BOROSILICATE GLASS PLANTS

SHREE SAI SCIENTIFIC

www.shreesaiscientific.in

Borosilicate (Type 3.3) Glass plants, pipelines and components fabricated by SHREE SAI SCIENTIFIC complies with the following international standards

- G BS EN 12585 : 1999 - Glass Plant, Pipeline & Fittings Compatibility & Interchangeability.
- G BS EN 1595 : 1997 - General rules for design, manufacturers & testing.

Properties of Borosilicate glass 3.3	
Component	Minimum % by weight
SiO_2	78%
B_2O_3	8%
Al_2O_3	1.5%
Na_2O+K_2O	2%
Others	0.2%

Physical properties			
Coefficient of mean linear thermal expansion (20°C to 300°C)	$a = (3.3 \pm 0.1)/10^{-6}$/K	Mean thermal conductivity (20°C to 200°C)	$l = 1.2$ W/mK
		Poisson's ratio	$m = 0.2$
Mean specific heat (20°C to 200°C)	$C = 0.98$ KJ/Kg-°K	Permissible tensile and bending stress	K/S = 6 N/mm^2
Density at 20°C	$r = (2.23 \pm 0.02)$ g/cm^3	Permissible compressive stress	K/S =100N/mm^2
Modulus of elasticity	E = 64 KN/mm^2		

Chemical Resistance

Borosilicate glass 3.3 is resistant to almost all chemicals except hydrofluoric acid, phosphoric acid, and strong caustic solutions. Hydrofluoric acid has maximum effect on glass and presence of this acid even at ppm levels can cause corrosion. Phosphoric acid and caustic solution at cold conditions do not cause much problems. However at elevated temperatures these corrode glass.

Permissible operating Temperature

The recommended operating temperature : (-) 50° C to 200°C, Max. Temp. difference 120°C

Permissible operating Pressure

Borosilicate glass plant & pipeline can be used in both pressure and full vacuum application. The maximum operating pressure for a complete system is governed by the lowest rated component in the system, which is given below.

DN	25	40	50	80	100	150	225	300	450	600
Kg/cm^{2}g	4	4	4	3	2	2	1	0.7	0.5	0.3

JACKETED COMPONENTS

Shree Sai Scientific can supply jacketed version of all major components listed in the product catalogue, such as pipe and fittings, column components, heat exchangers and vessels. The glass jacket is sealed on the component either by fusing, silicon/Viton rubber or in a combination of both. The Jacketed components help in saving energy by minimizing heat loss, and to maintain the product characteristics at the desired temperatures.

Permissible operating temperature for the inner component : (-) 40°C to 150°C

Permissible operating temperature for the jacket : (-) 40°C to 150°C

Permissible operating pressure for Jacket : 0.5 kg/cm^2 g to full vacuum

PIPELINE COMPONENTS & VALVES

Borosilicate glass pipeline components find universal application throughout the world's chemical, pharmaceutical, food & drink and allied industries where the advantage of using glass as a basis for the construction of complete process systems have long been recognized. With almost universal resistance to corrosion, a long service is guaranteed & maintenance is kept to minimum. Their transparency permits visual monitoring of the process at all times. Being inert, the risk of contamination is negligible. Smooth surfaces allow easy cleaning and sterillzation and prevent the build-up of solids on the inner walls.

All wetted parts of valves and filters are constructed from Borosilicate glass and PTFE, thus ensuring maximum resistance to corrosion. Complete valve consists of Glass Valve Body, PTFE Bellow with nut, Bakelite valve, Bonnet with MS Spindle etc. Different types of valves like Line valve, Drain valve, Vent valve, Angle valve, Bottom Outlet valve, Adjusted Overflow valve, Sampling valve, 3 Way valve, Non return valve, Gas mixing valve, Safety valve, ON/OFF Control valve are available.
Pipeline filters are recommended for used in glass pipeline systems to remove impurities from liquid and gas streams.

Dirt trap are supplied for pipeline were high product purity is required. They are of particulars important when pump have to be protected against abrasive constituents and other impurities.

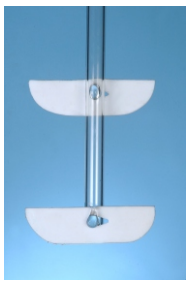
VESSELS & STIRRERS

In the majority of glass plant installations, vessels find universal application as reactors, reboilers, receivers and separators as well as for storage, feed or measuring. Standard glass vessels are available in two basic forms: spherical (available up to 500 lit. in capacity) & cylindrical (available up to 500 lit. in capacity). In application where temperature control is necessary, heating baths & heating mantles are available. Vessels can be supplied with graduations to special order. Cylindrical vessels are available with a glass jacket for heating & cooling duties.

STIRRER

Stirrer assemblies for use with spherical or cylindrical vessels generally comprise two main components: a drive unit (including shaft seal) and a stirrer shaft. Shaft seals are designed to operate either under vacuum or at pressures up to the maximum recommended for the vessel. Special type Teflon sleeved stirrers are available in different type to suit customer's requirement of high-speed reaction / slurry reactions. It is equiped with standard stirrer drive with mechanical seal assembly having options of speed variation by Mechanical Variator /Electronic Variator.



HEAT EXCHANGERS

Heat Exchangers are used for condensation of vapours or cooling of gas or cooling of liquids. Two basic types of glass heat exchanger are available, Coil type and Shell and Tube type. Glass coil type heat exchangers are available as condensers, boilers or immersion type units with heat transfer areas up to $8m^2$

Shell and tube type heat exchangers are available with glass or Mild Steel (MS) Shells in combination with glass tube as standard. The shell, end bonnets can be supplied in other material of construction eg, CS, SS, PTFE/FEP lined, FRP, glass lined etc, depending on the process condition. The tube can also be supplied in Silicon Carbide.

The advantages of using Shell and Tube type Heat Exchanger are Larger heat transfer area in single unit, Low pressure drop, Easy tube replacement, Tube can be plugged in case of breakage etc.

COLUMN COMPONENTS

In many unit operations such as reaction, extraction and absorption, the transparency factor of glass column components is a particular advantage.

As an example, colour changes in reaction processes are easily monitored, droplet separation in extraction processes can be observed unhindered and constant visual monitoring of hydraulic performance in packed columns is possible. All column section are supplied complete with packing support, Glass Rasching rings, Thermometer pocket, Feed pipe, PTFE Perforated plate, PTFE Redistributor, Liquid redistribution tray etc depending upon the requirements. Column section is available up to 600 mm in diameter and max length of 2000 mm.

Special packing support with risers can be supplied n sizes DN 300 to DN 600 with increased free cross sectional area.

ROTARY FILM EVAPORATORS

Shree Sai Scientific offers the complete range of Rota Evaporators and its accessories and spares. The basic function of the Rota Evaporator is gentle evaporation and concentration that is thin film evaporation under vacuum. A standard model of Shree Sai Scientific Rota consists of Evaporating flask, receiving flask, Vapor Tube and reflux and product collection.

- G Laboratory model with capacity from 500 ml. to 2000 ml. & 5 L.
- G Industrial models from 10 L. to 100 L. with micro processor controls, GMP & flame proof option.

PRODUCTS RANGE

Glass Assemblies

For almost all unit operations like

- G Reflux Reaction cum Distillation unit (up to 500 lit capacities)
- G Fractional Distillation unit (up to 500 lit capacities)
- G Overhead equipment installed on glass-lined vessels
- G Absorption
- G Extraction
- G Crystallization

Process Plant Components & Pipelines

- G Reaction Vessels and Stirrers (Up to 500 lit in Round Bottom and Cylindrical)
- G Jacketed Cylindrical Vessels up to 100 lit.
- G Glass Pipeline & column components up to DN 800
- G Vessels & Pipe sections are also available with MS/SS Jacket. Metal Jacketed is designed for High pressure up to 3 kgf/cm^2 (g) instead of 0.5 kgf/cm^2 (g) in glass jacket. Glass cylindrical vessels are also available with baffles.
- G Valves : Line, Drain, Flush Bottom, Sampling, NRV
- G Pressure relief valve & ON/OFF control valve.
- G Glass coil type Condensers (UP TO 8.0 M^2)
- G Glass Shell & tube Heat Exchangers (UP TO 36 m^2)
- G Sight Glass-PTFE Bush Type & PTFE Flare Type, FEP Lined
- G On-line Filters
- G High Pressure PTFE Bellows upto 800 DN
- G Coupling Flanges in CI, SS, Plastic
- G Glass plant Automation PLC based control systems

Package Units

- G HCl gas generation
- G Bromine recovery from bromide solution
- G Bromine recovery from bitterns
- G Gas absorption for HCl, SO_2, CI_2, HBr
- G Sulphuric acid dilution
- G Sodium hypochlorite
- G Nitric acid concentration & Sulphuric acid concentration

Engineered Items

- G Falling Film Evaporators
- G Mixer - Settlers
- G Rotary Evaporator (from 10 lit to 100 lit cap)-Rota Vapor
- G Custom Built pilot plant
- G Short path Vacuum Distillation (Lab Scale)
- G Shell & tube Heat Exchangers with SiC tubes
- G Glass wiped film Evaporators

MS/SS-PTFE Lined Pipelines & Fittings includes:

- G MS/SS-PTFE Lined Pipelined (15NB TO 300 NB & 3000MM Long)
- G MS/SS-PTFE Lined Bends & Spacers
- G MS/SS-PTFE Lined Dip Pipe/Sparger
- G MS/SS- FEP/PFA lined Reducers/Reducing Flanges/Blind Flanges
- G MS/SS-FEP/PFA lined Tee / Un-Equal, Equal Cross / Un-Equal Cross
- G MS/SS-FEP/PFA lined Lined Filter/Vessel cover/Valves

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