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KC-108

Composite Piping System



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INTRODUCTION



Established in 1981, **Krystal Composites (India) Pvt. Ltd.** manufactures and exports composite raw material & end user products for industrial sectors such as chemical processing, oil & gas, metals and mining, water and waste treatment, infrastructure, construction, pharmaceuticals, food and beverage, pulp and paper, electronics, railways, aerospace, marine, defense, wind energy, telecommunications and many more. . .

A leader in the field of composites in India, the company delivers standard as well as customized solutions that are ideal replacements for conventional materials particularly those prone to corrosion. The State-of-the-Art facility located close to Vadodara in the western part of India, provides high-quality engineered advanced composite solutions and reliable services, complying with customer specifications as well as national and international standards. Oriented towards continuous improvement, the company operates using principles of Total Integrated Management, ensuring complete customer satisfaction. Dedicated to single point responsibility it encompasses conceptual design, prototype development, testing, manufacturing, logistic support, installation and comprehensive after sales service.

COMPOSITES

Composite materials or Composites are engineered materials made from two or more constituent materials with different physical or chemical properties. In general terms, a composite is a material made from two or more substances which give properties, in combination, that are not available from any of the ingredients alone. The most visible applications are Helmets, F1 Cars and Speed Boats made of FibreGlass. Krystal Composites is engaged in the manufacturing of Glass Fibre Reinforced Plastic (GFRP) at its state of art plant in Gujarat, India. The Indian Composites Industry has been growing at a consistent rate over the last few years allowing us to leverage our expertise & exploiting the opportunities offered by the Indian Market.

KRYSTAL COMPOSITE PIPING SYSTEM

NEW AGE SOLUTIONS

The infrastructure is aging both domestically in India and in different parts of the world. Thousands of kilometers of water drainage and sewer pipes made of traditional materials need either replacement or rehabilitation due to the damage caused by corrosion – an irreversible process. Internally unprotected concrete sewer pipes or metallic pipes rapidly deteriorate due to the corrosive attack from materials such as acids present in the sewer system and the external soil conditions. Metallic pipes used for sea water services typically corrode within a very short period of time.

These problems can be significantly reduced if not eliminated by adopting a careful material selection process in which materials resistant to corrosion are chosen or the incorporation of a corrosion protection system into the pipeline design adopted. The solution to this problem is the use of Krystal Composites Pipes. Krystal Composites Corrosion resistant Fibre Glass Reinforced Polymer Composite Pipes meet the demanding needs of industry to transport corrosive and non-corrosive fluids for various applications including Oil, Gas, Petrochemical, Power Generation, desalination, Municipal and General Industries.

Krystal Composites Glass Fibre Reinforced Plastic (GRP) Pipes manufactured with Polyester, Vinylester and Epoxy Resins using either the dual helical filament winding (discontinuous) or continuous filament winding technique, offer superior corrosion resistance, high mechanical and physical properties as well as the ease of handling, transportation and installation, when compared to traditional materials.

Krystal Composites is among the very few Composite Pipe manufacturers in the world to produce thermosetting resins such as Polyester, Vinyl Ester & Epoxy Resins in-house ensuring uninterrupted and consistent quality of resin supply to the plant, to meet the most challenging contractual commitments.



PRODUCT VALUES

- Consistency and Reliability Cost



- Effectiveness and Longevity



- TroubleFree Performance



CHARACTERISTICS

Krystal Composites GRP Pipes are manufactured using the filament winding process. The pipe wall is designed as sandwich construction and comprises:

- Thermosetting Resin
- High Strength Corrosion Resistant Glass Fibre
- Glass Veil
- Silica Sand Fillers of Defined Granularity.



*Intermediate or higher-pressure classes & higher-stiffness classes can be offered upon request, depending on the design parameters and conditions



PIPE SIZES

The range of pipe dimensions offered by Krystal Composites is wide, thereby allowing us to cater to a variety of applications and requirements. Nominal size of pipe is based on the internal diameter. Pipes are produced from :

Diameter 25 to 3000mm

PRESSURE CLASS

GRP Pipes are classified according to the nominal pressure. Standard pressure classes offered are :

PN 3	PN 6	PN 9	PN 12
PN 16	PN 20	PN 25	PN 32

Where the number quoted is the maximum pressure in bars the pipe can support with water at 20^oc.

PIPE STIFFNESS

GRP Pipes for underground service is classified according to the specific pipe stiffness, a function determined by the burial depth, soil characteristics, loads and negative pressure should it exist. Standard stiffness classes offered are:

1250 N/m ² (62 KPA)	5000 N/m ² (248 KPA) *
2500 N/m ² (124 KPA)	10000 N/m ² (496 KPA)

TEMPERATURE

Krystal Composites GRP pipes are suitable for temperatures up to 130C, depending on the type of resin used, fluid medium and other service condition parameters.

STANDARD LENGTHS

Standard pipes are produced in lengths of :

3m	6m	9m	12m
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Customised lengths are available on request.

JOINTING SYSTEMS

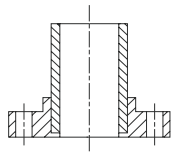
The jointing system selected for a particular application is determined by the pressure rating and installation conditions.

AVAILABLE JOINTING SYSTEMS

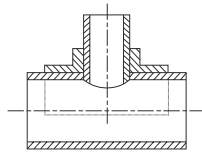
• Double bell Coupler • Butt & Wrap or Lamination • Bell & Spigot • Flanged

FITTINGS

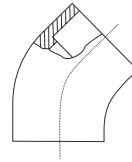
All pipeline systems require fittings. We offer a wide range of GRP fittings such as:



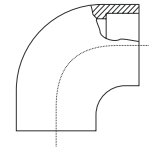
Flange



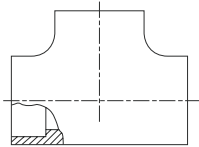
Saddle



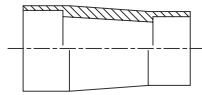
Elbow 45°



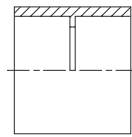
Elbow 90°



Tee



Reducer



Coupling



Blindflange

QUALITY

Krystal Composites operates with a Quality Assurance Scheme approved by Bureau Veritas to ISO : 9001 : 2008, 14001 : 2004 and OHSAS18001 : 2007.

PERFORMANCE STANDARDS

Krystal Composites GRP Pipes are manufactured & tested in accordance with international and domestic standards such as AWWA, ASTM, BS and BIS to verify the longterm performance, visual, dimensional characteristics as well as their physical & mechanical properties before delivery. Krystal Composites is committed to high quality standards. All pipes are 100% pressure tested for twice their nominal service.



ENGINEERING SERVICES

The Company provides technical support through the entire project and can perform the following activities :

- Stress analysis for underground and above ground GRP piping Systems.
- Verification of underground piping according to AWWA C950/AWWAM 45
- Verification of above ground GRP pipe installed on supports.
- Conceptual design of above ground piping supports
- Drawings of plant, isometrics and product shop drawings



SITE ASSISTANCE

The Company has an experienced site team that can provide assistance, technical support and training at site during pipe laying and final pressure testing. Krystal Composites can also deploy their crew to perform the laying and jointing of GRP pipes & fittings at site, both below and above ground.



PROJECT MANAGEMENT

Our project management team serve as a contact point for our customers and are also responsible for the liaison between the company and client. The team co-ordinates engineering activities, production schedules, site services and installation to ensure the smooth flow of activities and deliveries in accordance with the project milestones.



LOGISTICS

Krystal Composites Pipe systems are supplied to countries throughout the world. Working closely with our customers, experienced personnel in our Logistics Department use the most efficient way of transportation by rail, road, sea and air. Cost saving can be achieved by nesting our Pipes, which is possible due to the low weight and ease of handling.

ADVANTAGES OF KRYSTAL COMPOSITES GRP PIPE SYSTEMS

- Durable and Corrosion Resistant
- Does not produce rust or scale - suitable for potable water
- Low Weight ($\frac{1}{4}$ th weight of ductile iron and $\frac{1}{10}$ th weight of concrete pipe)
- No Cathodic protection required
- No External or Internal Coatings required
- Flow efficiency allows downsizing
- Design Life of 50 years
- Zero Maintenance Costs
- Low internal friction, resulting into low operating (pumping) costs
- Constant hydraulic characteristics over time
- Low Life-cycle Costs
- UV Resistant
- Suitable for high service pressures and temperatures
- Easy & reliable jointing mechanisms
- Suitable for underground and above ground applications



APPLICATIONS OF KRYSTAL COMPOSITES GRP PIPE SYSTEMS

corrosive and non-corrosive fluids for various applications, viz.

- Oil & Gas Industry - offshore & onshore such as crude oil transmission lines, water injection, multiphase fluids.
- Water transmission and distribution (Potable & Raw)
- Irrigation Pipe Systems
- Sewer & Drainage pipe Systems for Industrial, Chemical, Sanitary & Storm Water
- Firewater Systems
- Paper and Printing Industry
- Power & Desalination - Seawater Intake and Outfall, Cooling Water Lines, Brine
- Industrial - Refinery, Petrochemical, Fertilizer.
- Marine





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