

**Cosmoplast**



**Interplast Co. Ltd.**



**GRP PIPES  
AND FITTINGS**





**Cosmoplast**

**IP**

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A MEMBER OF **Group HARVAL** COMPANIES  
MANUFACTURING TECHNOLOGIES

Version 1 - Issue 2 - Nov, 2009



Cosmoplast, a primary member of Group Harwal, has been at the forefront of the plastic industry in the Gulf region since it's founding in 1976. Through constant growth and product diversification, the company continues to be the largest thermoplastic pipe manufacturer in the region.

Continuously enhancing its capabilities in plastic manufacturing technologies, Cosmoplast now utilizes a diverse range of materials such as uPVC, polyethylene (PE100, PE80, LLDPE), cross linked polyethylene (PEX), random copolymer polypropylene (PP-R), and glass-reinforced plastic (GRP).

Cosmoplast's ongoing research and development programs continue to add new products to its pipeline systems product range that now includes pre-insulated pipes, reinforced thermoplastic pipes, specialized plumbing systems and fabricated uPVC and GRP manhole systems. It's state of the art engineering, design and tool room facilities are fully capable of manufacturing moulds, dies, machinery equipments and other specialized tooling requirements to meet the company's continual expansion and product development requirements.

With this extended product range, Cosmoplast's pipeline systems cater to an extensive range of market sectors and applications covering infrastructure development, plumbing, oil & gas, district cooling, irrigation, landscaping and water extraction.

An ISO 9001 certified company, Cosmoplast has its production facilities based in Sharjah, Abu Dhabi and Dubai converting over 75,000 metric tons of plastic per annum. In addition to these, Cosmoplast also has upcoming facilities in Saudi Arabia, Moscow and Kaliningrad.



## COSMOPLAST PIPELINE SYSTEMS PRODUCT RANGE INCLUDES:

### INFRASTRUCTURE PIPELINE SYSTEMS (uPVC, PE, GRP)

uPVC and Polyethylene pipeline systems with sizes ranging from 15mm up to 1200mm, well casings and screens and GRP pipeline systems with sizes from 100mm up to 1400mm for applications including

- Water extraction
- Water distribution
- Drainage
- Sewerage
- Gas distribution
- Cable ducting

### PLUMBING SYSTEMS (uPVC, PP-R, PEX)

Comprehensive range includes uPVC systems for drainage, random polypropylene (PP-R) [plain and aluminium composite] and cross linked polyethylene (PEX) systems for water and sanitary applications and uPVC high pressure pipes and fittings for water supply and A/C drain. Plumbing accessories such as pipe clamps, polyethylene compression fittings, solvent cements, lubricants and adhesives compliment this product range.

### PRE-INSULATED PIPES (HDPE-HDPE, HDPE-GRP, HDPE-STEEL, GRP-HDPE, GRP-GRP, GRP-STEEL)

Jacket – core pipe combination with polyurethane insulation are used for applications such as District Cooling systems, Oil & Gas and other industrial applications. Cosmoplast provides HDPE and GRP pipes as jackets and HDPE, GRP and steel as core pipes.

### IRRIGATION SYSTEMS (LLDPE)

Consists of high precision inline drip pipes and landscape and lawn edging. This range also includes saline resistant valves, drainage systems, sprinklers and central controllers.

### REINFORCED THERMOPLASTIC PIPES (RTP)

Available in length of upto 500m, with a working pressure of 150 Bar at a temperature of 60 degrees celsius. RTP is used for gas distribution networks, oil flow lines and water injection lines.



ISO 4427/4437  
BS EN 1329/1401



ISO 9001 FM 75767



## GRP PIPES AND FITTINGS

Glass Reinforced Plastic (GRP) is a composite material which consists of thermoset resin, glass reinforcement and sand (might be added). The Resin is generally a polyester resin and the lamination is strongly affected by the type of resin used. An acceptable resin must have:

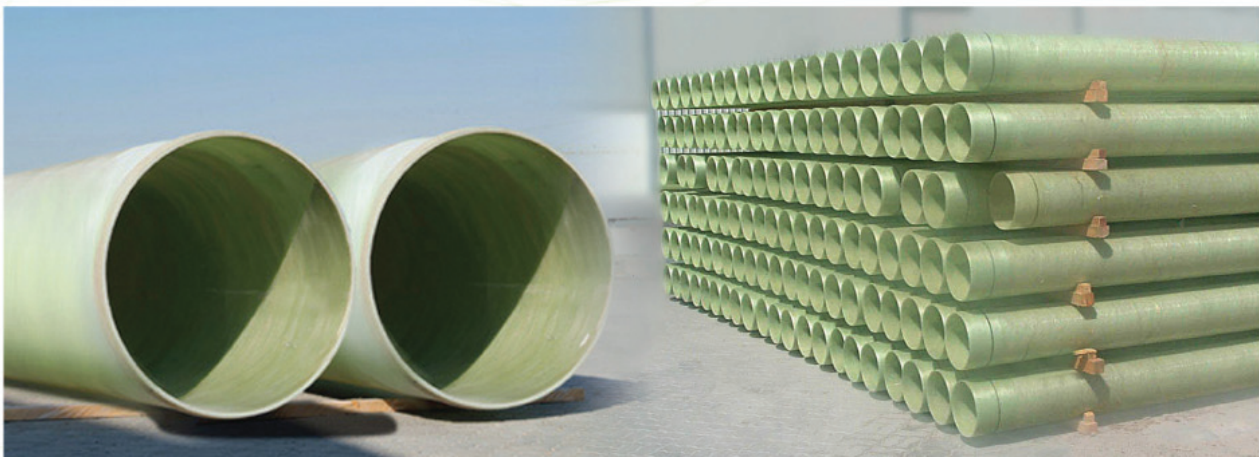
- Good adhesion to the glass fibres to increase the strength of the laminate and its resistance to fatigue.
- High purity to avoid migration of low molecular weight pollutants into the portable water.
- Low water absorption and good resistance to boiling water to reduce the effect of ageing.

There are three different types of pipes, which are categorized as:

- Glass Reinforced Polyester (GRP) pipes and fittings.
- Glass Reinforced Vinyl (GRV) pipes and fittings.
- Glass Reinforced Epoxy (GRE) pipes and fittings.

The intrinsic corrosion resistance of GRP assures a long maintenance free operational life and GRP can be used for high pressure piping because of its high mechanical properties. Due to the smooth inner surface of GRP pipes, the head losses are low. The light weight of GRP pipes enables them to be supplied in long lengths, therefore enabling faster installation and reduction in number of joints.

As a composite material, the use of GRP is becoming more widespread in various applications and increasingly replacing traditional concrete base pipes.





## APPLICATIONS

GRP pipes and fittings are used for various applications

### Sewerage:

GRP pipeline systems are resistant to highly corrosive chemical attacks from effluent or septic sewers.

### Potable Water Supply:

GRP Pipe Systems are widely used for potable water and have been tested and approved by the water authorities in many countries.

### Irrigation:

GRP Pressure Pipe Systems for irrigation available in a wide diameter range for different pressure and stiffness classes. They are widely used in main transmission lines, network lines and pumping lines in irrigation projects.

### Chemical Transportation:

GRP is used in chemical transportation because of polyester resins used in its production process to prevent contact with aggressive media, thus GRP Pipe has outstanding resistance to corrosion from industrial wastewater and sewerage. Corrosive agents do not affect the resins used in our pipes and extensive tests like the Strain Corrosion Test have been made to demonstrate the pipe's highest chemical resistance. The results of the test show that acid media and salivated water in combination with high temperatures have no impact on the mechanical performance. The composite can withstand even highly corrosive environments without any failure.

### Thermal Lines:

GRP Pipe Systems can be used for applications where a high resistance against temperature is required. For example:

- Thermal water pipe lines
- Cooling water systems
- Paper mills

By using appropriate constituents and resins (e.g. epoxy-modified vinylester resins) GRP Pipe Systems can be tailored to the specific requirements of applications with elevated service temperatures.

### Jacking Pipe Systems and Micro Tunneling:

GRP Jacking Pipe Systems show high compressive strength and consistent superior quality. Due to the smooth, non-absorbing exterior surface, tight outer diameter tolerances and lighter weight construction. GRP Jacking Pipe Systems experience the lowest jacking loads in the industry.

GRP pipes are also used for micro tunneling applications with or without concrete encasing around them.

### Seawater intake:

Seawater application is used in circulating cooling water for power and petrochemical industries, piping systems are predominantly metallic and used in transporting corrosive fluids such as sea water and oily waste water but metallic piping is subject to corrosion attack from sea water and other corrosive fluids which cause a blockage to the system and also increase life maintenance costs, whereas GRP products are inherently corrosion resistant in many difficult environments.

### Ducts:

In water and wastewater treatment applications, numerous examples of fiberglass structures can be found. Ducts for handling corrosive gases in some instances may be placed underground to reduce the possibility of damage.



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## ADVANTAGES OF GRP PIPES

Glass reinforced plastic pipes represent the ideal solution for supply of water, chemicals, effluent and sewers; because they combine the advantage of corrosion resistance, typical of plastics, with a mechanical strength comparable to steel. Typical advantages of GRP pipes compared to steel pipes can be summarized as follows:

- Pipes are lighter in weight, which allows for easier laying and transportation.
- Nesting of different diameters of pipe thus allowing additional saving in transport operations.
- Length of sections are larger than other materials.
- Easy installation procedures due to the mechanical bell and spigot joint.
- Corrosion resistance of both external and internal walls in contact with the conveyed fluid. No protections such as coating, painting or cathodic protection are required.
- Smoothness of the internal wall that minimizes the head losses and avoids the formation of deposits.
- High mechanical resistance due to the glass reinforcement.
- Absolute impermeability of pipes and joints both from external to internal and vice-versa.
- Very long life of the material, virtually infinite, does not need maintenance.
- Easy workability of the material on-site, employing simple equipments.

### Comparison of GRP and Metallic Products

| Comparison of <b>GRP</b> pipeline system versus <b>CONVENTIONAL</b> Pipelines such as <b>DUCTILE, CONCRETE, CLAY</b> etc. |                     |            |
|---|---------------------|------------|
|   | <b>Conventional</b> | <b>GRP</b> |
| Joint traceability ?  | No                  | Yes        |
| Low maintenance costs ?   | No                  | Yes        |
| Corrosion resistant ?   | No                  | Yes        |
| Flexible pipe, less liable to stress fractures ?  | No                  | Yes        |
| Operational system during additional branch?  | No                  | Yes        |
| Reduced labour requirement in pipe lifting and installation due to weight differential                                    | No                  | Yes        |
| Reduced labour skill in Jointing operations   | No                  | Yes        |
| Reduced joint stress due to pipe flexibility ?  | No                  | Yes        |
| Lower energy requirement to overcome pipe friction ?  | No                  | Yes        |
| Extra protection required   | Yes                 | No         |
| Liable to layer separation ?  | Yes                 | No         |
| Potential joint leakage ?   | Yes                 | No         |

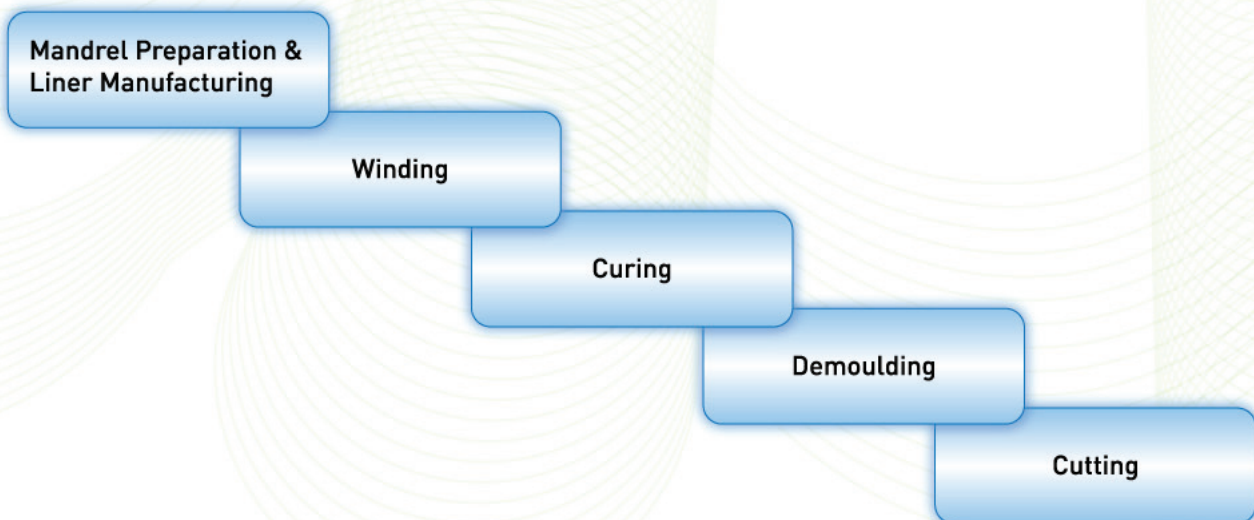


## MANUFACTURING PROCESS OF GRP PIPES

GRP pipes can be manufactured using various manufacturing techniques depending on the type of product and customer requirements. Cosmoplast manufactures GRP Pipes using Filament Winding process. This process involves winding the glass fibre fully impregnated with Polyester / Vinylester resin over fixed lengths of a revolving mandrel. The resin impregnated glass fibre is roved at a desired angle along the circumference of the pipe in either direction so as to form a dual helical cross winding pattern for increased axial strength. For pressure pipe applications, the principal stress in the circumferential direction is countered by this glass fibre reinforcement thereby yielding a higher performing product at an economical cost.

A specially designed resin chosen for the inner liner is in accordance with the application of the pipe. Any additional inner layer of differing resin for specific requirements can then be applied where necessary.

In general, the pipes are manufactured through five distinct stages.



All through these stages the pipes are subjected to stringent in-process control and quality checks.



# PIPE WALL STRUCTURE



| ASTM - D 2310 & 2996        |
|-----------------------------|
| S1 = Inner Layer            |
| S2 = Structural Layer       |
| S3 = Outer Layer            |
| S4 = Over (wall ) thickness |

| Cosmoplast Designation |
|------------------------|
| Liner                  |
| Structural Layer       |
| Outer Layer            |
| Wall Thickness         |

| COSMOPLAST Material Composition: |
|----------------------------------|
| Resin +Veil + CSM                |
| Resin + Glass + Sand (optional)  |
| Pure Resin + Veil (optional)     |
| -----                            |



# PRODUCT RANGE

## Lengths

The pipes are supplied in standard lengths of 6, 9 and 12 meters. Customized lengths up to 18 meters are available on request. Diameters of less than 300 mm are available in standard lengths of 6 meters.

The standard lengths of pipes available are

6m. 9m. and 12m.

## Pressure

The GRP pipes are available in the pressure classes listed in the table:

The value of nominal pressure (PN) denotes the maximum working pressure in bars.

We also manufacture custom-designed pipes with pressure tailored to the needs of a project. We ensure that pipes with PN greater than 1 are 100% tested for 1.5 times the nominal pressure.

The standard pressure ratings available are

| Pressure Class (PN) | Pressure Rating (bar) |
|---------------------|-----------------------|
| 1 (gravity)         | 1 (gravity)           |
| 6                   | 6                     |
| 10                  | 10                    |
| 16                  | 16                    |

## Stiffness

GRP pipe systems have the following specific initial stiffness defined as minimum initial stiffness of a pipe calculated as  $[EI / D^3]$  in  $N/m^2$ .

Other stiffness classes and custom-designed pipe systems with a stiffness tailored to the needs of a given project are available on request.

Cosmoplast manufactures GRP pipes with stiffness class as listed in the table. We do manufacture GRP pipes in stiffness higher than 10,000  $N/m^2$ , if the application required.

The standard Nominal Stiffness is

Stiffness Class (SN) ( $N/m^2$ )

1500 • 2500 • 5000 • 10000

## Diameters

Cosmoplast GRP pipes are supplied in normal diameters ranging from DN 100 up to DN 1800.

Diameters currently manufactured (in mm)

DN 100 • 150 • 200 • 250 • 300 • 350 • 400

450 • 500 • 600 • 700 • 800 • 900 • 1000

1100 • 1200 • 1300 • 1400



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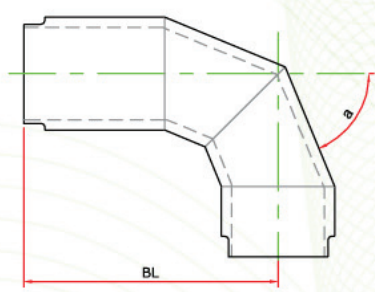
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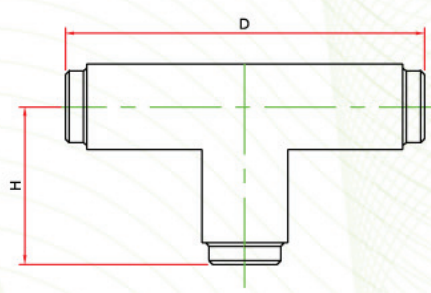
# GRP FITTINGS

Cosmoplast manufactures Glass Reinforced Plastics fittings to interface with the sizes, configurations and pressure requirements of GRP pipes. These fittings are manufactured to the same high standards and operational requirements as that of the pipes by either filament winding over mould or mitered process. The fittings manufacturing starts from the resin rich glass fiber liner, which is then reinforced by resin impregnated glass fiber filaments. The fittings are then finished off with a further smooth resin rich outer layer.

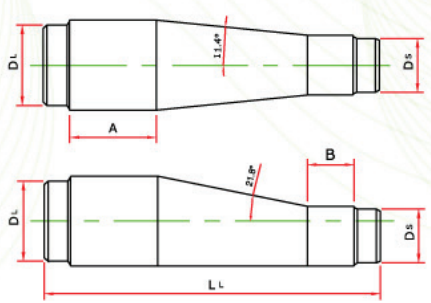
Cosmoplast manufactures a full range of fittings including:



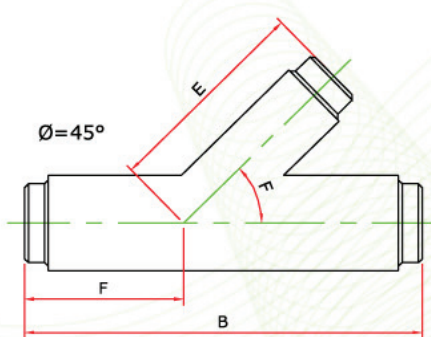
**Bends** (any required angle)



**Tees** (Equal and unequal)



**Reducers** (Centric and Eccentric)



**Branches** (Wye Branch)









## JOINTING

Different jointing methods as follows can be used for jointing Cosmoplast GRP pipes and fittings.

### Double Bell Coupling Joints

In order to ensure that the joints are leak proof, Cosmoplast manufactures double bell couplings with two rubber rings to join the pipes and fittings.



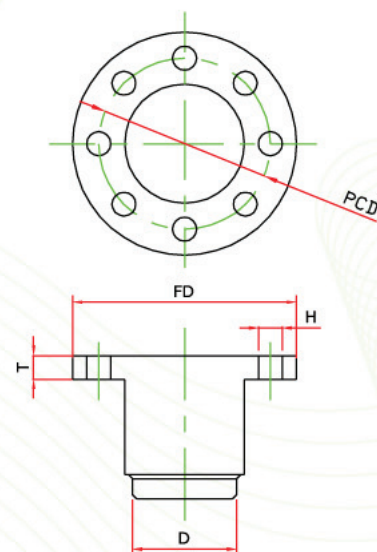
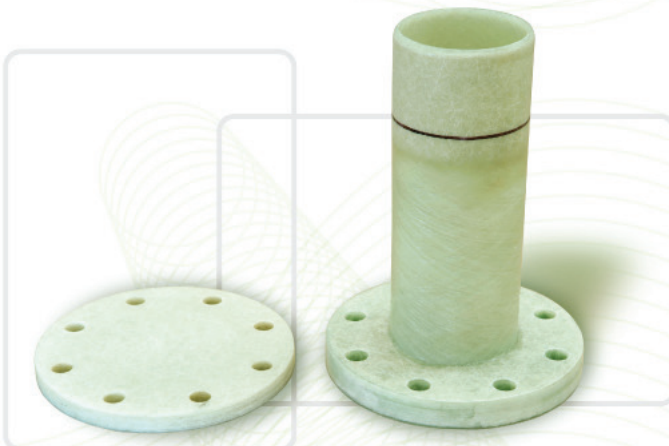
### Laminated Joints:

These are permanent joints, which consist of a laminate of glass mats and tissues with resin. Predominantly used directly at the jobsite, this type of joint guarantees a safe and long-lasting connection that accommodates all axial strengths. For the laminated joint, plain-ended pipes and fittings must be used. This joint consists of a glass fibre impregnated with resin, which is laminated according to a specified width and thickness.

### Flanged Joint:

Flanged joints offer the same safety and allow the dismantling of the installation at a later stage. Flanges are also a good solution for connections with other pipe materials, valves and accessories. They are available as fixed and loose flanges. Two types of flange connections are available:

- Socket / Spigot Flexible Flange Joint
- Stub End and Loose Flange Joint



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# INSTALLATION OF GRP PIPES

## General Points on Trench Excavation

The dimensions of a trench line opening are normally governed by the pipe diameter, method of jointing and site conditions. Normal minimum depth of cover for mains should be 900mm from ground level to the crown of the pipe. Trench width should be as narrow as possible but provide adequate access for the pipe welders.

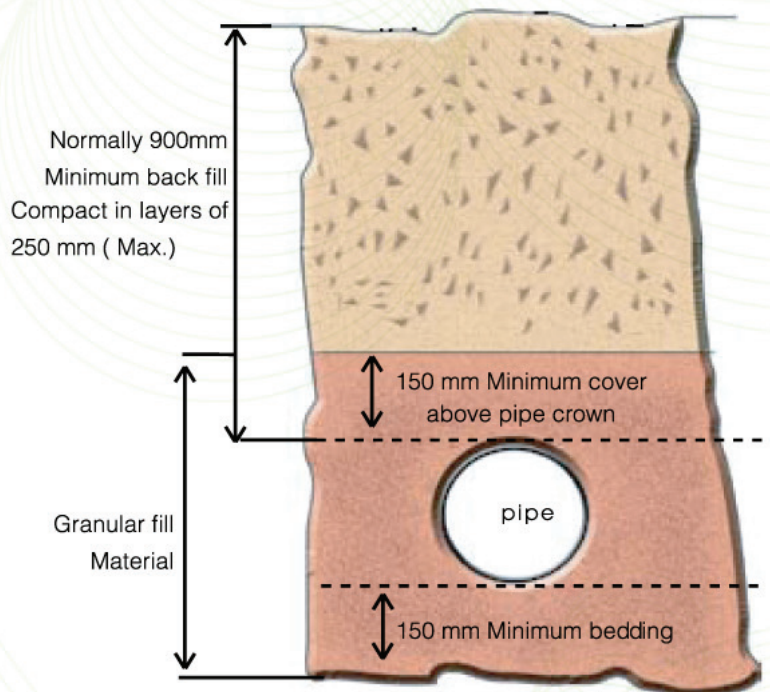
Generally, at least three pipe lengths of ground should be excavated ahead of mains laying to expose any obstructions, which may necessitate deviation from the planned route.

In some instances, it may be acceptable to lay GRP pipe directly on the bottom of the trench - but only where the soil is uniform, relatively soft and fine-grained without large flints, stones and other hard objects. The trench bottom should be brought to an even finish, providing consistent support for pipes along their whole length.

In other cases, the trench should be cut to a depth, which will allow for the necessary thickness of selected bedding material below the bottom of the pipe. If spoil from the excavation is unsuitable, granular material should be imported. Gravel or broken stone graded between five and ten millimeters in size provides suitable bedding, since it needs little compaction. Coarse sand, a sand and gravel mix, or gravel smaller than 20mm are also all acceptable straight from the quarry.

After installation, the ground can be backfilled and consolidated.

## Pipe Recommended Trench Composition



## Backfilling

Unless special procedures apply, such as local agreements for carriageway reinstatement, appropriate excavated material may be returned to the trench and compacted in layers of a thickness specified by the appropriate utility. Ensure the trenches should be compacted properly after the initial backfill to prevent lateral movement of pipes. Heavy compaction equipment should not be used until the fill over the crown of the pipe is at least 300mm.



## QUALITY CONTROL

Cosmoplast quality management system is ISO 9001 certified with every essential requirement for managing, performing, monitoring and verifying the achievement of product quality in line with international standards and customer specification. All raw materials and finished goods are tested to ensure their quality according to given specification. We have our standard inspections and testing plan for the manufacture of GRP pipes and fittings. Our quality control department conducts short term and long term tests under the supervision of consultants , clients , engineers as well as third party inspectors.

### GRP Qualification Tests:

- Hydrostatic Pressure Test
- Stiffness Test
- Axial Tensile Test
- Burst Test
- Loss on Ignition Test
- Long Term Strain Corrosion Test
- Long Term Creep Test



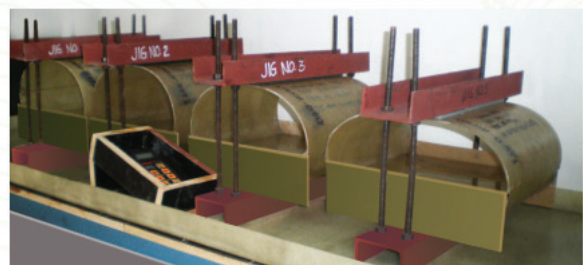
### GRP Raw Material Tests:

- Viscosity
- Specific Gravity
- Curing/Gel Time
- Exothermic Time & Temperature



### Quality and Standards:

|          |                           |
|----------|---------------------------|
| Pipes    | BS 5480 • AWWA C950       |
|          | ASTM D 2996 • ASTM D 1599 |
| Manholes | ASTM D3753                |



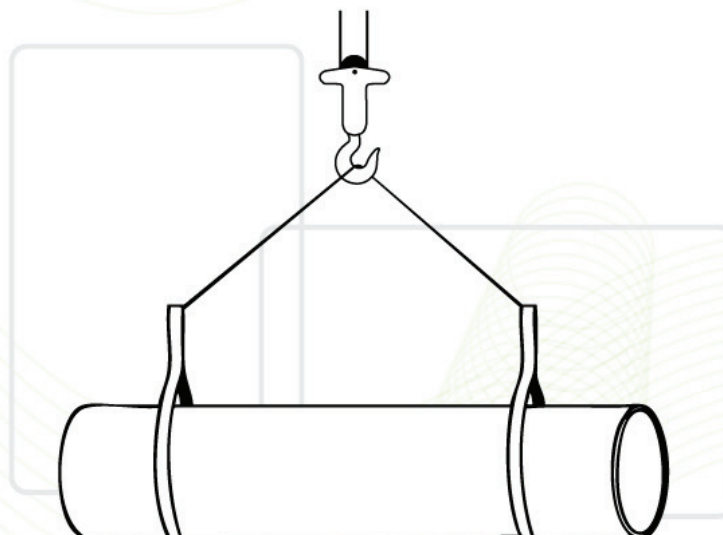


## HANDLING, TRANSPORT AND STORAGE

Finished goods shall be handled as per GRP storage procedures. Special attention shall be taken for the stacking of large diameter pipe where a weight load is critical to pipe load resistance capacity. Only qualified and trained personnel should handle GRP products and raw materials. Assistance will be provided where required for field installations.

### Handling

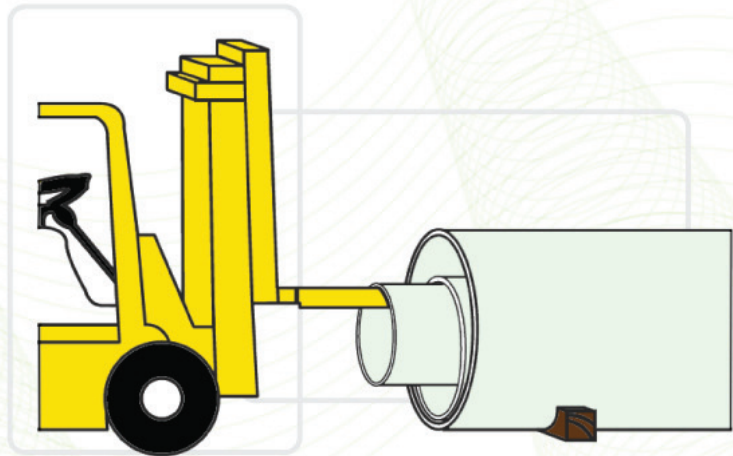
- Care and attention should always be taken while handling pipes. This should be done not only for the protection of the pipes but also for the safety of the personnel handling them.
- Metal chains, metallic slings, hooks should never be brought into direct contact with the pipes. Wide band webbed slings of polypropylene, nylon or similar materials are recommended. Forklifts with suitably padded forks should be used whenever possible.
- Exercise special care when handling pipes in humid or wet conditions, as the pipes may become slippery.
- Pipes should always be offloaded individually.
- During offloading the pipes should not be dropped onto hard or uneven surfaces.
- Pipes should not be dragged or rolled along the ground. It is recommended to use forklift trucks or overhead crane whenever possible, or in case of large pipes use pipe pieces as rollers while moving it along the ground.
- Pipes should not be pushed or pulled off the end of the pipe in truck. If forklifts are used for load stability the forks should be as far apart as possible and should enter the load slowly to reduce the possibility of damage.
- It is recommended to use mobile cranes with load spreading beams, with a length equivalent to one quarter of the length of the pipe or bundle pack should be employed. Lifting points should always be well spread and evenly spaced.
- Never swing a load of pipe over personnel or areas that are used as pathways for travelling. Operate the crane at constant speed and avoid jerking.
- For some projects, pipes may be nested (i.e. one or more small pipes inside a large pipe) for delivery. Special handling procedures must be followed when handling and de-nesting such pipe loads.
- De-nesting a load is easily accomplished by inserting a forklift fork into a padded boom. The lifting capacity should be able to handle the weight and length of the pipes being de-nested.
- Pipes may be loaded manually (not less than two persons and only allowed for small diameter pipes, not exceeding 60kg).





## Transportation

- Vehicles transporting pipes should have a flat bed, which includes supports that are free of sharp edges or projections.
- Pipes should be evenly supported over their full length and not overhang the vehicle.
- Where different sizes of pipes are to be transported together larger diameter pipes should be loaded first with the vehicle having side supports covered with rubber or corrugated paper.



## Storage

- Pipes should be stored away from sharp projections.
- Care must be taken that the storage surface has the same level, is as firm as possible, and clear of rocks or solid objects that might damage the pipes.
- Store the pipes in separate stockpiles according to their class and nominal diameter.
- Pipes are to be placed on wooden timber with spacing in between. Any extraneous material is to be removed from the area.
- During storage on site, pipes should be stored on flat even ground able to withstand weight of both pipes and lifting equipment.
- Adequate space should be allocated for lifting machinery to manoeuvre without causing accidental damage.
- Where individual pipe lengths are stacked in the field, they should not be stacked in large piles (specially under hot weather conditions) as the bottom pipes may be distorted thus giving rise to difficulty in pipe alignment and jointing. Pipes should be carefully stacked so as to prevent movements. As shown in the table.

| DN                   | 80-400 | 450-600 | 700-800 | 900-1400 | 1500 |
|----------------------|--------|---------|---------|----------|------|
| Layers in stock pipe | 5      | 4       | 3       | 2        | 1    |
| Maximum height       | 2 m    | 2.4 m   | 2.8 m   | 2.8 m    | OD   |

- Pipes should be properly protected from direct sunlight for long period of storage. If covered by tarpaulin, care should be taken to provide proper airflow to avoid heat entrapment.
- Never place pipes in contact with lubricating or hydraulic oil, gasoline, and solvents or with any such liquids. The pipes should be stored away from exhaust outlets and all other high temperature sources.

