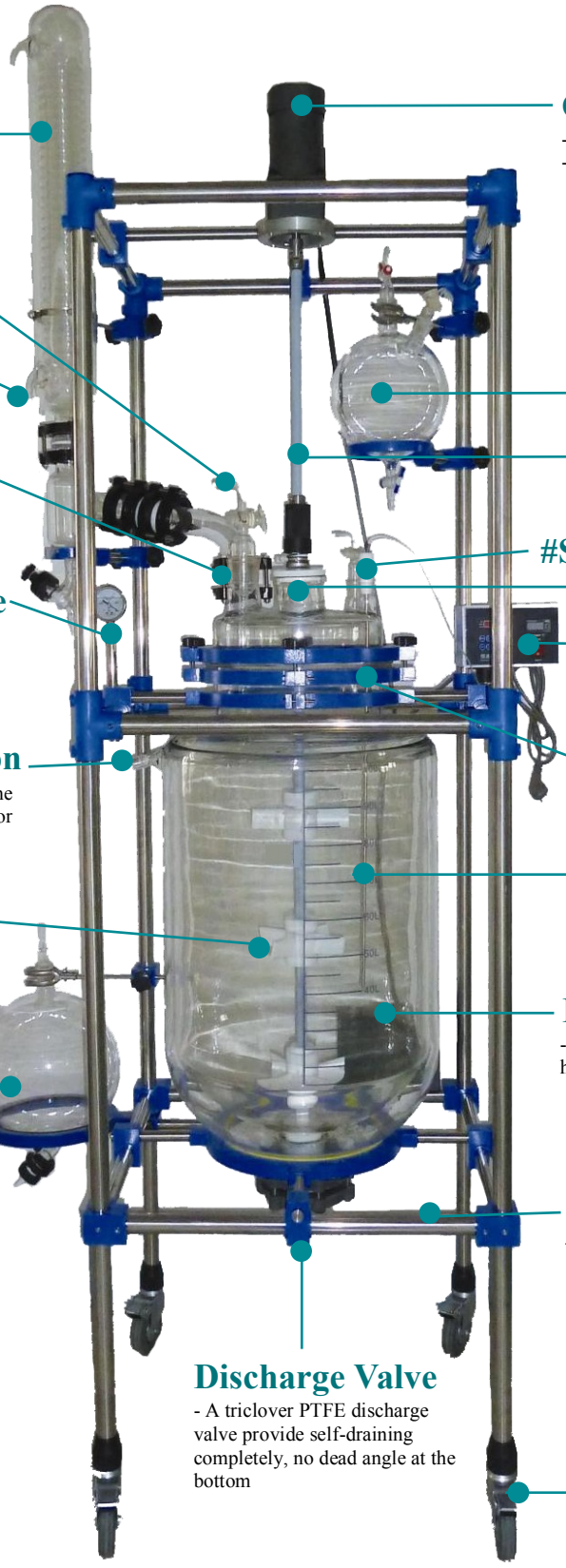
Standard Options	DL-10L
Propeller Stirrer	Anchor, Pitched blade
	Retreat curve impeller, 2-stage propeller
Vacuum Gauge	Analog
Vapor Duct Reflux Splitter	Reflux Flask
Coil Condenser	Double Coil Condenser
Collection Flask	Receiving Round Bottom Flask
Dropping Funnel	Pressure Equalising Dropping Funnel
Gas release/inlet Valve	Cone with PTFE stopcock

Optional Items	DL-10L
Explosion Proof	Controller with RPM display
Baffle Vessel	2/3/4 bar baffles
Triple Jacketed Reaction Vessel	For vacuum

Parameters Spec	DL-10L
Reactor Material	Borosilicate glass, thickness 5-7mm
Glass Reactor	Double Jacketed 10 liter
Pressure	-1.0 (FV) to 0.5 bar (-14.5 to 7.2 psi)
Temperature	-60°C to + 200°C(normal condition) * For >200°C available upon request
Glass Lid Diameter	265mm
Necks	5+1
Motor Power	120W
Rotation Speed	50-800rpm
Torque	162Ncm
Vacuum	-0.096Mpa (-13.92psi)
Power Supply	220V/50Hz
Vessel Size IDxH	230x220(mm)
Vessel Size ODxH	290x240(mm)
Coolant In Vessel	3L
Overall Size LxWxH	500x500x1200(mm)
Net Weight	30kg



HCS Pilot Plant Glass Reactor—Mobile & Station (50– 200L)



Coil Condenser

Overhead Motor
- Continuously viable agitator speed, 50-600rpm
- Single phase, 220V, 50Hz

Gas Purge Adaptor

Hose Connection for Vacuum

Header Tank

#50 flange for coil condenser

Propeller
- Stainless steel PTFE coated

#S14 for thermometer

#50 flange for stirrer gland

Vacuum Gauge

Controller
- LED digital display
- On/ Off switch, RPM control and temperature display

Hose Connection
- 13mm, connected to the heating or cooling circulator

Flange Clamp
- Custom made to secure the glass dome and vessel

Temperature Probe
- PT100, PTFE coated

Blade
- PTFE pitched blade

Collection Flask

Reaction Vessel (50-200L)
- A borosilicate glass reaction vessel with jacket for heating or cooling

Mobile Support Stand
- custom made stainless steel 304 & aluminum frame

Discharge Valve
- A triclover PTFE discharge valve provide self-draining completely, no dead angle at the bottom

Lockable swivel castors
- 4 heavy duty lockable swivel castors

HCS Pilot Plant Glass Reactor—Mobile & Station (50– 200L)

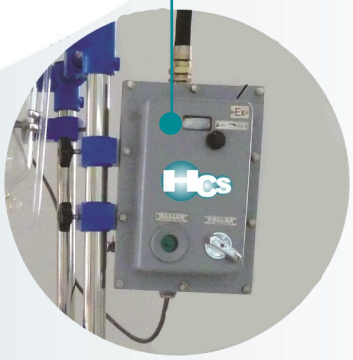
Standard Options	DL-100L
Propeller Stirrer	Anchor, Pitched blade
	Retreat curve impeller, 3-stage impeller
Vacuum Gauge	Analog
Vapor Duct Reflux Splitter	Reflux Splitter
Coil Condenser	Double Coil Condenser
Collection Flask	Receiving Round Bottom Flask
Dropping Funnel	Pressure Equalising Dropping Funnel
Gas release/inlet Valve	Cone with PTFE stopcock

Optional Items	DL-100L
Explosion Proof	Controller with RPM display
Baffle Vessel	2/3/4 bar baffles

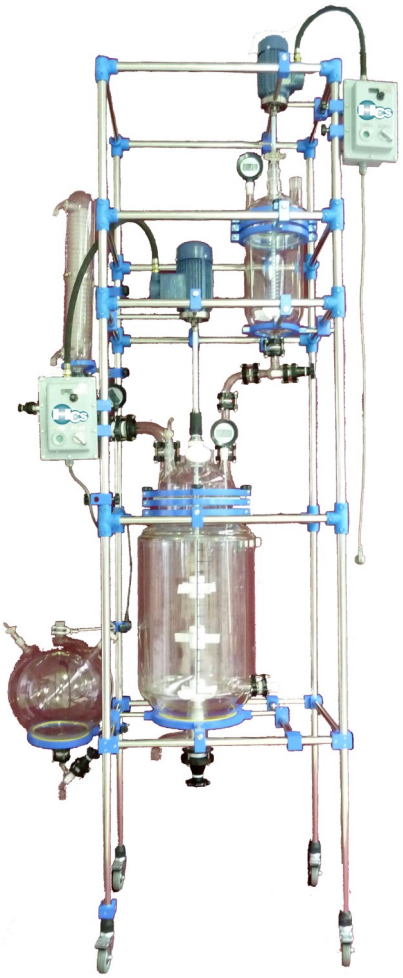
Parameters Spec	DL-100L
Reactor Material	Borosilicate glass, thickness 5-7mm
Glass Reactor	Double Jacketed 100 liter
Pressure	-1.0 (FV) to 0.5 bar (-14.5 to 7.2 psi)
Temperature	-60°C to + 200°C(normal condition) * For >200°C available upon request
Glass Lid Diameter	340mm
Necks	5+4
Motor Power	250W
Rotation Speed	50-600rpm
Torque	400Ncm
Vacuum	-0.096Mpa (-13.92psi)
Power Supply	220V/50Hz
Vessel Size IDxH	460x1050(mm)
Vessel Size ODxH	500x1100(mm)
Coolant In Vessel	25L
Overall Size LxWxH	700x700x2600(mm)
Net Weight	105kg

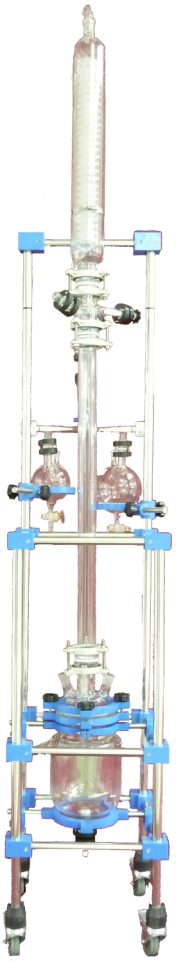
Explosion Proof Controller

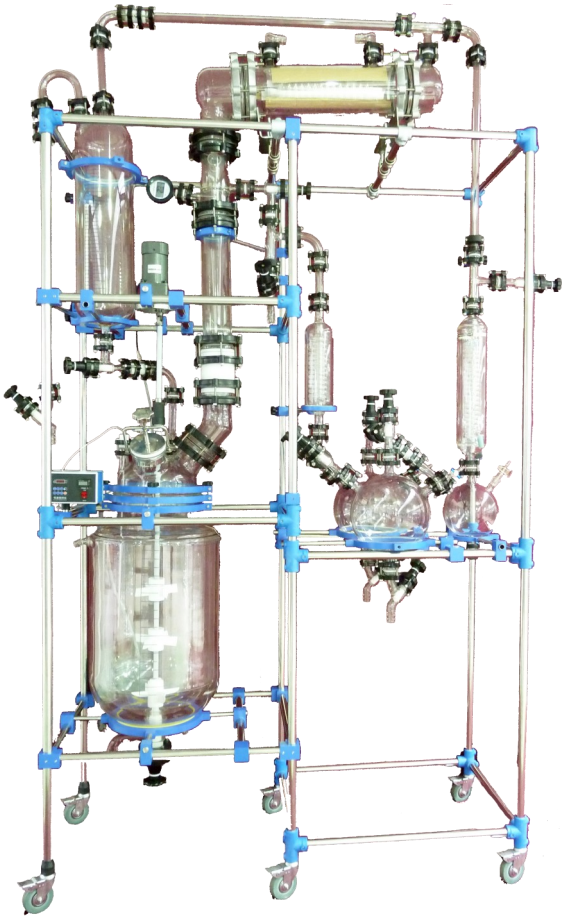
- LED digital display
- On/ Off switch and RPM control

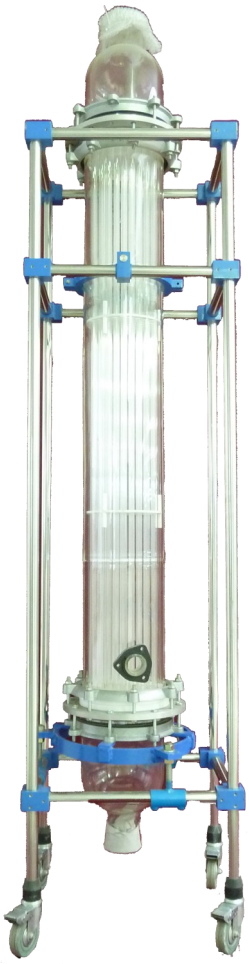


OTHER GLASS REACTOR SYSTEM









Technical Information of Glass Reactor System

Borosilicate Glass is widely used for laboratory glassware. It has excellent thermal properties with its low coefficient of expansion and high softening point. It also offers a high level of resistance from water, acids, salt solutions, organic solvents and halogens.

Our glass reactor is manufactured from borosilicate 3.3 glass tubing. Complemented with other highly corrosion-resistant materials such as PTFE and Viton. HCS Glass Reactor Series has a high durability over a long period of time.

Advantages of Borosilicate 3.3 Glass Tubing

- Wide operation temperature range
- High heat resistance
- Very low thermal expansion (linear over a wide temperature range)
- Hydrophobic characteristic makes cleaning easier
- Against chemical aggressions
- Non-flammable
- High optical translucency

Properties of Borosilicate 3.3 Glass Tubing

Physical Properties

- Coefficient of Expansion (20-300°C) = 3.3 x $10^{-6}K^{-1}$
- Density = 2.23g/cm^3
- Dielectric Constant (1MHz, 20°C) = 4.6
- Specific Heat (20°C) = 750J/kg°C
- Thermal Conductivity (20°C) = 1.14W/m°C
- Poisson's Ratio (25-400°C) = 0.2

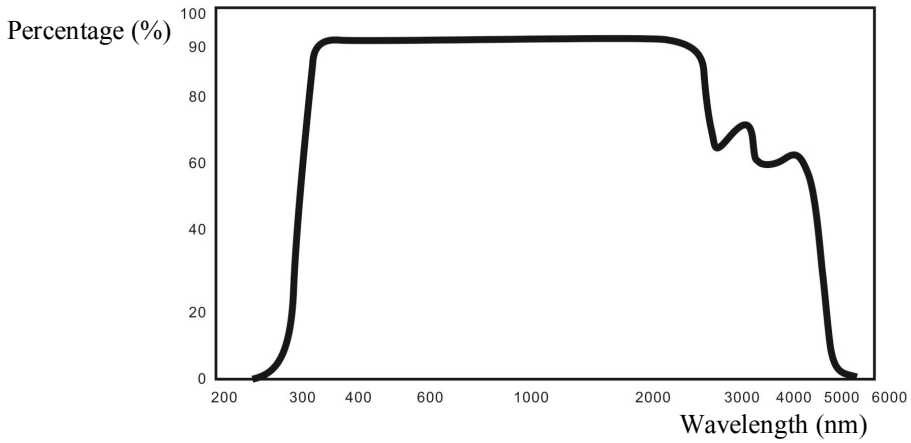
Chemical Composition

Silicon Dioxide	SiO_2 = 80.6%
Boron Trioxide	B_2O_3 = 13.0%
Sodium Oxide	Na_2O = 4.0%
Aluminum Oxide (Alumina)	Al_2O_3 = 2.3%

Thermal Properties

- 150°C – When working above this temperature, care should be taken to heat and cool borosilicate glass in a slow and constant manner.
- 500°C – Maximum working temperature
- 510°C – Thermal stress temperature
- 565°C – Annealing temperature
- 820°C – Softening point
- 1252°C – Melting point

Optical Properties



- Refractive Index (Sodium D Line) = 1.474
- Visible Light Transmission, 2mm Thickness = 92%
- Visible Light Transmission, 5mm Thickness = 91%

Standardization

ISO 3585:1991 - Glass plant, pipeline and fittings: Specification for properties of borosilicate glass 3.3
ISO 3586:1976 - Glass plant, pipeline and fittings: General rules for testing, handling and use
ISO 3587:1976 - Glass plant, pipeline and fittings: Pipeline and fittings of nominal bore 15 to 150 mm
ISO 4704:1978 - Glass plant, pipeline and fittings: Glass plant components/ spare parts
HG/T2435-1993 - Fiberglass pipe and fittings
HG/T2436-1993 - Pressure testing method for glass pipelines and units
HG/T3116 - Glass plant, pipeline and fittings - General rules for testing, handling and use
GB6580 - Glass: Resistance to attack by a boiling aqueous solution of mixed alkali- Method of test and classification
GB6582 - Glass: Hydrolytic resistance of glass grains at 98 centigrade– Method of test and classification
GB12416.2 - The experimentation method and classification for Water-Resistant Particles at 121°C

Material Safety Data Sheet

1. CHEMICAL PRODUCT AND CONTACT INFORMATION

Product Name: Borosilicate Glass

2. COMPOSITION/ INFORMATION ON INGREDIENTS

CAS NO.	%W	CHEMICAL NAMES	OSHA PEL (mg/m3)	ACGIH TLV (mg/m3)
65997-17-3	100	Glass, Oxide, chemicals	15 5 (resp)	10 5 (resp)

3. HAZARDS IDENTIFICATION

Eyes: Dust or powder may irritate eye tissue. Symptoms can include irritation, redness, scratching of the cornea, and tearing. Rubbing may cause abrasion of cornea.
Skin: Dust or powder may irritate the skin.
Inhalation: Dusts of the product may cause irritation of the nose, throat and respiratory tract. When inhaled in very large amounts, damage to the lung can occur.
Ingestion: May cause irritation of the throat, stomach and gastrointestinal tract.
Chronic Overexposure: N/A
Acute Overexposure: N/A
Medical Conditions Aggravated: N/A.
Carcinogenicity: N/A

4. FIRST AID MEASURES

Eyes: Eye injuries from glass particles should be treated by a physician immediately.
Skin: Cuts or abrasions should be treated promptly with thorough cleansing of the affected area.
Inhalation: Move person to non-contaminated air. Seek medical assistance if symptoms persist.
Ingestion: Seek medical help if material is ingested.

5. FIRE FIGHTING MEASURES

Flammability Classification: Will not burn
Flash Point: N/A
Upper Flammable Limit (UFL): N/A
Lower Flammable Limit (LFL): N/A
Auto Ignition Temperature: N/A
Hazardous Combustion Products: Material will begin softening at about 700°C, will proceed to a liquid and will form irritating and toxic gaseous metallic oxides at extremely high temperatures.
Extinguishing Media: Use methods for the surrounding fire.
Fire Fighting Instructions: Wear full protective clothing, including helmet, self contained positive pressure or pressure demand breathing apparatus, protective clothing and face mask.

6. ACCIDENTAL RELEASE MEASURES

Containment and Clean-up Procedures: Avoid creating dust. Wear appropriate protective equipment and clothing during clean-up. Collect spill using a vacuum cleaner with a HEPA filter.

7. HANDLING AND STORAGE

Handling Procedures: Avoid creating dusts. Avoid contact with skin and eyes. Wash thoroughly after handling.
Storage Procedures: Store in a dry area.

8. EXPOSURE CONTROLS/ PERSONAL PROTECTION

Engineering Controls: Use appropriate local exhaust ventilation to keep exposures below the recommended exposure limits.
Ventilation Protection: General room ventilation is normally adequate.
Respiratory Protection: Not normally needed. If permissible levels are exceeded, use NIOSH approved dust respirator.
Skin Protection: Wear leather or other appropriate work gloves, if necessary for type of operation.
Eyes and Face Protection: Safety glasses are recommended.
Other Protective Equipment: None required.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Clear
Softening Point: 821 °C
Freezing Point: N/A
Vapor Pressure: N/A
Vapor Density: N/A
Solubility in water: Insoluble
Specific Gravity: 2.23 g/cm3
pH: N/A
Odor: None
Percent Volatile: N/A
Evaporation Rate: N/A

10. CHEMICAL STABILITY AND REACTIVITY

Chemical Stability: Stable.
Incompatibility: Hydrofluoric Acid.
Hazardous Decomposition: At very high temperature, irritation and toxic gaseous metallic oxides can be formed.
Hazardous Polymerization: Will not occur.

11. DISPOSAL CONSIDERATION

Disposal Instructions: You must test your waste using methods described in 40 CFR Part 261 to determine if it meets these or other applicable definitions or hazardous wastes. Waste must be handled in accordance with all applicable regulations. Glass products may be recycled.

Safety Precautions

1. Before installation, please read the operation manual carefully.
2. Always wear the appropriate personal protective equipment.
3. Check all glassware such as damage, such as scratches, chips or cracks. Even the smallest defects can significantly affect the strength of your glassware.
4. To prevent contamination, clean all glass parts before use.
5. Each standard opening, ball milling opening and sealing surface should be coated with small amount of vacuum grease to secure air tightness.
6. Apply vacuum grease on the rotating parts (glass stopcock or feeding tube)
7. Power supply to the equipment must be consistent.
8. Keep the motor and all electrical components in a cool and dry condition.
9. When operating in high temperature with flammable solvents, increase the temperature gradually to avoid ignitable mixture at its surface.
10. After installation is completed, lock the castor wheels of the bracket to prevent movement of the whole stainless steel rack.
11. If the grinding opening has already been tightened, it is very dangerous to force demount as it will cause the glass to break. If such case arises, please use heating (hot water) to solidify vacuum grease, and proceed to demount.
12. Borosilicate glassware offers superior chemical resistance, the use of hydrofluoric acid, hot phosphoric acid and strong alkalies should be avoided.
13. Whilst borosilicate glass has excellent heat resistance, it should not be subjected to sudden temperature changes or thermal shock. Always heat glassware slowly and evenly.

Maximum Allowable Pressure

The pressure of the glass reactor is dependent on the glass components and the accessories attached to the system. The maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating if lower.

DN	DN15	DN20	DN25	DN40	DN50	DN80	DN100	DN150	DN165 Φ180	DN200	DN215 Φ230	DN300 Φ315	DN400	DN600
MPa	0.2	0.2	0.15	0.15	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.07	0.07

DN: Internal Diameter

Maximum Allowable Temperature

The maximum recommended working temperature for borosilicate glass is 500°C. Care should always be taken when heating above 150°C to ensure that heating and cooling is done in a slow and uniform manner.

Standard Dimension

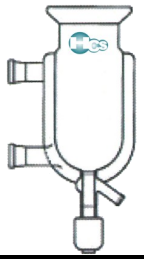
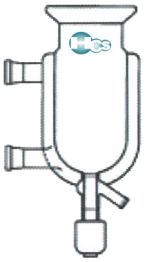
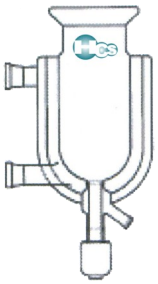
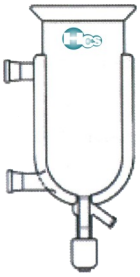
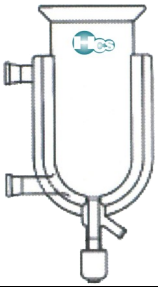
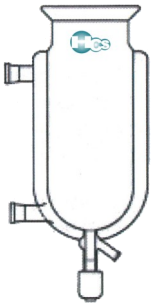
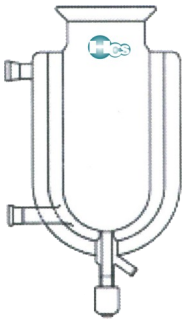
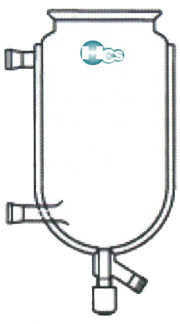
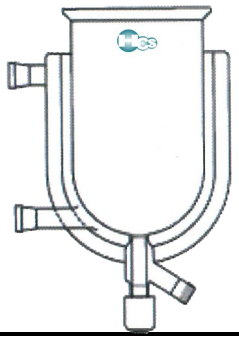
DN15	DN20	DN25	DN40	DN50	DN80	DN100	DN125	DN150	DN165 Φ180	DN215 Φ230	DN285 Φ300	DN300 Φ315	DN400 Φ415	DN600 Φ620
1/2”	3/4”	1”	1.5”	2”	3”	4”	5”	6”	7”	9”	11”	12”	16”	24”

Customization of Glass Reactor System

(I) Reaction Vessels

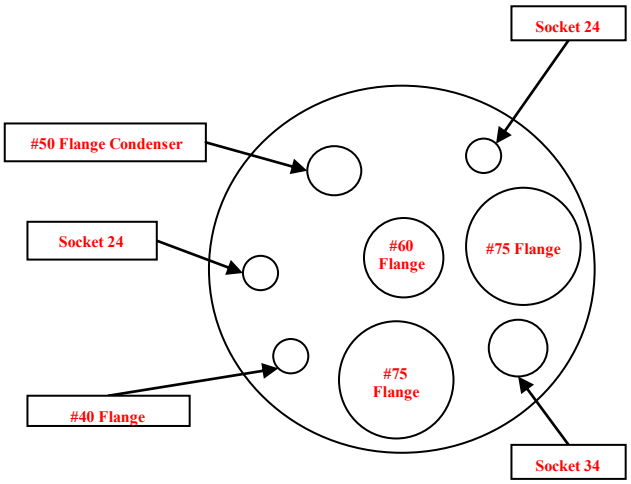
The reaction vessels are available from 50ml up to 200 liter with flat bottom or round bottom. Our reaction vessels are made of borosilicate 3.3 glass with a thickness of 5-7mm.

Images in proportion, but not to scale.

Reaction Vessels		Vacuum Jacketed Reaction Vessels	
2 Liter Item No. RVDL-2L		2 Liter Item No. RVTL-2L	
5 Liter Item No. RVDL-5L		5 Liter Item No. RVTL-5L	
10 Liter Item No. RVDL-10L		10 Liter Item No. RVTL-10L	
30 Liter Item No. RVDL-30L		30 Liter Item No. RVTL-30L	
50 Liter Item No. RVDL-50L		50 Liter Item No. RVTL-50L	

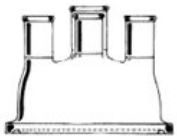
(II) Reaction Vessel Lid

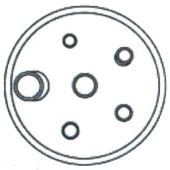
The reaction vessel lid is multi-necks which catered for different application. These necks can be customized to any number and size of standard-taper glass joints, threaded glass connectors and flange. Neck configurations are based on your specifications.



How to select the actual vessel lid

1. Select the flange size
2. Select the number and size of necks
3. Select the position and angle of the necks

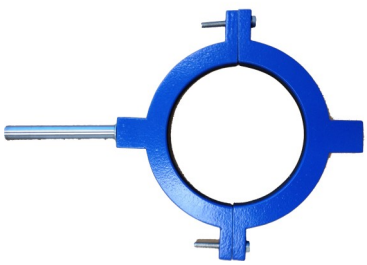




Interchangeable Ground-Glass Joints

British Designation (BD)	Flange (DN) Internal Diameter
14/23	#20 #25
19/26	#30 #35
24/29	#40 #45
29/32	#50 #55
34/35	#60 #65
40/38	#70 #75
45/40	#80 #85
50/42	#90 #95
55/44	#100

Clamp and Holder



Secure the reaction vessel with a fixture using an attached rod onto the retort stand:

- Fast, easy assembly and disassembly
- Very sturdy
- Secure fixture holder on the reaction vessel

(III) Motor

Parameters	Specifications
Motor Power	40W-250W
Rotation Speed	50-800rpm
Torque	30-400 Ncm
Power Supply	220V/50Hz

(IV) Stirrer Shafts Agitators

There are various types of stirrers shafts and impellers such as propeller-stirrer, centrifugal-stirrer and anchor-stirrer. They come with two type of materials such as Stainless Steel and Stainless Steel coated with PTFE. The choice of blades will determine the flow produced, either radial or axial. Selection of stirring shafts is based on the stirrer power, the volume of substances to be stirred and its viscosity. Both propeller stirrer and centrifugal stirrer generate axial flow while anchor stirrer produces tangential flow.

- PTFE— chemical and abrasion resistance, low friction , operating within –100°C to 250°C
- Stainless Steel 304

Types of stirrer

PTFE Centrifugal Stirrer

PTFE Propeller Stirrer

Anchor Stirrer

3-stage propeller

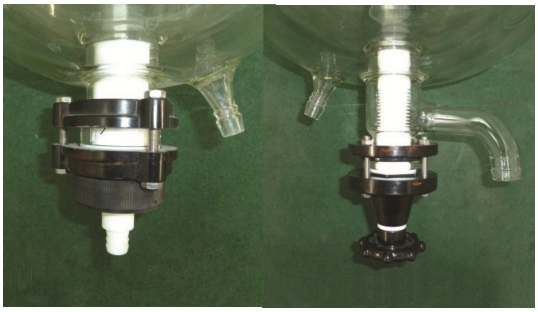
(V) Controller

- Digital Display
- Temperature Display
- RPM Control and Display
- Explosion Proof
- Power Supply 220V/50Hz

(VI) Reactor Support Systems

With the variety of clamping components listed below, you can either design and build your own structure or use the existing stand we provided. We have bench-top reactor stand and mobile stand. Our high quality reaction vessel stands are constructed from 304 stainless steel throughout, and are ideal for holding large reaction vessels up to 200 liter capacity.

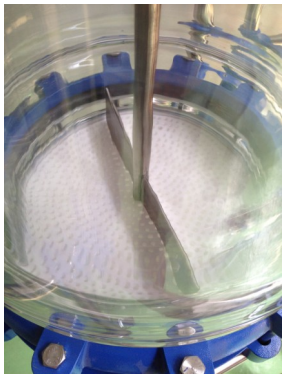
(VII) Discharge Valves



Straight-through Triclover

A PTFE bottom discharge valve provide self-draining completely. There is no dead angle at the bottom which allows fast discharge of the fluid.

(VIII) Nutsch Filters

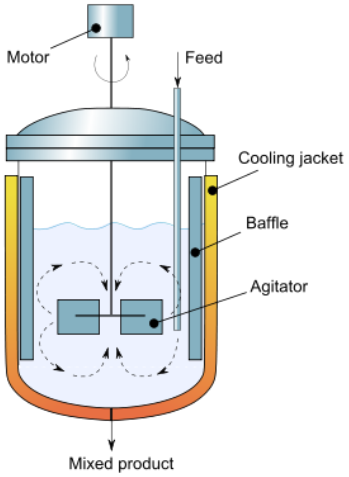


Typical applications

- Filtration
- Drying
- Crystallization
- Ion exchange
- Solid phase synthesis
- Chromatography

(IX) Baffles

Application of Baffles



- Improve efficiency in uniform mixing
- Reduce operation time
- Increase fluid velocity and speeds up the process of mixing

In a chemical reactor, baffles are often attached to the interior walls to promote mixing. This helps to increase heat transfer and chemical reaction rates.

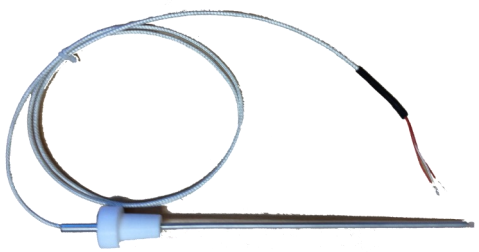
Types of Baffles

Implementation of baffles is decided on the basis of size, cost and their ability to lend support to the vessel and direct flow. Often this is linked to available pressure drop and the size and number of passes within the exchanger. Special allowances/changes also made for finned vessels.

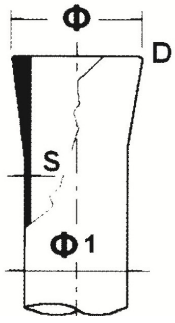
- Rod/bar baffles (giving a uniform shell-side flow)

(X) Other Accessories and Tools

- Temperature probe - PTFE coated
- pH electrode probe
- Vacuum gauge
- Cross Screwdriver
- 4mm Allen key
- Wrench #10 & #14



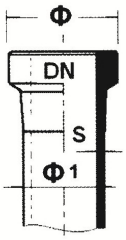
Connection Tubes



Tapered Expansion Joint

Expansion Tube

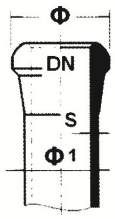
Item No.	DN	ϕ mm	ϕ1 mm	S mm
127.R0301.015	15	26.5	18	2.5
127.R0301.020	20	35	25	3.0
127.R0301.025	25	43	32	3.3
127.R0301.040	40	56	45	3.5
127.R0301.050	50	71	58	4.0
127.R0301.080	80	99	85	4.7
127.R0301.100	100	131	113	5.6
127.R0301.125	125	150	135	6.0
127.R0301.150	150	182	165	6.5
127.R0301.180	ϕ180	196	180	7.0
127.R0301.230	ϕ230	250	230	7.5



Flat Flanged Joint

Flat Flanged Joint

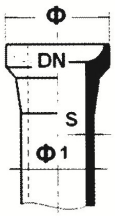
Item No.	DN	ϕ mm	ϕ1 mm	S mm
127.R0304.015	15	30	22	2.5
127.R0304.025	25	44	32	3.3
127.R0304.040	40	62	45	3.5
127.R0304.050	50	76	58	4.0
127.R0304.080	80	100	85	4.7
127.R0304.100	100	130	113	5.6
127.R0304.125	125	150	135	6.0
127.R0304.150	150	185	165	6.5
127.R0304.180	ϕ180	200	180	7.0
127.R0304.200	200	233	215	7.0
127.R0304.230	ϕ230	250	230	7.0
127.R0304.285	285	320	300	8.0
127.R0304.300	300	338	315	9.0
127.R0304.400	400	465	415	9.5
127.R0304.600	600	684	620	10.0



Ball Ground Joint

Ball Ground Joint

Item No.	DN	ϕ mm	ϕ1 mm	S mm
127.R0302.015	15	30	22	2.5
127.R0302.025	25	44	32	3.3
127.R0302.040	40	62	45	3.5
127.R0302.050	50	76	58	4.0
127.R0302.080	80	110	85	4.7

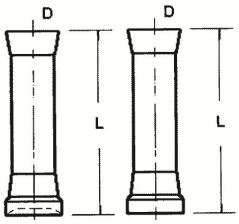


Cup
Ground Joint

Cup Ground Joint

Item No.	DN	ϕ mm	ϕ1 mm	S mm
127.R0303.015	15	30	22	2.5
127.R0303.025	25	44	32	3.3
127.R0303.040	40	62	45	3.5
127.R0303.050	50	76	58	4.0
127.R0303.080	80	110	85	4.7

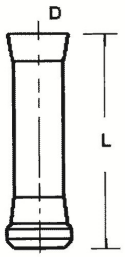
Extension Tubes



Cup Expansion Ground Joint Extension Tube

Item No.	DN	D	L mm
127.R0305.025	25	1”	100
127.R0305.040	40	1.5”	100
127.R0305.050	50	2”	100
127.R0305.080	80	3”	150
127.R0305.100	100*	4”	150

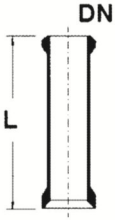
* DN100— right angle edge



Ball Expansion Ground Joint Extension Tube

Item No.	DN	D	L mm
127.R0306.025	25	1”	100
127.R0306.040	40	1.5”	100
127.R0306.050	50	2”	100
127.R0306.080	80	3”	150
127.R0306.100	100*	4”	150

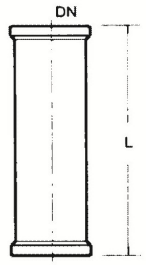
* DN100— right angle edge



Ball-cup Ground Joint Extension Tube

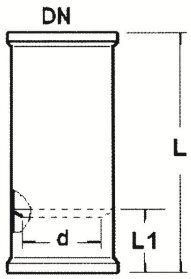
Item No.	DN	L mm
127.R0307.015	15	100 150 200 250 300 350 400 500 600 750 1000 1500 2000 2500
127.R0307.020	20	100 150 200 250 300 350 400 500 600 750 1000 1500 2000 2500
127.R0307.025	25	100 150 200 250 300 350 400 500 600 750 1000 1500 2000 2500
127.R0307.040	40	100 150 200 250 300 350 400 500 600 750 1000 1500 2000 2500
127.R0307.050	50	100 150 200 250 300 350 400 500 600 750 1000 1500 2000 2500
127.R0307.080	80	100 150 200 250 300 350 400 500 600 750 1000 1500 2000 2500

Flat Flange Extension Tube—Type A



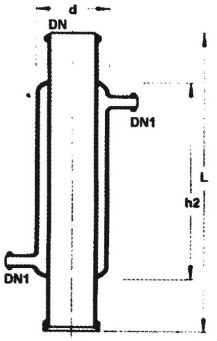
Item No.	DN	L mm
127.R0308.025	25	100 150 200 250 300 350 400 500 600 750 1000 1500 2000 2500
127.R0308.040	40	100 150 200 250 300 350 400 500 600 750 1000 1500 2000 2500
127.R0308.050	50	100 150 200 250 300 350 400 500 600 750 1000 1500 2000 2500
127.R0308.080	80	100 150 200 250 300 350 400 500 600 750 1000 1500 2000 2500
127.R0308.100	100	100 150 200 250 300 350 400 500 600 750 1000 1500 2000 2500
127.R0308.125	125	150 200 250 300 350 400 500 600 750 1000 1500 2000
127.R0308.150	150	200 250 300 350 400 500 600 750 1000 1500 2000
127.R0308.180	ϕ180	250 300 350 400 500 600 750 1000 1500 2000
127.R0308.230	ϕ230	300 350 400 500 600 750 1000 1500 2000
127.R0308.300	300	300 350 400 500 600 750 1000 1500 2000
127.R0308.400	400	400-1000
127.R0308.600	600	400-1000

Flat Flange Extension Tube—Type B



Item No.	DN	L mm	D mm	L1 mm
127.R0309.080	80	1000	45	100
127.R0309.100	100	1000	65	125
127.R0309.150	150	1000	120	150
127.R0309.180	ϕ180	1000	135	150
127.R0309.230	ϕ230	1000	165	150
127.R0309.300	300	1000	240	175

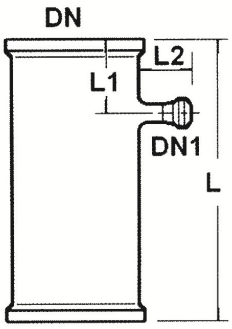
Flange Jacketed Extension Tube



Item No.	DN	DN1	L mm	d mm	h2 mm
127.R0315.025	25	25	500 1000	60	380 880
127.R0315.040	40	25	500 1000	70	380 880
127.R0315.050	50	25	500 1000	90	380 880
127.R0315.080	80	25	500 1000	113	360 860
127.R0315.100	100*	25	500 1000	135	360 860
127.R0315.150	150*	25	500 1000	180	340 840
127.R0315.180	ϕ180*	25	500 1000	230	300 800
127.R0315.230	ϕ230*	25	500 1000	270	300 800
127.R0315.300	300*	25	500 1000	370	300 800

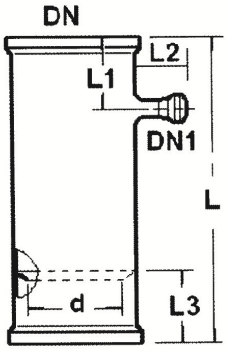
* DN100-300 — right angle edge

Flange Extension Column with ball side arm - Type A



Item No.	DN	DN1	L mm	L2 mm	L1 mm
127.R0310.001	ϕ180	25	400	65	100
127.R0310.002	ϕ180	40	400	80	100
127.R0310.003	ϕ180	50	400	85	100
127.R0310.004	ϕ180	25	600	65	100
127.R0310.005	ϕ180	40	600	80	100
127.R0310.006	ϕ180	50	600	85	100
127.R0310.007	ϕ180	25	1000	65	100
127.R0310.008	ϕ180	40	1000	80	100
127.R0310.009	ϕ180	50	1000	85	100
127.R0310.010	ϕ180	25	400	65	100
127.R0310.011	ϕ180	40	400	80	100
127.R0310.012	ϕ180	50	400	85	100
127.R0311.001	ϕ230	25	600	65	125
127.R0311.002	ϕ230	40	600	80	125
127.R0311.003	ϕ230	50	600	85	125
127.R0311.004	ϕ230	25	1000	65	125
127.R0311.005	ϕ230	40	1000	80	125
127.R0311.006	ϕ230	50	1000	85	125
127.R0311.007	ϕ230	25	400	65	125
127.R0311.008	ϕ230	40	400	80	125
127.R0311.009	ϕ230	50	400	85	125
127.R0311.010	ϕ230	80	400	100	125
127.R0312.001	300	25	600	65	125
127.R0312.002	300	40	600	80	125
127.R0312.003	300	50	600	85	125
127.R0312.004	300	80	600	100	125
127.R0312.005	300	25	1000	65	125
127.R0312.006	300	40	1000	80	125
127.R0312.007	300	50	1000	85	125
127.R0312.008	300	80	1000	100	125
127.R0313.001	400	50	1000	85	175
127.R0313.002	400	50	2000	85	175
127.R0313.003	600	50	1000	85	200
127.R0313.004	600	50	1500	85	200

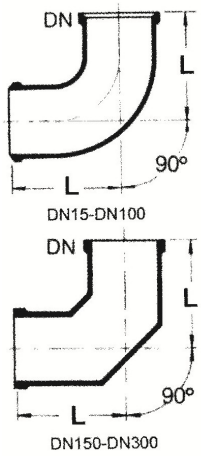
Flange Extension Column with ball side arm - Type B



Item No.	DN mm	DN1	L mm	D mm	L1 mm	L2 mm	L3 mm
127.R0314.100	100	50	1000	65	75	85	125
127.R0314.150	150	50	1000	120	75	85	150
127.R0314.180	ϕ180	50	1000	135	100	85	150
127.R0314.230	ϕ230	50	1000	165	125	85	150
127.R0314.300	300	50	1000	240	125	85	150

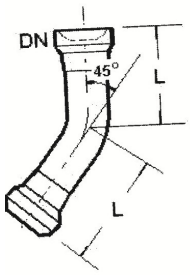
Elbow

90° Flange Elbow



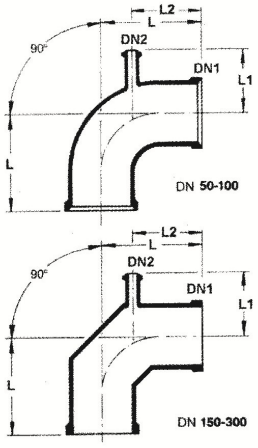
Item No.	DN	L mm
127.R0320.015	15	50
127.R0320.025	25	100
127.R0320.040	40	125
127.R0320.050	50	150
127.R0320.080	80	200
127.R0320.100	100	250
127.R0320.125	125	250
127.R0320.150	150	250
127.R0320.180	ϕ180	250
127.R0320.230	ϕ230	300
127.R0320.300	300	400

135°-160° Ball-Cup Ground Joint Elbow



Item No.	DN	L mm
127.R0321.015	15	50
127.R0321.025	25	75
127.R0321.040	40	100
127.R0321.050	50	100
127.R0321.080	80	125
127.R0321.100	100	175
127.R0321.125	125	200
127.R0321.150	150	200
127.R0321.180	ϕ180	200
127.R0321.230	ϕ230	200
127.R0321.300	300	200

90° Flange Elbow Thermometer Inlet

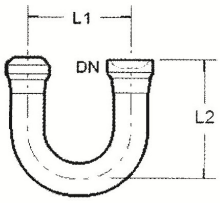


Item No.	DN1	DN2	L mm	L1 mm	L2 mm
127.R0322.050	50	25	150	100	75
127.R0322.080	80	25	200	110	100
127.R0322.100	100*	25	250	125	100
127.R0322.150	150*	25	250	150	150
127.R0322.180	ϕ180*	25	250	150	150
127.R0322.200	200*	25	300	175	150
127.R0322.230	ϕ230*	25	300	175	175
127.R0322.300	300*	25	400	225	225

* DN100-300 — right angle edge

Ball-Cup Ground Joint

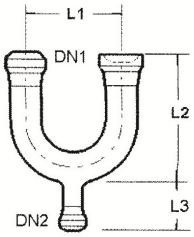
Ball-Cup Ground Joint — U-Tube



Item No.	DN	L1 mm	L2 mm
127.R0323.015	15	100	100
127.R0323.025	25	150	150
127.R0323.040	40	175	150
127.R0323.050	50	200	190
127.R0323.080	80	250	250
127.R0323.100	100*	300	325

* DN100— right angle edge

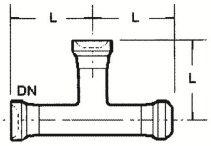
Ball-Cup Ground Joint — Y-Tube



Item No.	DN1	DN2	L1 mm	L2 mm	L3 mm
127.R0324.015	15	15	100	100	50
127.R0324.025	25	15-25	150	150	60
127.R0324.040	40	15-40	175	150	65
127.R0324.050	50	15-50	200	190	70
127.R0324.080	80	15-80	250	250	80
127.R0324.100	100*	15-100	300	325	90

* DN100— right angle edge

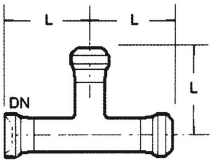
Ball-Cup Ground Joint — T Tube (Type A)



Item No.	DN	L mm
127.R0325.015	15	75
127.R0325.025	25	100
127.R0325.040	40	125
127.R0325.050	50	150
127.R0325.080	80	200
127.R0325.100	100*	250
127.R0325.150	150*	250

* DN100-150 — right angle edge

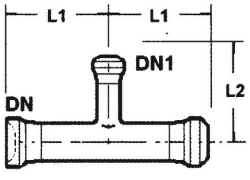
Ball-Cup Ground Joint — T Tube (Type B)



Item No.	DN	L mm
127.R0326.015	15	75
127.R0326.025	25	100
127.R0326.040	40	125
127.R0326.050	50	150
127.R0326.080	80	200
127.R0326.100	100*	250
127.R0326.150	150*	250

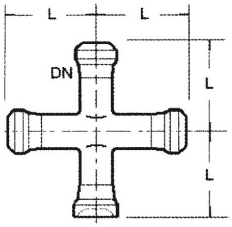
* DN100-150 — right angle edge

Ball-cup Ground Joint — T Tube (Type C)



Item No.	DN1	DN2	L1 mm	L2 mm
127.R0327.025	25	15	100	75
127.R0327.040	40	15-25	125	100
127.R0327.050	50	15-40	150	100
127.R0327.080	80	15-50	200	150
127.R0327.100	100*	15-80	250	150

* DN100— right angle edge

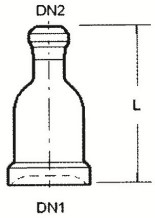


Ball-cup Ground Joint — Cross Tube

Item No.	DN	L mm
127.R0328.015	15	75
127.R0328.025	25	100
127.R0328.040	40	125
127.R0328.050	50	150
127.R0328.080	80	200
127.R0328.100	100*	250
127.R0328.150	150*	250

* DN100-150 — right angle edge

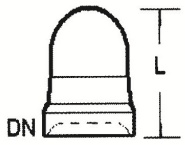
Adaptors



Cup Reducing Adaptor

Item No.	DN	L1 mm	L2 mm
127.R0330.025	25	15	100
127.R0330.040	40	15-25	100
127.R0330.050	50	15-40	120
127.R0330.080	80	15-50	150
127.R0330.100	100*	15-80	200

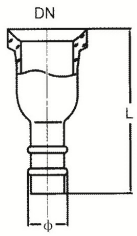
* DN100— right angle edge



Cup Closures

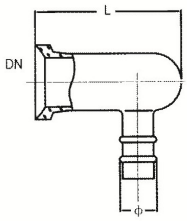
Item No.	DN	L mm
127.R0331.015	15	70
127.R0331.025	25	80
127.R0331.040	40	85
127.R0331.050	50	85
127.R0331.080	80	100
127.R0331.100	100*	130

* DN100 — right angle edge



Cup - Hose Connection

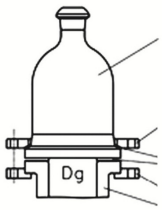
Item No.	DN	ϕ mm	L mm
127.R0332.015	15	~22	100
127.R0332.025	25	~32	125
127.R0332.040	40	~41	150
127.R0332.050	50	~54	150



90° Cup - Hose Connection

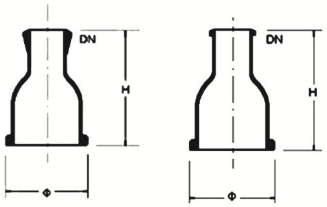
Item No.	DN	ϕ mm	L mm
127.R0333.015	15	~22	90
127.R0333.025	25	~32	100
127.R0333.040	40	~41	120
127.R0333.050	50	~54	150

Adaptors



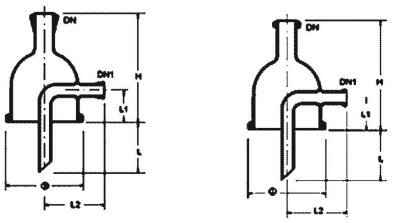
Flat Flange Adaptor

Item No.	ϕ mm	H mm	DN	Dg
127.R0334.110	110	175	25-80	70
127.R0334.120	120	175	25-80	80
127.R0334.140	140	200	40-100	100
127.R0334.170	170	225	40-100	125



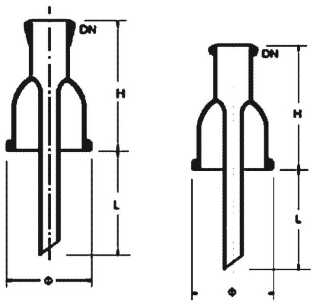
Distill & Reflux Flange Adaptor

Item No.	ϕ mm	H mm	L mm	L1 mm	L2 mm	DN	DN1	Dg
127.R0335.110	110	200	150	100	125	40-80	15-25	70
127.R0335.120	120	200	125	100	125	40-80	15-25	80
127.R0335.140	140	200	150	100	125	40-100	25-40	100
127.R0335.170	170	250	150	120	150	50-100	25-40	125
127.R0335.185	185	250	125	120	150	80-100	25-40	150
127.R0335.250	250	375	150	150	200	100-ϕ180	25-50	200



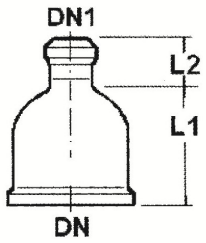
Reflux Flange Adaptor

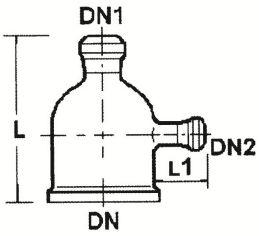
Item No.	ϕ mm	H mm	L mm	DN	Dg
127.R0336.110	110	175	100	15-50	70
127.R0336.120	120	175	125	25-50	80
127.R0336.140	140	200	125	25-50	100
127.R0336.170	170	225	125	25-80	125
127.R0336.185	185	250	125	25-80	150
127.R0336.250	250	325	125	25-80	200



Flange Reducing Adaptor

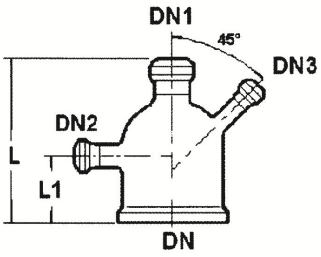
Item No.	DN	DN1	L mm
127.R0337.001	ϕ180	25	255
127.R0337.002	ϕ180	40	260
127.R0337.003	ϕ180	50	275
127.R0337.004	ϕ180	80	290
127.R0337.005	ϕ180	100	310
127.R0337.011	ϕ230	25	340
127.R0337.012	ϕ230	40	345
127.R0337.013	ϕ230	50	360
127.R0337.014	ϕ230	80	375
127.R0337.015	ϕ230	100	390
127.R0337.101	300	25	350
127.R0337.102	300	40	360
127.R0337.103	300	50	360
127.R0337.104	300	80	380
127.R0337.105	300	100	400





Flange Reducing Adaptor with ball side arm

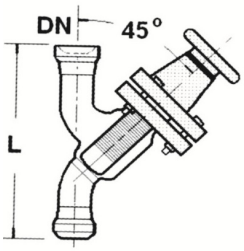
Item No.	DN	DN1	L mm	L1 mm
127.R0338.180	ϕ180	25-100	280	110
127.R0338.230	ϕ230	25-100	360	155
127.R0338.300	300	25-100	400	175



Flange Reducing Adaptor with 2 ball side arm

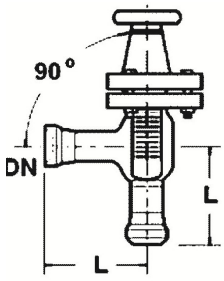
Item No.	DN	DN1	L1 mm	L mm
127.R0339.180	ϕ180	50-100	110	280
127.R0339.230	ϕ230	40-100	155	360
127.R0339.300	300	40-100	175	400

Valves



Straight Through Valve - Ball

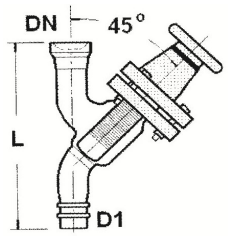
Item No.	DN	L mm
127.R0340.015	15	150
127.R0340.025	25	175
127.R0340.040	40	250
127.R0340.050	50	300
127.R0340.080	80	400
127.R0340.100	100	500



Right-Angle Valve - Ball

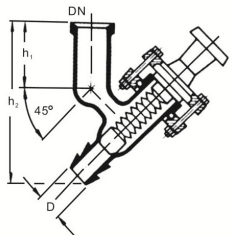
Item No.	DN	L mm
127.R0341.015	15	75
127.R0341.025	25	100
127.R0341.040	40	125
127.R0341.050	50	150
127.R0341.080	80	200
127.R0341.100	100	250

Straight Through Valve - Hose Connection



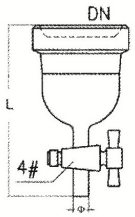
Item No.	DN	L mm	D1 mm
127.R0342.015	15	150	~22
127.R0342.025	25	175	~30
127.R0342.040	40	250	~36
127.R0342.050	50	300	~49

45° Drain Valve - Hose Connection



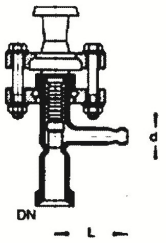
Item No.	DN	H1 mm	H2 mm	D mm
127.R0343.015	15	45	141	~22
127.R0343.025	25	45	141	~30
127.R0343.040	40	50	145	~30
127.R0343.050	50	50	148	~30

Vent Valve - Hose Connection



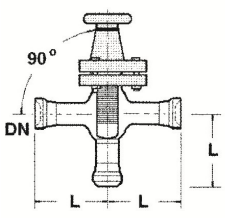
Item No.	DN	L mm	Φ mm
127.R0344.015	15	100	~15
127.R0344.025	25	100	~15
127.R0344.040	40	125	~15
127.R0344.050	50	125	~15

Vent Valve with Hose Connection

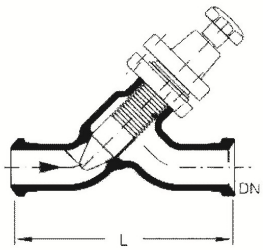


Item No.	DN	L mm	D mm
127.R0345.025	25	60	15

Vent Valve - T

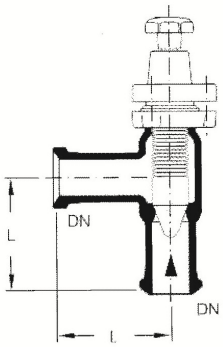


Item No.	DN	L mm
127.R0346.015	15	75
127.R0346.025	25	100
127.R0346.040	40	125
127.R0346.050	50	150
127.R0346.080	80	200



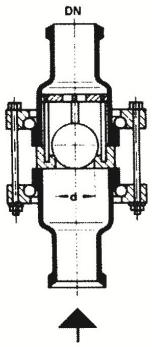
Straight Through Valve - Cup

Item No.	DN	L mm
127.R0347.015	15	150
127.R0347.025	25	175
127.R0347.040	40	250
127.R0347.050	50	300
127.R0347.080	80	400



Right Angle Valve - cup

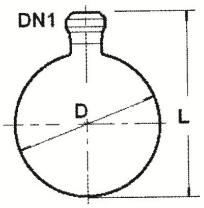
Item No.	DN	L mm
127.R0348.015	15	75
127.R0348.025	25	100
127.R0348.040	40	125
127.R0348.050	50	150
127.R0348.080	80	200



Non- Return Valve - cup

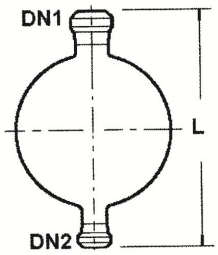
Item No.	DN	D mm	L mm
127.R0349.025	25	23	300
127.R0349.040	40	48	350
127.R0349.050	50	48	360
127.R0349.080	80	48	360
127.R0349.100	100	48	380

Vessels



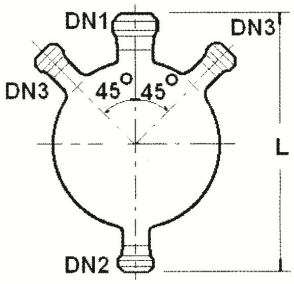
Spherical Vessel Ball Joint

Item No.	Liter	DN1	L mm	D mm
127.R0360.005	5	50	50	220
127.R0360.010	10	50	365	280
127.R0360.020	20	80	455	355
127.R0360.030	30	150	580	428
127.R0360.050	50	200	640	490
127.R0360.100	100	200	735	610
127.R0360.200	200	300	890	750



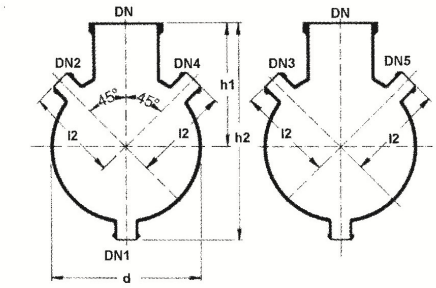
Double Neck Spherical Vessel Ball Joint

Item No.	Liter	DN1	DN2	L mm
127.R0362.010	10	50	40	450
127.R0362.020	20	80	50	540
127.R0362.030	30	150	25	645
127.R0362.050	50	200	25	705
127.R0362.100	100	200	25	800
127.R0362.200	200	300	25	960



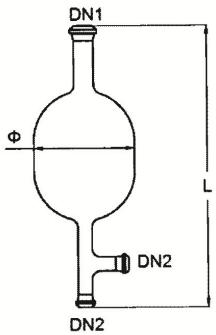
Four Neck Spherical Vessel Ball Joint

Item No.	Liter	DN1	DN2	DN3	L mm
127.R0364.010	10	50	40	40	445
127.R0364.020	20	80	50	50	540
127.R0364.030	30	100	25	50	645
127.R0364.050	50	200	25	50	705
127.R0364.100	100	200	25	50	800
127.R0364.200	200	300	25	50	960



Six Neck Spherical Vessels

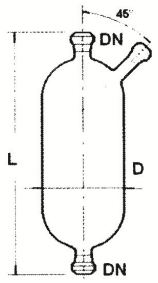
Item No.	Liter	DN	DN1	DN2	L2 mm	DN3	DN4	DN5	D mm	H1 mm	H2 mm
127.R0366.050	50	200	25	100	320	100	25	50	490	400	700
127.R0366.100	100	200	25	100	391	100	25	50	610	450	825
127.R0366.200	200	300	25	150	508	150	25	50	750	550	1000



Bromide Measuring Flask

Item No.	KG	Φ mm	DN1	DN2	L mm
127.R0370.030	30	230	40	25	680

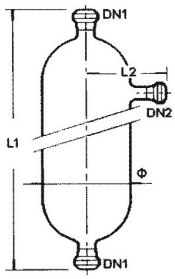
Cylindrical Vessels



Type A

Item No.	Liter	D mm	DN	L mm
127.R0371.030	30	230	40	1300
127.R0371.060	60	300	40	1300
127.R0371.100	100	300	50	1850

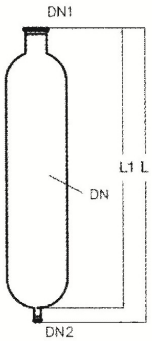
*Graduated vessel is available.

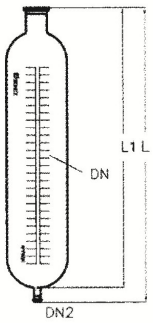


Type B

Item No.	Liter	Φ mm	DN1	DN2 mm	L1 mm	L2
127.R0372.045	45	230	50	25	~1700	180

*Graduated vessel is available.



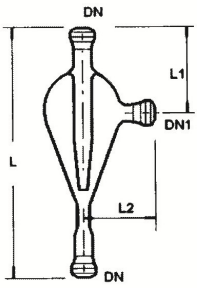


Type C

Item No.	Liter	DN	DN1	DN2	L1 mm	L mm
127.R0373.020	20	300	100	25	590	650
127.R0373.030	30	Φ230	100	25	1335	1400
127.R0373.031	30	300	100	25	735	800
127.R0373.050	50	300	100	25	935	1000
127.R0373.060	60	300	100	25	1335	1400

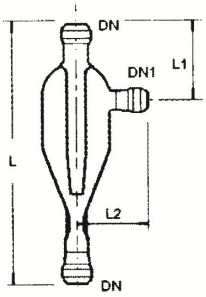
*Graduated vessel is available.

Columns



Jet Tower Type A

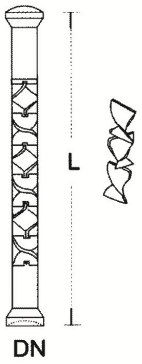
Item No.	DN	DN1	L	L1	L2
127.R0374.015	15	15	280	100	90
127.R0374.025	25	15	350	130	115
127.R0374.040	40	15	390	150	115
127.R0374.050	50	25	450	190	140



Jet Tower Type B

Item No.	DN	DN1	L	L1	L2
127.R0375.025	25	15	385	100	90
127.R0375.040	40	25	495	130	115
127.R0375.050	50	25	675	150	115
127.R0375.080	80	40	835	190	140

Self Mixed Column



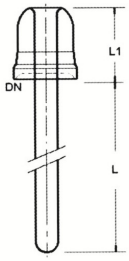
Borosilicate glass columns for distillation to obtain benefits of anti-corrosive and visibility.

Glass distillation columns can be filled with packing materials made of borosilicate glass, but other packing materials can also be supplied. Cooling arrangements for the distillate can use either shell and tube or coil type heat exchangers.

Options
- Durapack: a structured glass packing with outstanding separation properties, ideal for processes that does not require metal.
- Liquid collectors
- Redistributors
- Reboiler vessels
- Boilers
- Coolers
- Reflux separators
- Packing

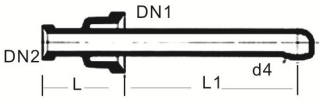
Item No.	DN	L mm
127.R0376.050	50	1000

Thermometer Adaptor



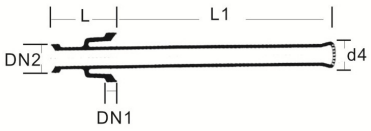
Item No.	DN	L1 mm
127.R0377.025	25	80
127.R0377.040	40	80
127.R0377.050	50	90
127.R0377.080	80	100
127.R0377.100	100*	125

Dip Pipes Type D



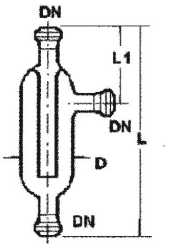
Item No.	DN1	DN2	L mm	d4 mm
127.R0378.050	50	25	100	2
127.R0378.080	80	50	150	3.5

Dip Pipes Type E



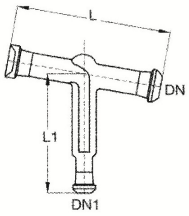
Item No.	DN1	DN2	L mm	L1 mm	d4 mm
127.R0379.050	50	25	100	350	2.5

Reflux Adaptors



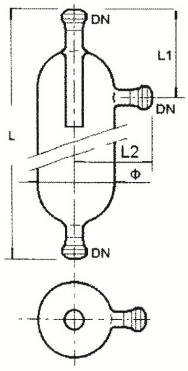
Liquid Non-Return Adaptor - Type A

Item No.	D mm	DN	L mm	L1 mm
127.R0380.025	85	25	380	230



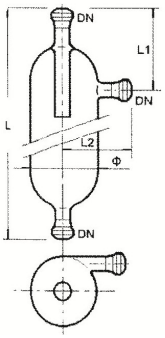
Liquid Non-Return Adaptor - Type B

Item No.	DN	DN1	L mm	L1 mm
127.R0381.025	25	15	200	150



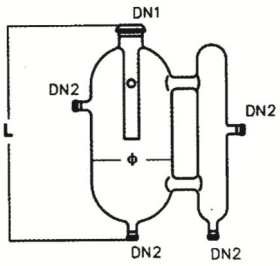
Reflux Adaptor - Type A

Item No.	Φ mm	DN	L mm	L1 mm	L2 mm
127.R0382.001	180	50	750	250	210
127.R0382.002	180	50	1050	250	210
127.R0382.011	230	50	1050	300	240
127.R0382.101	300	80	1050	300	285



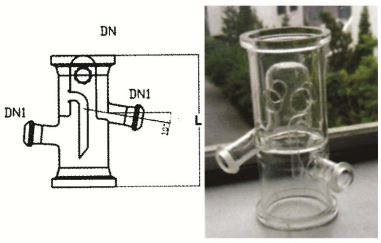
Reflux Adaptor - Type B

Item No.	Φ mm	DN	L mm	L1 mm	L2 mm
127.R0383.001	180	50	750	250	210
127.R0383.002	180	50	1050	250	210
127.R0383.011	230	50	1050	300	240
127.R0383.101	315	50	1050	300	285



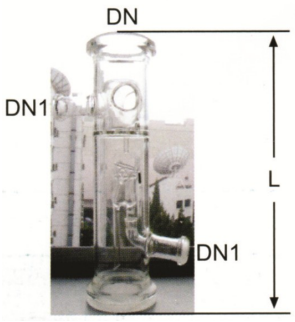
Separator

Item No.	Φ mm	DN1	DN2	L mm
127.R0384.050	230	50	25	710
127.R0384.080	300	80	25	850



Reflux Adaptor - Type C

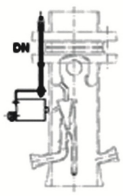
Item No.	DN	DN1	L mm
127.R0385.100	100	25	275
127.R0385.150	150	25	300
127.R0385.180	Φ180	25	350
127.R0385.230	Φ230	25	400
127.R0385.300	300	25	450

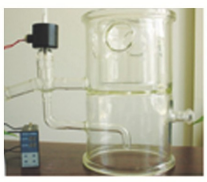


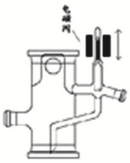
Magnetic Reflux Adaptor

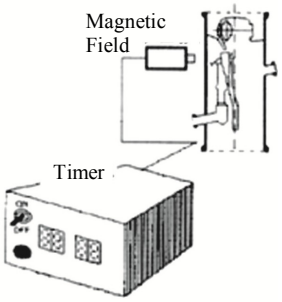
Item No.	DN	DN1	L mm
127.R0386.100	100	25	400

Electric Magnetic Reflux Divider Timer



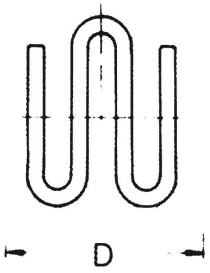






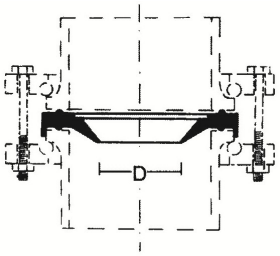
CUSTOMIZATION OF GLASS REACTOR SYSTEM

Column Insert Components



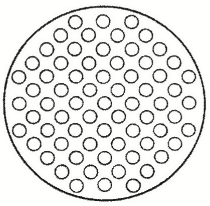
W-Packing Supports

Item No.	DN	D mm
127.R0390.080	80	65
127.R0390.100	100	90
127.R0390.150	150	140
127.R0390.180	ϕ180	155
127.R0390.230	ϕ230	190
127.R0390.300	300	260

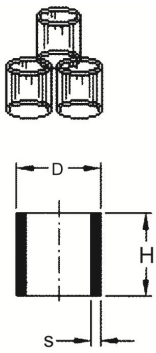


PTFE Redistributors

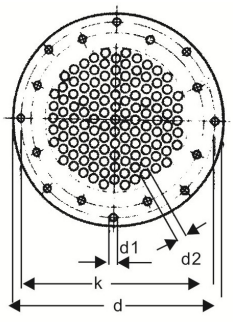
Item No.	DN	D mm
127.R0391.100	100	90
127.R0391.150	150	140
127.R0391.180	ϕ180	155
127.R0391.230	ϕ230	200
127.R0391.300	300	250



Column Packing Roaching



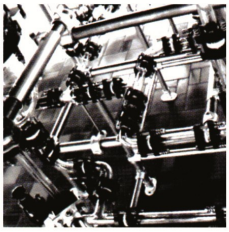
Item No.	D x H mm	mm	Kg/m^3	m^2/dm^3
127.R0392.010	10 x 10	1	541	0.58
127.R0392.015	15 x 15	1.8	521	0.40
127.R0392.020	20 x 20	1.8	282	0.27
127.R0392.025	25 x 25	2	279	0.18
127.R0392.030	30 x 30	2	204	0.14
127.R0392.040	40 x 40	2.5	164	0.10
127.R0392.050	50 x 50	2.5	144	0.08
127.R0392.060	60 x 60	3.2	116	0.06

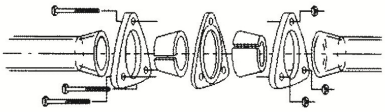


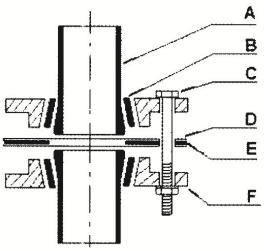
Perforated Retention Plates

Item No.	DN	d mm	d2 mm	d1 mm	K mm
127.R0393.080	80	170	6	9.5	150
127.R0393.100	100	190	6	9.5	170
127.R0393.150	150	245	10	9.5	225
127.R0393.180	ϕ180	276	15	9.5	256
127.R0393.230	ϕ230	330	15	9.5	310
127.R0393.300	300	415	20	9.5	395

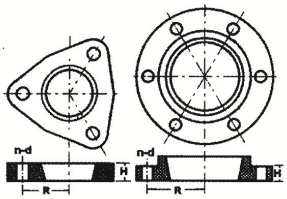
Coupling & Gaskets

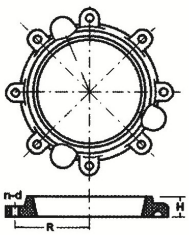






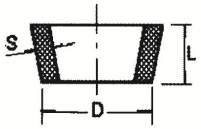
Flange





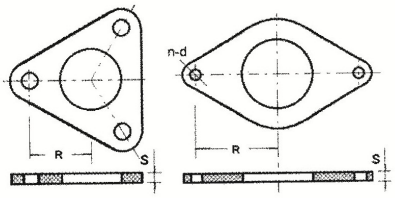
Item No.	DN	R mm	H mm	n-d mm	Material
127.H0750.015	15	20	10	3-ϕ4.5	Nitrile Butadiene Rubber
127.H0750.020	20	30	14	3-ϕ6	Nitrile Butadiene Rubber
127.H0750.025	25	35	17	3-ϕ8.5	Nitrile Butadiene Rubber
127.H0750.040	40	42	20	3-ϕ10	Nitrile Butadiene Rubber
127.H0750.050	50	55	22	4-ϕ8	Nitrile Butadiene Rubber
127.H0750.080	80	70	24.5	6-ϕ10.5	Nitrile Butadiene Rubber
127.H0750.100	100	88	28.5	6-ϕ8.5	Nitrile Butadiene Rubber
127.H0750.180	ϕ180	128	32	8-ϕ12	Aluminium
127.H0750.230	ϕ230	155	34	8-ϕ12	Aluminium

Bushings



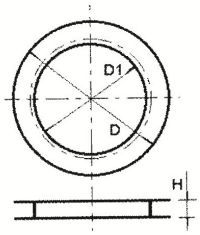
Item No.	DN	D mm	S mm	L mm
127.H0751.015	15	28	4	10
127.H0751.020	20	37	5	15
127.H0751.025	25	45	6.2	17.5
127.H0751.040	40	58	6.5	18.5
127.H0751.050	50	73.5	7.5	22.5
127.H0751.080	80	102	8.5	24.5
127.H0751.100	100	134	9	28.5
127.H0751.180	ϕ180	185	10	33
127.H0751.230	ϕ230	254	12	35

Cushions



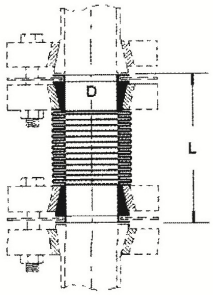
Item No.	DN	S mm	R mm	n-d mm
127.H0752.015	15	3	20	3-ϕ4.5
127.H0752.020	20	3.5	30	3-ϕ6
127.H0752.025	25	4.5	35	3-ϕ8.5
127.H0752.040	40	4.5	42	3-ϕ10
127.H0752.050	50	5.5	55	2-ϕ10
127.H0752.080	80	6	70	2-ϕ10.5
127.H0752.100	100	6	88	2-ϕ12
127.H0752.180	ϕ180	6	128	2-ϕ13
127.H0752.230	ϕ230	6	155	2-ϕ13

PTFE Cushions



Item No.	DN	D mm	D1 mm	H mm
127.H0753.015	15	26.5	13	3
127.H0753.020	20	36.5	20	3.5
127.H0753.025	25	45.5	25	4
127.H0753.040	40	58.5	38.5	4
127.H0753.050	50	73.5	48.5	5
127.H0753.080	80	102	76.5	6
127.H0753.100	100	140	104.5	6
127.H0753.180	ϕ180	205	168	7
127.H0753.230	ϕ230	257	216	7

PTFE Bellows



Item No.	DN	D mm	L mm
127.H0754.020	20	ϕ35	~119
127.H0754.025	25	ϕ43	~199
127.H0754.040	40	ϕ56	~133
127.H0754.050	50	ϕ71	~145
127.H0754.080	80	ϕ100	~160
127.H0754.100	100	ϕ131	~172
127.H0754.125	125	ϕ150	~160
127.H0754.150	150	ϕ182	~160

Flanges

Rubber Flange

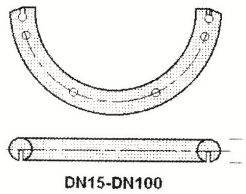
DN15-DN300

Item No.	DN	n mm	d mm	Material
127.H0755.015	15	3	ϕ7	PP
127.H0755.025	25	3	ϕ9	PP
127.H0755.040	40	3	ϕ9	PP
127.H0755.050	50	3	ϕ9.5	PP
127.H0755.080	80	6	ϕ9.5	PP
127.H0755.100	100	6	ϕ9.5	PP
127.H0755.150	150	6	ϕ9.5	PP
127.H0755.200	200	8	ϕ11.5	PP
127.H0755.300	300	12	ϕ13	PP

Metal Flange

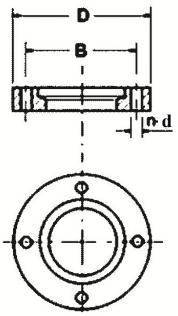
Item No.	DN	n mm	d mm
127.H0756.015	15	3	ϕ7
127.H0756.025	25	3	ϕ7
127.H0756.040	40	3	ϕ8.5
127.H0756.050	50	3	ϕ8.5
127.H0756.080	80	6	ϕ9
127.H0756.100	100	6	ϕ9
127.H0756.150	150	6	ϕ11
127.H0756.180	ϕ180	8	ϕ11
127.H0756.200	200	8	ϕ12
127.H0756.230	ϕ230	8	ϕ12
127.H0756.300	300	12	ϕ12
127.H0756.400	400	16	ϕ12
127.H0756.600	600	36	ϕ12

Inserts



Type A

Item No.	DN	
127.H0757.015	15	Bakerlite/ SMC
127.H0757.025	25	Bakerlite/ SMC
127.H0757.040	40	Bakerlite/ SMC
127.H0757.050	50	Bakerlite/ SMC
127.H0757.080	80	Bakerlite/ SMC
127.H0757.100	100	Bakerlite/ SMC
127.H0757.150	150	Bakerlite/ SMC
127.H0757.180	ϕ180	Bakerlite/ SMC
127.H0757.200	200	Bakerlite/ SMC
127.H0757.230	ϕ230	Bakerlite/ SMC
127.H0757.300	300	Bakerlite/ SMC
127.H0757.400	400	A3
127.H0757.600	600	A3

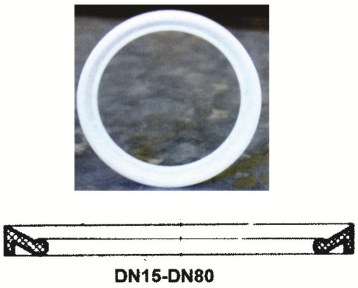


Type B

Item No.	DN	D mm	B mm	n-d mm
127.H0758.070	70	160	130	4-ϕ14
127.H0758.080	80	185	150	4-ϕ14
127.H0758.100	100	205	170	4-ϕ14
127.H0758.125	125	235	200	8-ϕ14
127.H0758.150	150	260	225	8-ϕ14
127.H0758.200	200	315	280	8-ϕ14

PTFE

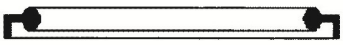
Type A



DN15-DN80

Item No.	DN
127.H0759.015	15
127.H0759.025	25
127.H0759.040	40
127.H0759.050	50
127.H0759.080	80

Type B



DN15-DN600

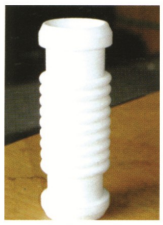
Item No.	DN
127.H0760.015	15
127.H0760.025	25
127.H0760.040	40
127.H0760.050	50
127.H0760.080	80
127.H0760.100	100
127.H0760.150	150
127.H0760.180	ϕ180
127.H0760.200	200
127.H0760.230	ϕ230
127.H0760.300	300

Universal Spacer PTFE

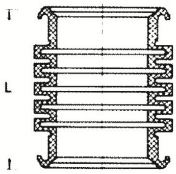
Item No.	DN	L mm
127.H0761.015	15	25
127.H0761.025	25	25
127.H0761.040	40	25
127.H0761.050	50	25
127.H0761.080	80	25
127.H0761.100	100	50

PTFE Bellows

Type A



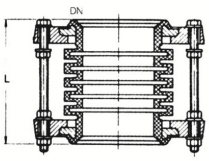
DN15-DN50



DN80-300

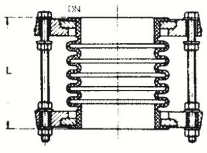
Item No.	DN	L mm
127.H0762.015	15	80
127.H0762.025	25	80
127.H0762.040	40	80
127.H0762.050	50	100
127.H0762.080	80	120
127.H0762.100	100	120
127.H0762.150	150	150
127.H0762.180	ϕ180	180
127.H0762.230	ϕ230	200
127.H0762.300	300	200

Type B

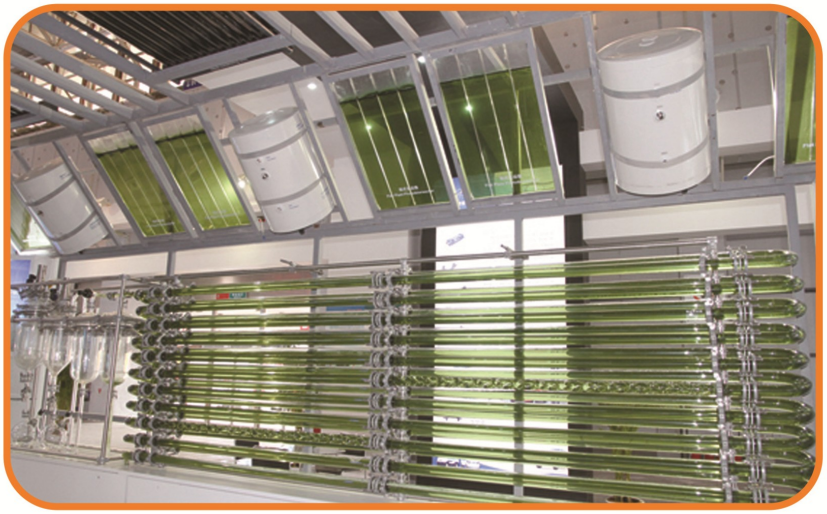


Item No.	DN	L mm
127.H0763.015	15	75
127.H0763.025	25	75
127.H0763.040	40	100
127.H0763.050	50	100
127.H0763.080	80	100
127.H0763.100	100	100

Type C



Item No.	DN	L mm
127.H0764.015	15	75
127.H0764.025	25	75
127.H0764.040	40	100
127.H0764.050	50	100
127.H0764.080	80	100
127.H07614.100	100	100



Micro-organism Culture Plant

Multi-reaction Plant

Micro-organism Culture Plant

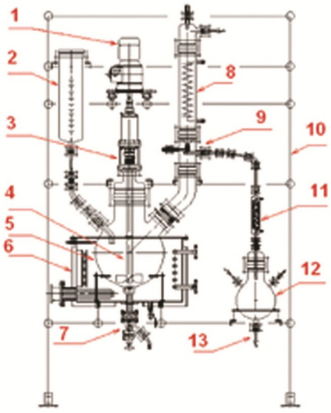
Multi-reaction Plant

Metal Purify Plant

Multi-distillation Plant

Multi-reaction Plant

High Corrosive Chemicals Processing

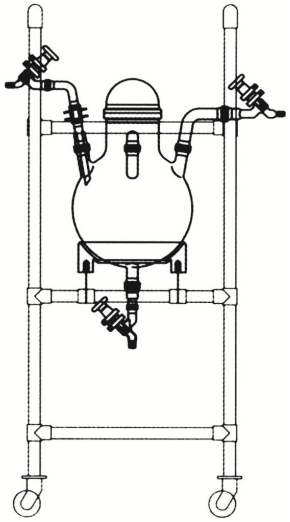


1. Overhead Motor
2. Header Tank
3. Stirrer Adaptor
4. Impeller
5. Glass vessel
6. Heating Mantle
7. Drain Valve
8. Coil Condenser
9. Reflux Adaptor
10. Stainless Steel Shelf
11. Condenser
12. Collection Flask
13. Drain Valve

Typical Applications

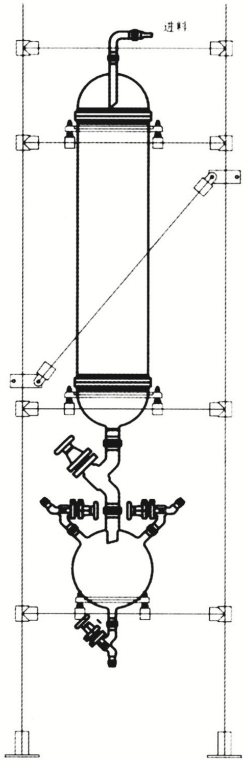
1. Reaction
2. Mixing
3. Distillation
4. Evaporation
5. Extraction
6. Assimilation
7. Crystallization
8. Deodorization
9. Purification

Mobile Vessels



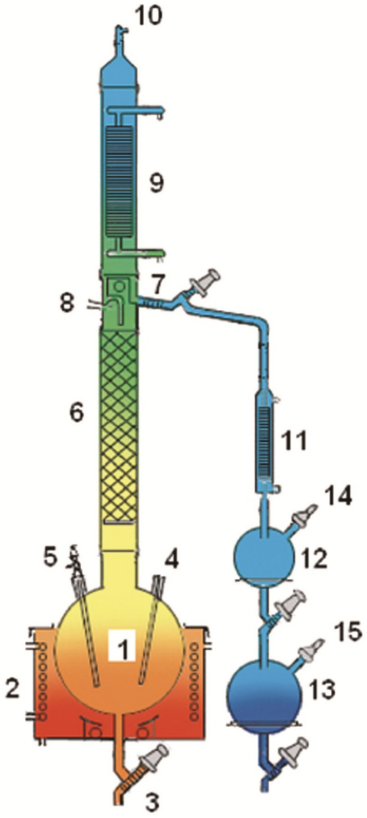
Vessel	Round Bottom: 10L - 200L
	Column: 10L - 200L

Packing Column



Tower	DN80, DN100, DN150, ϕ180

Fractional (Vacuum) Distillation Unit



1. Round Bottom Vessel (10L - 200L)
2. Heating Mantle
3. Drain Valve
4. Temperature Probe
5. Gas/ Liquid Inlet
6. Packing Column
7. Reflux Adaptor
8. Temperature Probe
9. Coil Condenser
10. Vacuum Connection
11. Condenser
12. 1st-stage Collection Flask
13. 2nd-stage Collection Flask
14. Vacuum Connection
15. Vacuum Release

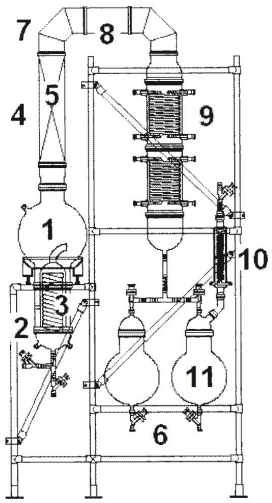
Vessel	Condenser	Condenser m^3 Distill	Condenser m^3 Product	Packing Column	Volume
20L	DN80	0.4	0.1	1000	10L/5L
50L	DN100	0.6	0.2	1000	20L/10L
100L	DN150	1.5	0.4	1000	30L/20L
200L	DN200	2	0.4	1000	50L/30L

HCL Absorption Tower

1. Release Valve
2. Acid Receiving Valve
3. Drain Valve
4. Bottom Condenser
5. Packing Column
6. Gas Inlet
7. Top Condenser
8. Liquid Inlet
9. Release Valve

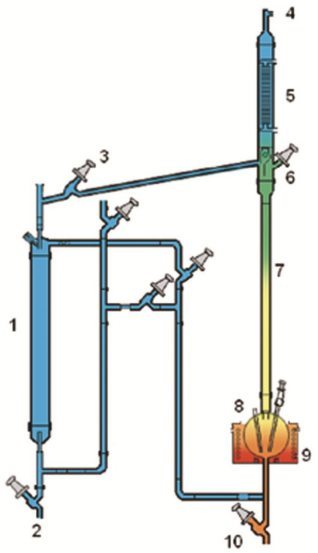
Packing Column	Condenser m^3	Gas approx.
DN80 x 3m	0.4 x 2	10kg/hr
DN100 x 4m	0.6 x 2	20kg/hr
ϕ180 x 4m	1.5 x 2	80kg/hr
ϕ230 x 4.5m	2.5 x 2	150kg/hr
DN300 x 4.5m	2.5 x 2	300kg/hr

Vacuum Circulating Evaporators



1. Vapor Tank
2. Insert Heating Mantle
3. Circulator
4. Packing Column
5. Glass Rings
6. Drain Valve
7. Elbow
8. Collection Tube
9. Coil Condensers
10. Vacuum Condensers
11. Collection Flask

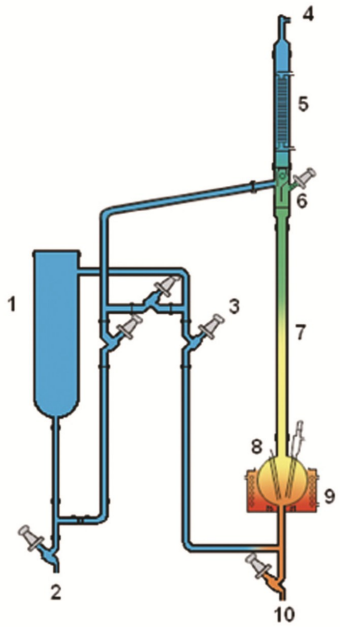
Liquid Extraction Unit



1. Extraction Column
2. Drain Valve
3. Reflux Valve
4. Hose Connection
5. Condenser
6. Reflux Adaptor
7. Distillation Column
8. Round Bottom Flask
9. Heating Mantle
10. Drain Valve

Vessel	Distill Column	Condenser m^3	Extraction Column
10L	DN40 x 1m	0.4	10L
20L	DN50 x 1m	0.6	20L
50L	DN80 x 1m	1.5	50L

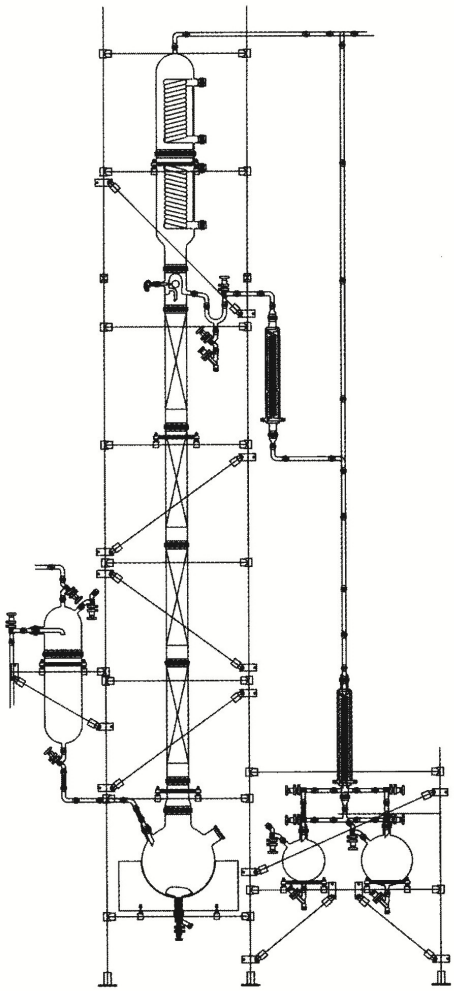
Solid Extraction Unit



1. Extraction Column
2. Drain Valve
3. Reflux Valve
4. Hose Connection
5. Condenser
6. Reflux Adaptor
7. Distillation Column
8. Round Bottom Flask
9. Heating Mantle
10. Drain Valve

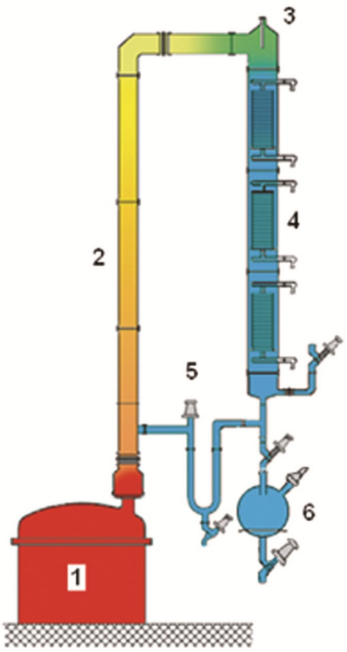
Vessel		Condenser m^3	Extraction Column
10L	DN40 x 1m	0.4	10L
20L	DN50 x 1m	0.6	20L
50L	DN80 x 1m	1.5	50L

Glass Distillation/ Rectifying Columns



Distillation/ Rectifying Columns Specification

Tower	DN80, DN100, DN150, ϕ180, ϕ230, DN300, DN400, DN600
Packing Column	Multi-Packing 1000m Tower
Packing	Glass rings/ Ceramic rings
Top Condenser	Coil Condenser 1-10m^3
Pressure	~ 10mmHg
Temperature	RT - 150 °C

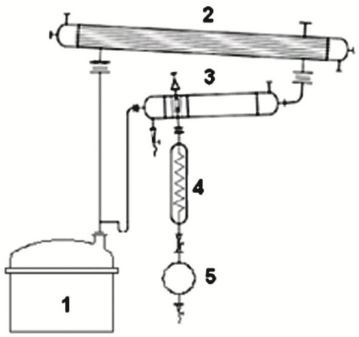


Glass-Lined/ Enamel Reactor (500L—3000L)

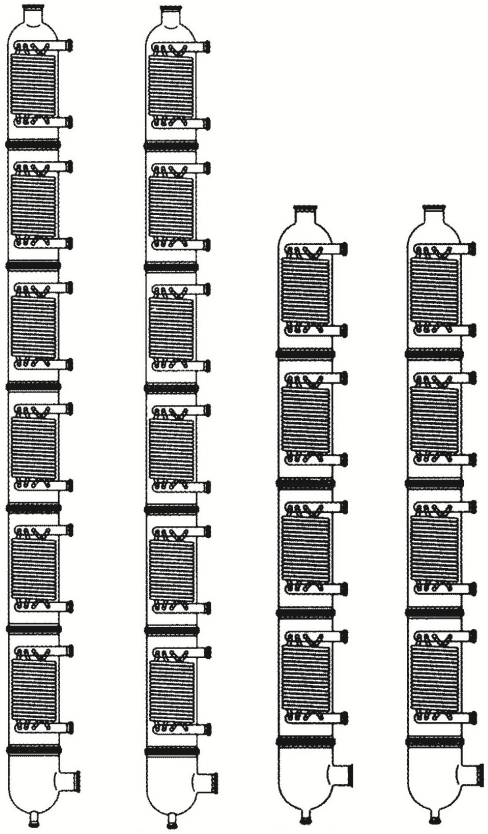
1. Enamel Reactor
2. Packing Column
3. Temperature Column
4. Coil Condenser
5. Reflux Valve
6. Collection Flask

Vessel	Distillation Column			Packing Column	Collection Flask
500L	DN100	0.4	0.1	2m	10L
1000L	DN100	0.6	0.2	2m	20L
2000L	ϕ180	1.5	0.4	3m	20L
3000L	ϕ230	2	0.4	3m	20L

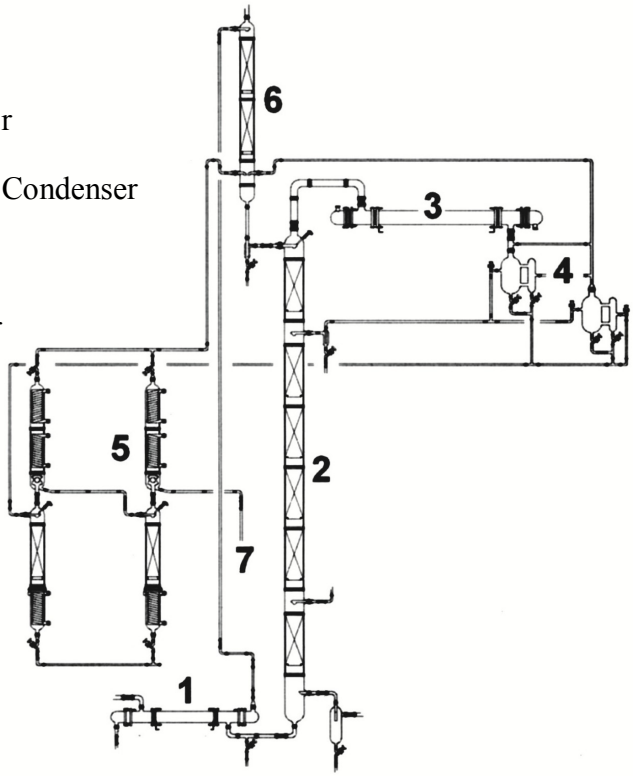
Enamel



1. Enamel Reactor
2. Heat Exchanger
3. Separator
4. Coil Condenser
5. Collection Flask



1. Heat Exchanger
2. Packing Column
3. Heat Exchanger
4. Bromine Separator
5. 1st and 2nd-stage Condenser
6. Packing Column
7. Bromine Receiver



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Glass Reactor System Questionnaire

Customer Contact Information

Name : _____ Company : _____

Title : _____ Department : _____

Tel : _____ Fax : _____

E-mail : _____

Address : _____

_____

Glass Reactor (Working Capacity)

☐2 Litre ☐5 Litre ☐10 Litre ☐20 Litre

☐30 Litre ☐50 Litre ☐80 Litre ☐100 Litre

Other : _____ Litre

Glass Vessel Options

☐Standard ☐Double-Layer ☐Triple-Layer

☐Baffle Vessel ☐Explosion Proof

Glass Lid

☐Rear Left #24 ☐Rear Centre #24 ☐Rear Right #24

☐Centre Left #34 ☐Centre #50 ☐Centre Right #34

☐Front Left #24 ☐Front Centre #40 ☐Front Right #24

Other : _____

Propeller

☐Stainless Steel ☐PTFE Coated

☐Anchor ☐Pitched Blade ☐Retreat Curve Impeller

☐2 Stage Propeller ☐3 Stage Propeller Other : _____

Overall System Specifications

Temperature : Maximum _____ Normal Operating : _____ °C / °F

Pressure : Maximum _____ Normal Operating : _____ psi / bar

Vacuum : Maximum _____ Normal Operating : _____ psi / bar

Pump Preference

Liquid 1 : ☐ Piston-Type Pump ☐ Syringe Pump ☐ Diaphragm Pump

Liquid 2 : ☐ Piston-Type Pump ☐ Syringe Pump ☐ Diaphragm Pump

HCS Scientific & Chemical Pte Ltd
Address: 2 Penjuru Place #01-08, 2-8 Penjuru Tech Hub Singapore 608783
T: (65) 6777 7077 F: (65) 6777 0500

Circulator Preference

☐Refrigerated ☐Heating ☐Recirculating Cooler

Temperature : –/+_____ ºC To _____ºC

Gas Feeds

	Flow Range (Sccm)	Typical Flow (Sccm)	Gas to be Used
Gas 1			
Gas 2			
Gas 3			

Pressure reducing regulators required on each gas supply line ☐ Yes ☐ No

Automated positive shut off valves required after each gas flow controller ☐ Yes ☐ No

Pressure relief valve on each gas supply ☐ Yes ☐ No

Liquid Feeds

Feed Tank : Volume _____ Litre

Tank / Feed Line Heating ☐ No ☐ Yes Temp _____ ºC

Blanketing With Inert Gas ☐ No ☐ Yes

	Flow Range (L/min)	Typical Flow (L/min)	Liquid to be used
Liquid 1			
Liquid 2			
Liquid 3			

Space Available of Operating area

L x W x H : _____ x _____ x _____

Desired Delivery Date

Date : _____

Others

_____

_____

_____

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