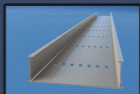




MASHADSADRA CO.

Manufacturer of G.R.P & G.R.V & G.R.E
Pipes, Fittings and Tanks



MashadSadra Pipe Industries





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1- Introduction of MashadSadra Company

MashadSadra Company started its activities with glass reinforced plastic (GRP) composite pipes by discontinuous filament winding (DFW) method since 1995, followed by the design and manufacturing of fittings, vessels, and fiberglass profiles according to the international standards.



Generally, the company produces its products in the form of three types of material (resin), as follows:

- GRP (Glass Reinforced Polyester)
- GRV (Glass Reinforced Vinyl Ester)
- GRE (Glass reinforced Epoxy)

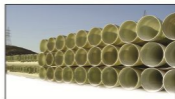
In 2006, MashadSadra Company as the first company, which designs and produces pipes and fittings (bell & Spigot with adhesive bonded) by using discontinuous filament winding achieved to supply all the requirements of oil industry and petrochemical companies and stopped importing fiberglass products from overseas companies in the field of transferring petroleum products and their derivatives.

Moreover, the company succeeded to obtain international quality management licenses (ISO/TS 29001:2007, ISO 9001:2008) and Food Grade from valid authorities. The company also received a certification issued by the Institute of Standards and Industrial Research of Iran.

2- Review of Fiberglass Products

2-1- History of Glass Reinforced Plastics (GRP) Pipes

GRP pipes have had a valuable status in the application of protected steel pipes, stainless steel pipes, and other materials since 1950. In the same year, GRP pipes manufactured using centrifuge method were introduced to oil industry for the first time. These pipes have been regarded as a suitable solution for elimination of corrosion.





The term GRP is an abbreviation for Glass-Fiber Reinforced Plastics, which is interpreted as fiberglass reinforced plastics. On the other hand, GRP is the abbreviation for Glass-Fiber Reinforced Thermoset resin Plastics, considered as fiberglass reinforced pipes made of thermoset resins.

On the mid-1950s, high-pressure GRP and GRP pipes with threaded joints special to be used at the end of the well were manufactured by filament winding. These pipes are perfectly suitable to be applied in oil fields. Since 1955 up to the mid-1960s, numerous products and manufacturers have entered the pipe marketing. Since then, GRP products have been approved to be used in urban water pipe market and sewage collection.



Given the service life of fiberglass pipes, as well as their strength and resistance against corrosion, which eliminates the external and internal surfaces and Cathodic protection, as these cost-effective pipes are a more efficient choice, compared to steel-coated or stainless steel pipes and other types of metals.

The basis for designing these pipes is the standards of American water works association (AWWA), which was introduced with the official name of RTRP. After numerous changes based on different types of available pipes or different features, the title of AWWA was officially announced. Nevertheless, some manufacturers often use their own desired terms.

- Fiberglass Reinforced plastics (FRP)
- Fiberglass Reinforced Epoxy (FRE)
- Glass Reinforced Plastics (GRP)

It should be mentioned that there are some unofficial but common terms as well. Regardless of the ability to produce pipes with various combinations, these pipes are generally recognized as fiberglass pipes, which covers all types of materials used in this product.

2-2- Features of GRP,GRV and GRE Pipes

1. High mechanical strength due to high modulus in direction of fibers
2. Resistance to chemical environments (high resistance to corrosion, which results in long service life and lack of need for protective coatings)



3. Low roughness of the inner surface (low friction coefficient and, consequently, reduced pumping costs and energy consumption)
4. Low weight of product (20% weight of steel pipes, consequently, reduced costs of loading and installation)
5. Quick and easy installation due to various installing techniques (male and female joint, flange joint, butt welding joint)
6. At least fifty years service life, which represents maximum economic efficiency.
7. Hygienic and applicable in potable water applications.
8. High temperature resistance up to 130°C (GREV)
9. Resistance against UV radiant by using special additives.
10. Electricity and heat insulation
11. Possibility of a few angular deviation along the line at pipe joints and, as a result, probability of eliminating elbows with low angle
12. Constant hydraulic characteristics during the service life of pipelines
13. Reduction of accumulated sediments on the inner surface of the pipe and, consequently, reduced costs of descaling

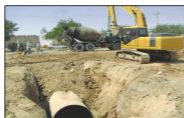


2-3- Applications of GRP, GRV and GRE Products

1. Transfer of crude oil and refined petroleum
2. Industrial applications, including industrial wastewater, corrosive liquids and chemical waste



3. Fluid transfer in subsea pipelines
4. Water supply, drainage, and urban wastewater treatment networks

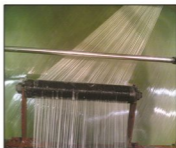
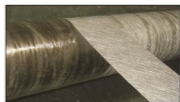


5. Using in cooling water systems
6. Fire fighting networks
7. Process lines for industrial plants
8. Adjusting water valves in dams and other various items

2-4- Advantages of Discontinuous Filament Winding (DFW) in manufacturing GRP,GRV and GRE Pipes

1. Possibility of using continuous fiber along the entire length of pipes and simple directing of fibers toward loading
2. Significantly high repetition capability of wrapping pattern from one layer to another layer and from one piece to other pieces
3. Possibility to manufacture very large pieces

4. Possibility of achieving the product with high fiber volume fractions
5. Ability to fully automate the system to prevent operational errors
6. Possibility of changing tensile strengths of pipes based on requirements by changing winding angle in filament winding system
7. Making high creep and fatigue properties
8. In addition, lack of use of fillers (silica sand) and using 100% of glass fibers and resin in the structure led to increased chemical resistance in long term. Therefore, this method is more preferred in oil industry and refineries, compared to other production techniques.





2-5- Special Benefits of Discontinuous Filament Winding (DFW) Pipes

1. Homogeneous and uniform structure throughout the product
2. Possibility of using different resins in different layers.
3. No layer separation (delamination) due to arrangement and materials of pipe layers
4. Achieving different mechanical strength corresponding to the designed winding angle of pipes
5. Purity of the applied materials and their qualities
6. Withstanding of high pressures depending on the type of fibers and design of layers and winding angle.
7. Possibility of installing production line and implementation of pipelines with regard to fewer facilities at the project site

3- License and Standards

- ✓ Food grade approval of products from food and drug administration of ministry of health
- ✓ ISO IEC 17025 standard concerning the general requirements for the competence of testing and calibration laboratories

- ✓ Laboratory accreditation certificate (accredited laboratory) from National Accreditation Center of Iran (NACI)



- ✓ Four incentive standards licenses from Standard Organization and Industrial Research of Iran for water pressure pipes, sewer pipes, and pressure industrial pipes



- ✓ International licenses of Integrated Management System (IMS), including ISO 9001, ISO/TS 29001, ISO14001, OHSAS18001 and ISO/IEC 17025



- ✓ Being on the approved vendors list (AVL) of Pars Oil and Gas Company (POGC)
- ✓ Research and development license (R&D) from Industry, Mine, and Trade Organization



- ✓ Operating license from Industry, Mine, and Trade Organization



- ✓ Legal membership in Iran Composites Scientific Association
- ✓ Member of Iranian Association of Standard Holders



4- Tests

One of the main targets of MashadSadra Company is obtaining the satisfaction of clients regarding the qualities of their manufactured

products. Therefore, the necessary tests are divided in two main groups of raw materials and final products.

4-1- Raw Materials Testing

Because the products manufactured in Mashad Sadra Company are mainly consist of fibers and resins, it is essential tests accurately these two materials in the laboratory to confirm the presence of the required properties.



4-2- Final Products Testing

Final products tests are divided into two groups of design (qualification) tests and quality tests. In addition, sampling is carried out according to the defined standard criteria.

4-2-1- Quality Test

These tests are mainly carried out to confirm the mechanical strength (axial and hoop loads) and resistance to corrosion of products in long-term exploitation.



Size of producible pipes (mm) and their length (m)											
diameter	15	20	25	40	50	75	80	100	125	150	200
length	3	3	3	3	6	6	6	6	6	6	6
diameter	250	300	350	400	450	500	600	700	750	800	900
length	12	12	12	12	12	12	12	12	12	12	12
diameter	1000	1100	1200	1400	1500	1600	2000	2500	2600	3000	4500
length	12	12	12	12	12	12	8	8	8	10	6

4-2-2- Design and Qualification Test

Long term hydrostatic and short term hydrostatic tests are performed to design the structure of products and evaluate the qualification of manufactured products and matching it with the selected pressure range. These tests are performed according to ASTM D1598, method B of ASTM D2992 and part 2 of ISO 14694.

Flange types: All flanges in the form of fixed and loose flanges with different joint types



5- Products

5-1- GRP Pipes and fittings (Tee, Elbow, Flange, Reducer)

Pipe types: Size of 25-1100 mm in pressure range of 6-40 times





Tee types: Production of Tee fittings are done in two groups of equal tee and reducing tee in the form of lateral and vertical angles with different joint types of bell and spigot with O-ring, plain end, bell ends with adhesive bonded .



Types of Elbows:

Producing elbows are done according to the standard and nonstandard angles between 5-90 degrees with different joints: plain ends, bell ends with adhesive bonded , flange, and bell and spigot with O-ring.



Reducer Types (Convertor):

Producing reducer fittings are done in two groups of concentric reducer and eccentric reducer with different kinds of joints: plain end, bell end with adhesive bonded , flange, and bell and spigot with O-ring.





Types of Caps and Blind flanges

Cap pieces are manufactured by hand lay-up with three kinds of plain end, flange and bell end with adhesive bonded. Same method is applied for blind flanges, which are manufactured by machine procedures. These pieces are used to choke the end of pipe lines and vessels.

Products with Thermoplastic Liner:

MashadSadra specialists have succeeded to manage corrosion problems by exploiting the technology for manufacturing pipes and joints with thermoplastic liner (e.g., PVC, PVDF, and other similar products) in combination with GRP in a condition that even GRE products are not able act efficiently. Due to customer demands, the company can manufacture these products according to the international standards.

5-2-Vessels

MashadSadra Company manufactures vessels by combining two common methods of hand lay-up and discontinuous filament winding. Similar to other products, Vessels are produced with different types of resins (Polyester, Vinylester, Epoxy) and glass fibers with regard to the customer demands. Moreover, this company can produce vessels with liner that are uniquely produced by inner layers of PVC, UPVC, CPVC, and PVDF, each of which has specific features.



no	length mm	diameter mm
1	12000	700
2	12000	800
3	12000	900
4	12000	1000
5	12000	1100
6	12000	1200
7	1000	1400

no	length mm	diameter mm
8	2600	1500
9	12000	1600
10	8000	2000
11	8000	2500
12	8000	2600
13	10000	3000
14	6000	4500





Benefits of Fiber Glass Vessels

- ✓ High corrosion resistance in both outside and inside of vessels
- ✓ Absolute impermeability of vessels and relevant fittings from inside to outside and vice versa
- ✓ Ability to install equipment and nozzles at project sites with minimum facilities
- ✓ Lack of need for coating and covering or Cathodic protection
- ✓ High mechanical properties due to use of glass fibers
- ✓ Very long service life without the need for preserving
- ✓ Low weight of vessels, which leads to easy transporting and installation
- ✓ Ability to easily repair at installation sites

Fiber Glass vessels applications:

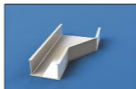
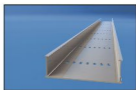
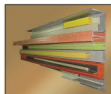
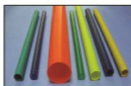
Fiber glass vessels have a wide range for storing materials, such as chemicals, petrochemicals, and food stuffs. Applications of vessels is in two forms of above ground and buried . Vessels can also be manufactured as storage container (static pressure) and under pressure. Applications of

vessels are mentioned, as follows:


- Vessels for storing drinking water
- Scrubber tower
- Vessels for storing Acid and Bases
- Sand filter
- Vessels for storing saltwater
- Septic tank

5-3-Profiles


Fiberglass profiles are among products which are manufactured by Pultrusion method in Mashad Sadra Company. Due to the specific properties of products that are manufactured by using this method, these products can be an appropriate alternative for similar metal ones in industrial usage.









a
2
4
5
5.5
10
12
19
25
30




a	b	c
102	51	6.5
70	35	4
60	25	3
110	60	6




a	b	c
100	50	6
80	40	5
160	50	8
240	73	8
50	22	4




a	b
20	5
100	12
120	12




a	b	c
60	60	8




a	b	c
60	25	11
38	15	4
25	15	3
100	50	6



a	b	c
100	100	8
40	40	5
90	90	6



a	b
25	2.3
16	1.5
20	5
100	10



a	b	c
102	102	6.5
51	51	4



Benefits of Fiber Glass Profiles:

- Resistance to Ultraviolet (UV)
- Resistance to wet environment
- High resistance to chemical materials (corrosion resistance)
- Resistance to fire by using additives
- Variation of colors due to the use of pigments (additive)
- Light structures and easy transportation due to low weight
- High tensile and bending strength due to fiber glass properties
- Minimum repairs and easy installation with various systems of installing
- Resistance to static loading
- Electricity non-conductivity
- Reduction of radio waves interference
- Reduction of line power loss in electrical systems
- Improving the service life of structure inside the concrete
- Withstanding impact and loads result from strong winds

Fiberglass Profiles applications:

- Cooling tower retaining construction
- Protective coating (covers) of electrical cables
- Using in oil and gas platforms of petrochemical and refinery industries
- Employing in evaluating refinery platforms and pools of water and wastewater industries
- Cable-crossing pipes in electronics industries, as well as aerospace, marine, construction, and automotive industries

5-4- By-products:

- Epoxy adhesive
- Custom products of fiber glass materials



6- Contact Us

MASHADSADRA CO.

Design and Manufacturing of GRP Pipes, Fittings, Vessels, and Pultruded Profiles

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