Overview

Yansab is the most recent SABIC (Saudi Basic Industries Corp), affiliate in Saudi Arabia, and will be the Sabic largest petrochemical complex. It will have an annual capacity exceeding 4 million metric tons (MT) of petrochemical products including ethylene propylene, polyethylene polypropylene, ethylene glycol, benzene, xylene and toluene. The project is owned by SABIC as majority shareholder.

Amiantit’s commitment is to closely monitor and receive feedback from their customers, which has revealed that, despite years of harsh environmental service conditions of their installed Flowtite® GRP pipes, the pipeline system remains in excellent condition. This proves that the Flowtite GRP pipes systems technology is well profound with an excellent back-up by experienced scientists, engineers and technicians who are committed in producing a superiorly engineered product.

Amiantit is fully dedicated towards its customer’s satisfaction and their expectations as well as safety and continuous improvement is their prime and utmost goal.

Project

In September 2005 AFIL contracted with Yansab for the design and supply of Flowtite® GRP pipes systems and fittings for the Yanbu Petrochemical Complex Project. Yansab is located at Yanbu’s Industrial city in Saudi Arabia. AFIL’s Flowtite® GRP corrosion resistant pipes systems and fittings were selected for Yansab’s sea & cooling water projects for both, underground and aboveground installation as a restrained system.

Amiantit Fiberglass® Industries Ltd (AFIL) was commissioned in 1977 as a Flowtite® GRP pipes and fittings manufacturer at the industrial area in Damman Saudi Arabia. Since then AFIL has produced more than 10 million meters (32.8 million feet) of Flowtite’s continuous advancing mandrel processed Glass fibre Reinforced Polyester (GRP) pipes, which represents the state of the art in GRP pipe production technology. This process allows the use of continuous glass fibre reinforcements in the circumferential direction. AFIL has supplied and supported its products nationally and internationally and delivered to countries at the Mediterranean Sea like Egypt, Syria and Libya and to countries at the Pacific Ocean like Hong Kong, New Zealand and Australia. Destinations in Malaysia, Singapore, India, Iran, Pakistan and Turkmenistan have also received GRP pipes from AFIL.
AFIL’s Flowtite® GRP Pipe system was the ultimate choice for the consultants due to the following advantages:

- Low maintenance costs.
- No pipeline system failures caused by cohesive materials and erosive natural soils.
- Flexibility of modification at very low cost;
- Onsite modifications can be done with consultation of AFIL field engineers through a local supplier.
- Easy installation.
- Inherent corrosion resistant.

An additional factor for using a Flowtite® GRP pipe system was the multinational recognition of the product with successful references.

In addition to the described project, AFIL’s Flowtite® pipes systems can also be used in the following main applications

- Water transmission and distribution.
- Sanitary sewerage collection systems and outfalls
- Storm water
- Hydropower
- Seawater intake and outfalls
- Circulating cooling water in power plants.
- Industrial application.

Product Range

M/S Fluor was the main contractor in charge of the seawater and cooling water piping installation for the U&O (Utilities and off-sites) section of the project. For the seawater application that was installed above/belowground M/S Fluor was supplied with various Flowtite® GRP pipes systems with more than 12000m of pipes ranging from diameters DN 600-3600mm with a pressure class of PN 8 bar and a stiffness class of SN2500 N/m².

As for the cooling water application that was installed above/belowground AFIL provided Fluor with a total of 12000m of various Flowtite® GRP pipes and fittings. The supplied diameters ranged from DN 750-4000mm with a pressure class of PN 10.3 bar and stiffness class of SN2500 N/m².

In general AFIL’s Flowtite® GRP pipe systems can be supplied in the following diameter range. Tailor made diameters can be supplied on request.

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AFIL diameter range in mm

In addition to the pipes, a wide range of Flowtite® GRP fittings and accessories are offered by AFIL and its affiliates throughout the world. These includes:

- Elbows
- Tees, Wyes and Nozzles
- Reducers
- Flanges
- Bulkheads
- Saddles
- Tapping

Installation

The installation methods used in this project were both underground and aboveground installation.

**Underground installation (UG):**
Is a common method of installing AFIL’s Flowtite® GRP pipes. For this project, trenches were dug and the pipes were joined using the butt and wrap process. The reason for using a restrained joint system goes back to eliminating the use of thrust blocks and the limited space available. Large pressure pipes with non-restrained joints require large concrete thrust blocks. Yansab’s project being a circuit system for seawater/cooling water had a very limited space between the pipes and it was not possible to have the thrust blocks placed in a sufficient distance between them, which concluded in installing the restrained joint system.

The actual bedding of the pipes is fairly typical in terms of placement. Each pipe joint is manually butt and wrapped together by the contractor and supervised by AFIL’s trained field technicians. The major challenge in the underground portion was the installation of 9 parallel seawater and cooling water lines from which a huge trench was dug and installation was carried out successfully.

**Aboveground installation (AG):**
Refers to the installation of pipes above ground level. The pipeline is fully exposed and supported on cradles. This method is often used inside plants or around its secure proximity. For this project it required detailed stress analysis to ensure proper performance. The major challenge in this area was the installation of larger diameter fittings in the above portion and laminating the above ground flanges with the flanges coming out from the underground portion.
Engineering Services

Other than manufacturing and supplying Flowtite® GRP pipes systems, AFIL provided engineering services before, during and after installation to Yansab to assure smooth and proper usage, installation and maintenance of its products. Following are a few examples of the services that were provided by AFIL during the Yansab Project:

Pipe and Fitting Design
- Development of isometric drawings.
- Design of GRP pipe and fittings.
- Performing stress and surge analysis.
- Performing analysis for testing circuits.
- Technical support including the method statement for the hydro test circuits.

Field Installation and Hydro Test Supervision
- Apart from supervising the installation, AFIL was fully involved in the technical support requirements to accomplish the hydro testing of the circuits.
- Installation of Flowtite GRP pipes systems and fittings were successfully hydro tested at the following testing pressures:
  - Cooling water system at 9.6 bar.
  - Seawater system at 6.5 bar.

Challenges and Solutions

As in any large project AFIL faced many challenges but with AFIL’s well trained professional managers, engineers and technicians AFIL was able to comprehend and resolve these tasks on the spot. Below are a sample of some topics and their solutions during the project.

Production, Fabrication and Testing
- Major constraint in terms of the fabrication was the completion of about 200 tees with header 4000mm/3600mm and branches 750mm/700mm in the plate exchange area of the project. This fabrication was carried out in one of Amiantit’s plants in Jeddah “Amitech Jeddah” and a special team was dedicated to achieve the target on time.
- Considering the volume of this project and the schedule available, Amiantit utilized all the three plants in the Kingdom (Amitech in Jeddah, AFIL in Dammam and FPC in Dammam) to target the schedule set by Yansab.

Handling, Packaging and Transportation
- The spools (elbows above 2900mm) which could not be transported due to the transportation limitation were delivered to the site in two sections. The middle miter of the elbows was fabricated at site by an AFIL trained crew.
- Given that the large diameter pipes involved in this project, handling and transportation is not an easy task, even so all the transportation was completed without reporting a single work accident or a damaged product.

Project and Data Sheet

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Appendix A / Samples of Engineering Drawing, Analysis and Design

Finite Element Analysis Drawing

Standard Project Drawing

Detailed Stress Analysis

Sample of a standard isometric drawing
Appendix B / Project Photos

DN 2900 and 2200mm Line Going to Utility Area

CWR and CWS Line Going to Valve Pit

WSS and WSR

CWS and CWR Main Header

CWR and CWS with DN 700mm Branches

CWS and CWR Main Header

CWR and CWS with DN 700mm Branches

Note:
WSR - Sea Water Return
WSS - Sea Water Supply
CWR - Cooling Water Return
CWS - Cooling Water Supply
Utmost Care has been taken to ensure that all the contents of this brochure are accurate. However, Amiantit and its subsidiaries do not accept responsibility for any problems which may arise as a result of errors in this publication. Therefore customers should make inquiries into the potential product supplier and convince themselves of the suitability of any products supplied or manufactured by Amiantit and/or its subsidiaries before using them.