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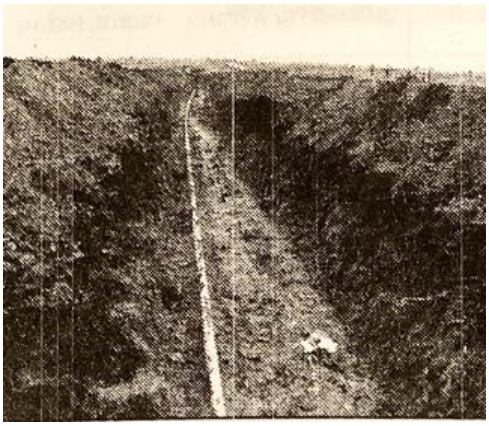
FIBREGLASS PIPING

The usage of FRP. Today, Fiberglass Reinforced Thermosetting Plastic (FRP) is being used in many industrial product applications, including the storage and transfer of corrosive materials and the handling of other materials in corrosive environments. While FRP piping has a 30-year history, it is a modern day product material with many emerging applications that take advantage of its corrosion resistance, strength-to-weight ratio, low maintenance and life cycle cost.



Fiberglass pipes feature high strength (30 to 40 times higher than that of a polyethylene pipes), low heat conductivity, corrosion resistance, very good electric-insulation properties, low specific mass, unlimited pipe length, resistance to incrustation by the components of the liquid being conveyed (paraffin, salts etc.), low pressure losses in pipelines and also simplicity as well as high assembly rate (a team of 5 men is capable of assembling up to 500 of a pipeline a day). Pipelines meant to convey both aggressive and other fluids within the temperature range from -196 C° to + 120 C°

What exactly is FRP piping? It is not to be confused with ordinary thermoplastic piping, such as PVC and polyethylene. Those thermoplastic systems typically employ non reinforced, extruded pipe and injection-molded fittings and flanges.

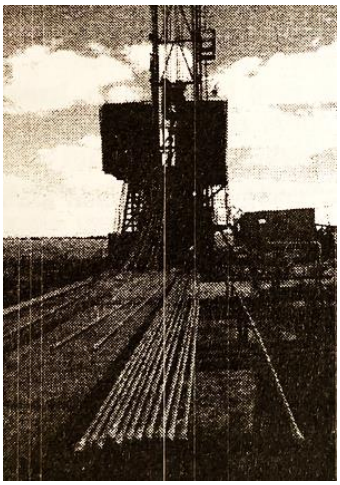
By contrast, FRP piping materials are manufactured by winding processes that employ epoxy resins, reinforced with continuous glass filaments. The resins used undergo irreversible chemical reactions as they cure, resulting in superior temperature capabilities, while the filament reinforcement makes the piping components mechanically far more capable than ordinary non- reinforced thermoplastics. This process is called thermosetting. The result is enhanced performance and lighter weight.

Machine-made FRP can have a higher glass loading content (i.e., a higher density glass fiber filament to resin ratios) than hand lay-up products. Also, ma-

chine made products are more reproducible since they are typically in a quality controlled environment.

The main spheres of application of fiberglass pipes are:

Oil-and-gas industry: Namely, tubing pipes in water supply wells and service wells as well as in gas-lift wells; high-pressure water mains in pressure maintenance systems; oil pipelines; pipelines for transporting chemically-aggressive fluids; basic parts of geophysical tools.



Communal economy: Heat supply systems,

systems of hot water supply, sewage, water supply tubing pipes for artesian wells.

Chemical industry: Pipelines for conveying chemically-aggressive fluids.

Energy production and communications: Heat-insulated pipes and linear pipelines for geothermal energy production, basic parts for electric insulators, as well as structural elements of antenna assemblies.

The main FRP manufactures in the world are Smith Fibercast Fiberglass Piping Systems, NOV Fiberglass Systems.

Currently, the "Plastar" Research and Production Company, Inc is the Ukraine's only producer of fiberglass tubing pipes capable of being used at the depths over 4 kilometers with pressure of up to 15 MPa for flowing pressure of up to 26 MPa.

The use of fiberglass tubing pipes in water-supply wells makes it possible to eliminate the problem caused by pipe corrosion in an area of water level difference when switching the pump on and off, this corrosion being the main reason through which metal tubing pipes break apart. Specific mass of fiberglass pipes is 4 times smaller than that of metal ones. Thanks to a high strength of fiberglass, a pump can be mounted right on a pipe.

Pipelines made of fiberglass pipes produced by the "Plastar" company are successfully used for conveying salt-saturated media as part of reservoir pressure maintenance systems in the oilfields operated by the "Ukrnafta" public company.

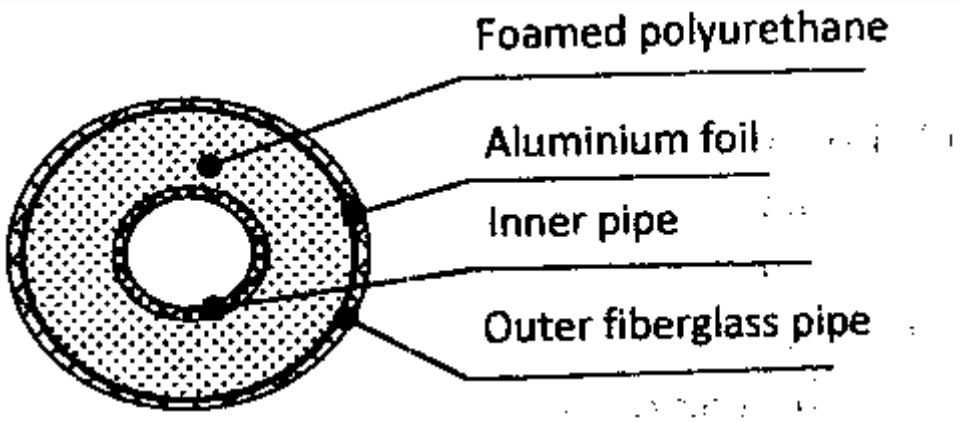
The "Plastar" offers a complete range of shaped pieces equal in strength to a pipe body: takeoffs, breechings, couplers, shoulders and adaptors. Guaranteed lifetime of our products is 15 years.

№	Oilfield	Pipe diameter and pipe thickness, mm	Pipeline length, m	Flowing pressure, MPa	Year of commission
1	Anastasyivcke oil-	108x4.2	690	2	2000

	field				
2	Anastasyivcke oil-field	108x4.2	390	2	2000
3	Perekopivske oil-field	108x4.2	265	2	2002
4	Perekopivske oil-field	108x4.2	205	2	2004
5	Perekopivske oil-field	108x4.2	650	2	2004
6	Bugruvativske oil-field	162x6.0	2322	2	2008

Company developed the technological process of producing fiberglass pipes that don't accumulate static electricity. The essence of the process is that a current-conducting wire is inserted into a pipe wall thereby the production cost is only increased by not more than 5%.

Specialists developed and patented pre-insulated pipes *for geothermal power production and hot water supply* (Patent of Ukraine №39881)



The advantages of such pipes helping reduce energy consumption are as follows:

1. Low heat conductivity factor of 0.4 to 0.5 Wt/(m*K) (steels usually have the factor value of about 50).

2. The application of a foam layer located in the space between the tubes, this foam layer having even lower heat conductivity factor (0.032…0.038 Wt/m*K).

3. The outer fiberglass pipe is hermetically impervious thus keeping dampness off and securing the stability of thermo-insulating properties within the entire period of pipe service life.

4. The presence of at least 10 screening layers of aluminium foil on an inner surface of outer pipe meant to prevent energy losses through emission.

5. An inner pipe uses epoxy binding material made on the basis of an aromatic amine possessing high hydrolytic resistance thus making it possible to use the products for conveying hot and overheated water. With the temperature of a heat carrier being 95 degrees Celsius, the temperature drop in this carrier will constitute less than 2 degrees Celsius per 1km of a pipeline.

Besides, the inner surface of pipes is mirror-like, its roughness being 4 to 5 times smaller than that of new metal pipes. Taking into consideration the fact that our pipes don't get incrusted, their use provides for a considerable energy saving while conveying water due to low hydraulic losses.

References

1. Rasato. D. V. and Grove. C.S., «Filament Winding», John Wiley and Son, New York, 1964, p 180.

2. стандарт NSI /API Spec 15HR Specification for High Pressure Fiberglass Line Pipe, Includes Addendum/Errata 1 and Errata 2 (2008) Edition: 3rd American Petroleum Institute / 01-Aug-2001 / p 25.

3. сайт http://www.futurepipe.com

4. сайт http://www.nov.com/FiberGlassSystems

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