SEPMA

شركة صناعة الأنابيب المحدودة ش.م.م

Composite Pipes Industry L.L.C.

TECHNICAL BROCHURE PRODUCTION

LEADERS IN MANUFACTURING FIBERGLASS PIPES

44 Years Experience

www.cpioman.com

CONTENT

PRODUCTION CAPACITY

• The production capacity of the plant is 12000 MT annually. The product range are available from 25-1400mm diameters for pipes and fittings.

• Production unit consists of six separate lines of CNC controlled winding machines of which two are specially made with double pipe winding system and the process is carried out by employees who are skilled and trained in GRE winding of pipe and fittings.

• The overall manpower capacity in the production unit is 150 plus.

• Fitting production unit consists of two separate semi-automatic winding machine and curing oven, with trained fitting winders.

• Separate spooling unit provides a wide range of spools made in-house based on the clients requirement. The spool range varies from 25-1400 mm.

MANUFACTURING RANGE

PIPE DIAMETER RANGE	***Diameter Range*** 15-45, 50-80, 100-150, 200-300, 350-450, 500-600, 700-800, 900-1400
FITTINGS	***Molded Fittings*** Size (mm) 25-150, 200-250, 300-600
MITER FITTINGS	Size (mm) 600-800, 900-1400

FITTINGS CATEGORY

COUPLING

TEE CLASSIFICATION

- Equal tee
- Unequal tee

REDUCER CLASSIFICATION

- Concentric reducer
- Eccentric reducer

ELBOWS CLASSIFICATION

They are classified based on
- Diameter
- Bend Radius
  (1D,1.5D,3D,5D & 10D)
- Angle of bend

BLIND FLANGE

SOCKET FLANGE

END CAP

FLANGE CLASSIFICATION

NIPPLE

STUB END

RAW MATERIALS

GLASS ROVING

The amount, type, location, and orientation of fiberglass in the pipe that will provide the required mechanical strength. Fiberglass materials are available with a variety of compositions. This allows for additional design flexibility to meet performance criteria. All fiberglass reinforcement begins as individual filaments of glass drawn from a furnace of molten glass. Many filaments are formed simultaneously and gathered into a "strand." A surface treatment (sizing) is added to maintain fiber integrity, establish compatibility with resin, and ease further processing by improving consolidation and wet strength. Sizing can also affect resin chemistry and laminate properties. The glass fibers most commonly used in pipe are referred to as Types E, ECR, and C. Glass types ECR and C provide improved acid and chemical resistance. Type C glass fibers are generally only used to reinforce chemical-resistant liners.

CONTINUOUS ROVING (E, ECRGlass): It consists of bundled untwisted strend. It provides excellent mechanical properties.

WOVEN ROVING: This is a heavy, drapable fabric, woven from continuous roving. It is available in various widths, thicknesses, and weights. Woven roving provides high strength to large molded parts.

SURFACE VEILS: These lightweight fiberglass reinforcement mats allow layers with a high resin content with minimal reinforcement. The surface veil provides extra environmental resistance for pipe and fittings, plus a smooth appearance. (Some surface veils from polyester fibers are also used).

POLYESTER VEIL: Surfaces exposed to UV light are generally fabricated with a resin-rich polyester veil layer. This provides a smoothing finish to the pipes outer surface.

RESIN SYSTEM

The second major component of fiberglass pipe is the resin system. Manufacturers choose a resin system for chemical, mechanical, thermal properties and process ability. The two basic groups of resin systems are thermosetting and thermoplastic. Fiberglass pipe, by definition, uses only thermosetting resin systems. Thermosets are polymeric resin systems cured by heat or chemical additives. Once cured, a thermoset is essentially infusible and insoluble. The thermosetting resins used in fiberglass pipe fall into three general categories - Epoxy, polyesters and Vinyl esters resins.

a) Epoxy Resin

Epoxy resins are used to a wide range of moderately strong acids and alkalis, conveying water, condensates, hydrocarbons and caustics Fiberglass epoxy piping is used in oil fields at pressures up to several thousand per square inch (kilopascals). Epoxy resins cannot be categorized by resin type as easily as polyesters. The type of curing agent, or hardener, is critical with epoxy resins because the agent influences the composite properties and performance.

For optimum chemical resistance, these mixtures usually require a heat cure and/or post cure. The cured resin has good chemical resistance, particularly in alkaline environments, and can have good temperature resistance. There are several types of base epoxy resins and associated curing agents. Curing agents typically used for epoxy resin are:

- Cyclo aliphatic amine (IPD)
- Aliphatic amine
- Aromatic amine (MDA)
- Anhydride

b) Polyester Resin

Polyester resins are commonly used to produce large-diameter water and sewage piping. Polyesters have excellent water and chemical resistance and are noted for acid resistance. Polyester resins are cured by organic peroxide catalysts. The type and amount of catalyst will influence gel time, cure time, curing temperature, and the degree of cure. Isophthalic polyester resin is typically used. Isophthalic polyester is a relatively low cost resin, with limited chemical resistance.

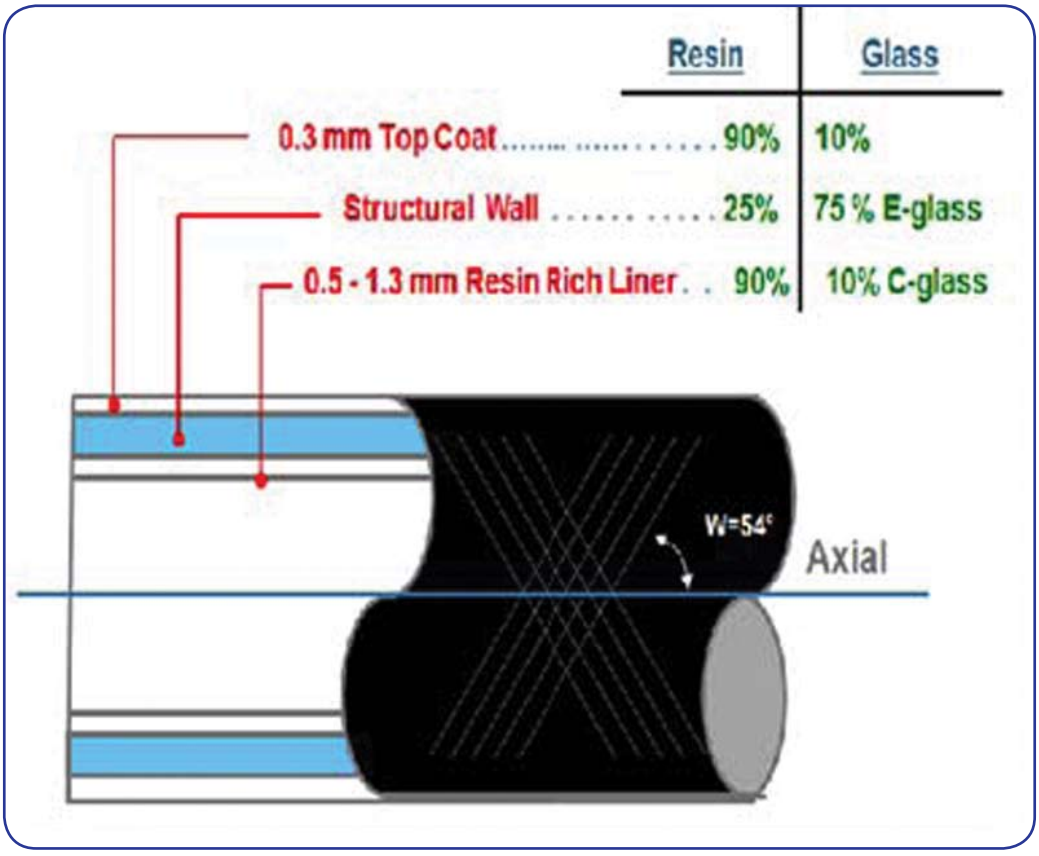
c) Vinyl ester Resin

Compared to polyester, vinyl ester resin has very good chemical resistance, especially against acids. High temperature and chemical resistant vinyl ester based resins, e.g. Novolac vinyl ester, are also available.

LAYER COMPOSITION OF GRE MATERIAL

THE GRE MATERIAL IS MADE OF THREE LAYERS

- The inner coat which gives resistance from corrosion
- Middle structural layer which gives the strength of the GRE material
- The outer top coat for UV protection.



PIPE MANUFACTURING PROCESS

- Mandrel Preparation
- Liner Application
- Pipe Winding
- Pipe curing & cooling
- Pipe Extraction
- Cutting and Hydrotesting
- Calibration and Testing

• MANDREL PREPARATION

In the preparation stage, the required mandrels are prepared and placed on the liner machine for gel coat preparation.

• LINER APPLICATION

The liner formation (Gel coat) is prepared as follows:
One or more layers of 'C' glass veil are wound with a 50% overlap around the rotating steel mandrel and impregnated with resin. For CB/CS pipe woven roving reinforcement is done as per the winding sequence.

• PIPE WINDING

CNC controlled program is used to wind the pipe with proper design parameters. The CNC program controls the rotation speed of the mandrel and the speed at which the carriage transports the impregnated filament wound the mandrel. The winding angle is also controlled along with the number of layers in the pipe.

Typical helical winding angles vary from 55 to 73 degrees.

A dispenser unit provides the exact ratio of resin and curing agent which controlled by PLC machine.

• PIPE CURING

Curing is done by temperature controlled oven .
There two stages of curing - pre-curing and post curing.

PIPE EXTRACTION

Demolding machine extracts the pipes from mandrel. After demolding, mandrels are shifted back to mandrel preparation stage and pipes to the cutting area.

CUTTING

The manufactured pipes are cut as per required length.

HYDRO TESTING

After cutting Pipes are hydrotested as per the Inspection Testing Plan (ITP) on the pipe hydrotest machine.

• CALIBRATING

After hydrotesting, the pipes are shifted to the calibration machine as per the required design.

• FINISHING

The calibrated pipes are visually inspected before released for QC check.

FITTING MANUFACTURING

Fittings are manufactured by winding discontinous reinforcements of woven rooving, which is impregnated with the resin and a hardner component and is manually wound on the molds.

FITTINGS HYDRO TESTING

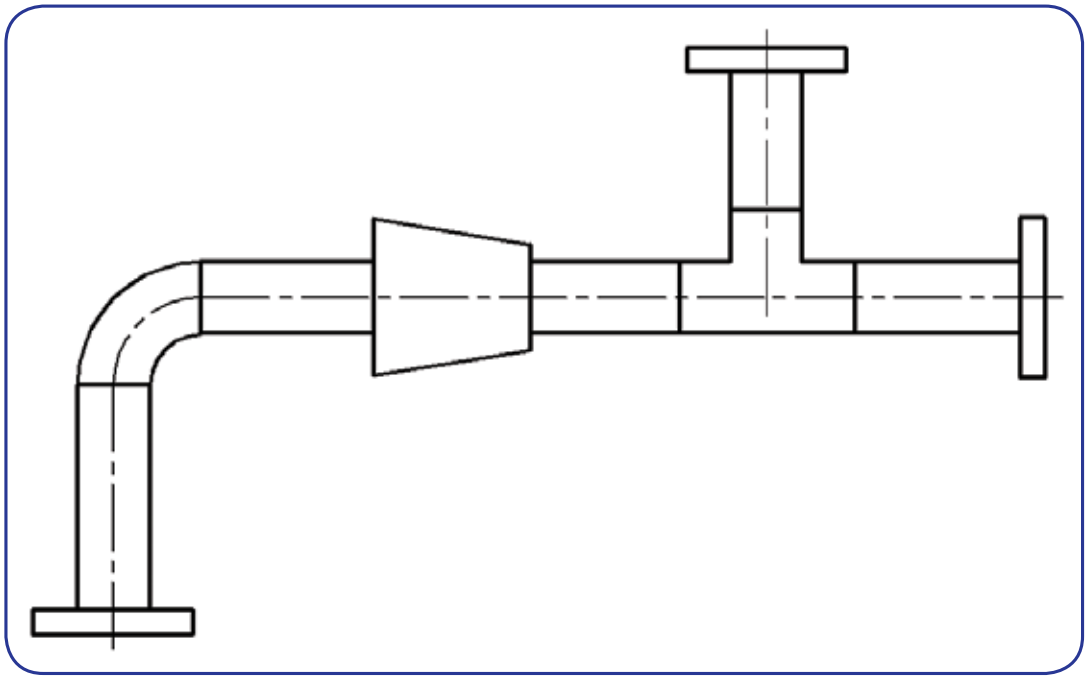
All manufactured fittings are tested in-house incompliance with international standards such as ASTM, ISO 14692-2 etc.

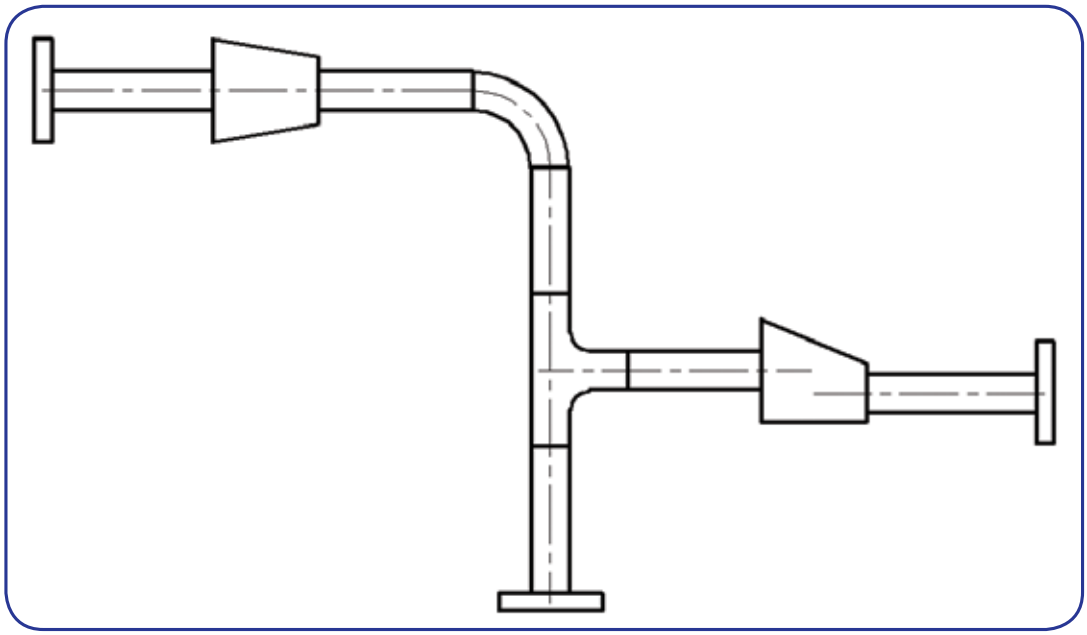
FINISHED FITTINGS

After Hydro testing the fittings are finished as per requirement and offered to QC inspection.

SPOOL

The term pipe spool refers to a prefabricated section of a piping system that includes the pipe, fittings and flanges that are pre-assembled in the CPI fabrication facility and then transported to the required site. We offer wide range of spools from 25 - 1400 mm fabricated in house by skilled and trained fabricators & bonders.





SPOOL DIA. 1400 X 1200 CONCENTRIC REDUCER, LAMINATION JOINT & FLANGES.

PRESSURE TESTING OF DIA. 1200 END CAP AND DIA. 80 SADDLE PICK

LOGISTICS

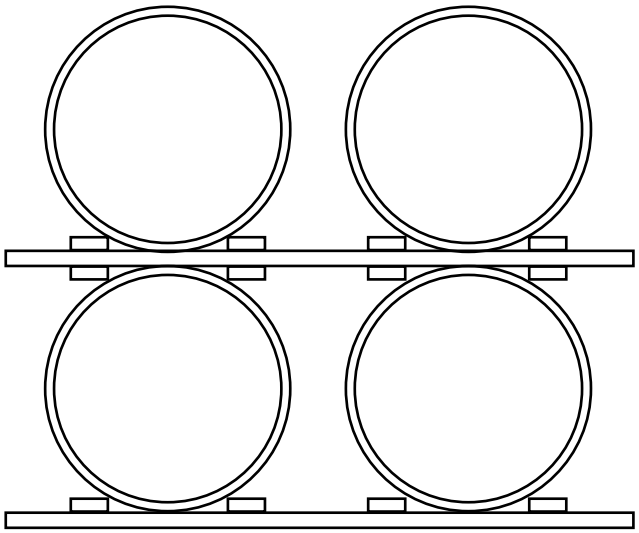
PROTECTION OF PIPES, FITTINGS AND SPOOLS

The ends of all pipes, fittings and spools shall be protected. These protections must remain in place throughout the operations of storage, transport and handling at site and must only be removed prior to bonding of the pipes and fittings.

PACKAGING FOR TRANSPORT

- Transportation used to transport pipes shall be flat-bottomed and free of any projections.
- Support the pipe and spool layers on the wooden planks.
- Place wooden blocks or rubber lined metallic beam vertically along the side panels to protect the pipes (avoid its direct contact with pipe).
- The pipes may be stacked at a height of 1.5-2 meters. Always place the wooden planks between layers. Pipes shall be stacked with bell ends in alternative directions. Spacers shall be located clear of the bell and spigot ends.
- Secure the pipes with nylon slings (securing with metal rope or chains shall not be permitted) and lock them with wooden wedges.

Fittings shall be loaded by hand on pallets or in boxes, with inter-component packing material to avoid transportation damage. Verify that there are no protruding nail heads or points on any wooden chocks or battens.

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