Flowtite is a worldwide pipe brand, based on a technology that embraces material, design, process and equipment. This brochure will give a brief introduction to the two latter technology areas - process and equipment.

Flowtite is the culmination of intense innovation, research and testing – over and over again, year after year - since 1968, when the first pipes were manufactured in Sandefjord, Norway. Our Flowtite Technology centre in Norway has the world’s largest and the most modern certified laboratory for the development and testing of GRP pipes.

Great research makes great Flowtite pipes!
Flowtite Jacking pipes manufactured in Germany

FLOWTITE PIPE MANUFACTURING

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Flowtite pipes are manufactured using the continuous advancing mandrel process which represents the state of the art in GRP pipe production. This process allows the use of continuous glass fibre reinforcements in the circumferential direction. For a pressure pipe or buried conduit the principle stress is in the circumferential direction, thus incorporating continuous reinforcements in this direction yields a higher performing product at lower cost. Using technology developed by material specialists, a very compressed laminate is created that maximizes the contribution from the three basic raw materials. Both continuous glass fibre roving and choppable roving are incorporated for high hoop strength and axial reinforcement. A sand fortifier is used to provide increased stiffness by adding extra thickness, placed near the neutral axis in the core. With the Flowtite dual resin delivery system, the equipment has the capability of applying a special inner resin liner for severely corrosive applications while utilising a standard type resin for the structural and outer portion of the laminate.

Flowtite filament winding

Taking advantage of the winding process, other materials such as a glass veil or a polyester veil can be used to enhance the abrasion, the chemical resistance and the finishing of the pipe. To assure a consistent, high level of product quality, it is essential that the method of fabrication be accurately controlled. The Flowtite filament winding machine represents the most advanced state of the-art technology in use, and is the foremost method of manufacturing glass fibre pipe.

Simply put, this manufacturing machine consists of a continuous steel band mandrel supported by beams in a cylindrical shape. As the beams turn, friction pulls the steel band around and a roller bearing allows the band to move longitudinally so that the entire mandrel moves continuously in a spiral path towards the exit assembly. As the mandrel rotates, all composite materials are metered onto it in precise amounts. Electronic sensors provide continuous production parameter feedback so that the various feeding systems apply the right amount of material. This ensures that the amount of material needed to build the different layers is applied throughout the manufacturing stage. Firstly, mould release film, followed by various forms and patterns of glass fibres, embedded in a polyester resin matrix. The structural layers are made of glass and resin only, whereas the core layer includes pure silica. It is the continuous application of these materials onto the mandrel which forms the pipe.

After the pipe has been formed on the mandrel, it is cured and later cut to the required length. The ends of the pipe section are calibrated to fit the coupling.
The double bell Flowtite couplings are manufactured on the continuous winding equipment and under the corresponding strict control procedures as the pipes. The coupling pipe process is tailor made in order to manufacture the coupling laminate, which is specifically designed to fit the two grooves for the lip gaskets.

The grooves are ground in a separate operation after manufacturing of the base coupling pipe. The coupling is cut to the required length during the grinding operation. Every coupling is pressure tested with water to two times the operation pressure before the coupling is mounted to the pipe.

The basic method for manufacturing of Flowtite fittings is by cutting pipe sections to size and connecting them with specially designed laminates, using multiaxial fabrics. Due to the huge amount possible combinations of diameters, pressure classes, and stiffness classes, the design process has been computer automated, and the operator receives detailed drawings of each reinforcement layer and hand-laying instructions.

The reinforcement mats are cut and marked, either with an efficient automatic cutting machine, or using power tools. The mats are then laid according to their marking, generating a smooth and hydraulically effective laminate, while consistent quality is ensured, regardless of operator skills. Fittings are also made with the woven roving and chopped strand mats. This is the more traditional way of fabricating fittings and has been the method used by Flowtite for decades.

Some Flowtite factories also make small diameter fittings on steel moulds.
STANDARDS AND QUALITY

FLOWTITE PIPES are manufactured to the following relevant standards under third party accredited quality assurance programs complying with ISO 9001 Quality Management System.

- ISO 25780 “Plastics piping systems for pressure and non-pressure water supply, irrigation, drainage or sewerage - Glass reinforced thermosetting plastics (GRP) systems based on unsaturated polyester (UP) resin — Pipes with flexible joints intended to be installed using jacking techniques”
- ISO 10467 “Plastics piping systems — Glass reinforced thermoplastics (GRP) systems based on unsaturated polyester (UP) resin Part 1: Pressure and non-pressure drainage and sewerage”
- ISO 10639 “Plastics piping systems — Glass reinforced thermoplastics (GRP) systems based on unsaturated polyester (UP) resin Part 2: Pressure and non-pressure water supply”
- EN 1796 “Plastics piping systems for water supply with or without pressure - Glass-reinforced thermosetting plastics (GRP) based on unsaturated polyester resin (UP)”
- NS-EN 14364 “Plastics piping systems for drainage and sewerage with or without pressure - Glass-reinforced thermosetting plastics (GRP) based on unsaturated polyester resin (UP) - Specifications for pipes, fittings and joints”
- ASTM D3262 “Standard Specification for “Fiberglass” (Glass-Fiber-Reinforced Thermosetting-Resin) Sewer Pipe”

COMPLIANCE

CEN TS 14632

FLOWTITE PIPES are manufactured in accordance with CEN TS 14632. This is taken into account on all levels of Flowtite manufacturing, from the manufacture of equipment to end control of pipes and couplings.

All pipes are quality inspected after manufacture to ensure their compliance with the relevant national and international standards.

FLOWTITE MANUFACTURING is subjected to extensive tests and quality control routines in order to secure the performance. Each product has a unique manufacturing specification which is audited regularly through manufacturing and pipe samples, which are sent daily to the laboratory in order to confirm the mechanical properties and material composition from the specification.

Every pipe is measured, marked and pressure tested with water to two times nominal operation pressure in the manufacturing line. The measured QC data is recorded for traceability of every pipe.

In-line production control, Location: Spain
SAMPLE TESTING

FLOWTITE® GRP QUALITY SYSTEM imposes specific procedures at every stage of pipe production to ensure a finished product that is according to Flowtite standards. Below are examples of some of these testing procedures.

Determination of initial ring stiffness

Determination of axial compressive strength

Laminate composition

Material composition control

Measurement of coupling dimensions

Flowtite winder in production. Photo: Spain.
EQUIPMENT BASICS

FLOWTITE TECHNOLOGY designs and supplies tailor made production equipment to produce Flowtite products of different range and specifications in an efficient and safe manner, and meeting highest quality product standards.

Different types of production equipment’s are available to cover the current Product range of Flowtite – the main types used are diameter related – most common are:

- CW 300 - manufactures products from DN80 to DN300
- CW 3000 - manufactures products from DN300 to DN3000
- CW 4000 - manufactures products from DN900 to DN4000

Any diameter within the range of DN80 - DN4000

The GRP pipe is manufactured on the winder. The winder consists of an advancing mandrel system on which the pipe is formed, as well as different material applications and storage systems, curing and extraction systems and many supporting functions. All Flowtite winders are fully PLC controlled machines with an easy to use operator interface.
**DOWNSTREAM EQUIPMENT**

After the pipe is manufactured on the winder it is delivered to the downstream section of the plant using a specially designed pipe transport way. Here the pipe spigots are calibrated and chamfered using a Flowtite chamfer calibration machine and the couplings are pushed on using a Flowtite coupling mounting machine.

In order to cut short pipes, samples or pipe sections used in fittings production, Flowtite Technology has developed the odd length station which covers these requirements. Couplings are manufactured out of specially manufactured coupling pipes using a Flowtite coupling milling machine. Every coupling is pressure tested with water to two times the operation pressure before the coupling is mounted to the pipe.

**TESTING EQUIPMENT**

FLOWTITE products are used in gravity and pressure applications. All pressure products are hydrostatically pressure tested. Pipes are tested on the Flowtite pipe pressure tester and couplings on the Flowtite coupling pressure tester.

Both machines are integrated in the pipe production flow, and as such are part of the downstream section. You can find more information about performed tests and testing equipment typically used in a Flowtite plant in this section here.
At Amiantit Technology, we design and manufacture the world’s best piping systems to provide unique, sustainable piping solutions and maximise the health and well-being of people around the world.

Flowtite is connected worldwide by more than 40 specialized production lines. Flowtite and Flowtite licensee plants are modern, efficient and reliable, located strategically on 5 continents of the world.

**FLOWTITE TECHNOLOGY** looks back at almost 50 years of successful history and has become the preferred provider of continuous filament wound GRP-pipe technology throughout the world. In cooperation with our partners and licensees we have developed a unique pipe production technology and the Flowtite brand is now recognised around the globe as the first choice of GRP pipe systems used in water applications.

This was only possible by maintaining close relations with our licensees with the aim to continuously provide them with products, support and new developments needed to succeed in their markets. Our unique market position and advanced technology solutions have been key in promoting factors for our licensees’ business and we are proud of our contribution to their success stories.

In order to promote our technologies on a global scale we have implemented a selective worldwide licensing program. Please contact us to learn more about our technologies and how to become a licensee.

**FLOWTITE TECHNOLOGY** provides full technology packages including product specifications, marketing material, manufacturing equipment, detailed production processes, and all related support and training required for a successful launch of a new operation.

**LICENSING PROGRAM**

**WORLDWIDE**
TODAY AND EVERYDAY MAKING THE WORLD A LITTLE BIT BETTER. Flowtite believes that the world’s need for infrastructure can be solved with innovation, research and excellence. At Flowtite we want to contribute to a more sustainable world. We do so by cutting edge technology through better research.

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