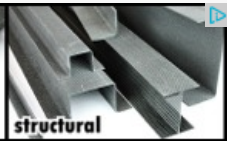
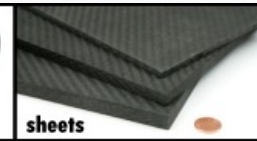


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Fiberglasses

Dr. Dmitri Kopeliovich

Fiberglass is a common name of Polymer Matrix Composite materials reinforced by fine glass fibers.

The **reinforcing dispersed phase** may be in form of either continuous or discontinuous glass fibers.

Glass is widely used as a material for reinforcing fibers due to the following its properties:

- Readily available and inexpensive material;
- Simple and inexpensive technology of preparation of continuous fibers from molten glass;
- High **tensile strength**, which may reach 600 ksi (4100 MPa);
- High **corrosion** resistance.

The types of glass used for fiberglasses are as follows:

- **E-Glass** – the most popular and inexpensive glass fibers. The designation letter “E” means “electrical” (E-Glass is excellent insulator). The composition of E-glass ranges from 52-56% SiO₂, 12-16% Al₂O₃, 16-25% CaO, and 8-13% B₂O₃
- **S-Glass** – stronger than E-Glass fibers (the letter “S” means strength). S-Glass is used in military applications and in aerospace. S-Glass consists of **silica** (SiO₂), **magnesia** (MgO), **alumina** (Al₂O₃).
- **S+R-Glass** – the strongest and most expensive glass fibers of low diameter (half of that of E-Glass fibers).
- **C-Glass** – corrosion and chemical resistant glass fibers. C-Glass fibers are used for manufacturing storage tanks, pipes and other chemical resistant equipment.

Glass fibers are manufactured from molten glass, from which glass monofilaments are drawn and then gathered to strands. The strands are used for preparation of different glass fiber products (yarns, rovings, woven fabrics, mats).

The most popular matrix materials for manufacturing fiberglasses are **Thermosets** such as **unsaturated polyesters (UP)**, **epoxies (EP)** and **Thermoplastics** such as **nylon (polyamide)**, **polycarbonate (PC)**, **polystyrene (PS)**, **polyvinylchloride (PVC)**.

Fiberglass materials usually have **laminated structure** with different fibers orientations in the reinforcing

Packaging Material

Flexible packaging material dry laminate, film lamination
www.mitsuichemicals.com

Glass Substrates

.5mm-1000mm diameter, tolerance to .010mm thick to .125mm, surface 2A
sydor.com/products.asp

Surfx Technologies

Atmospheric plasma bond preparation
 Replace: sand-grit blast-peel ply
www.surfxtechnologies.net

Aluminum Extrusion Suppliers

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linktob.com/eural-alumin...

Polyply Composites LLC

Compression Molder and Compounder of fiberglass reinforced plastics.
www.polyplycomposites.co...

Fiberglass materials usually have **laminate structure** with different fibers orientations in the reinforcing glass layers. Various glass fibers orientations result in anisotropy of the material properties in the plane parallel to the laminates. Concentration of glass fibers in fiberglass is normally about 40% - 70%.

Glass fibers reinforced polymer matrix composites are manufactured by **open mold processes**, **closed mold processes** and **Pultrusion** method.

Fiberglasses (Glass fibers reinforced polymer matrix composites) are characterized by the following properties:

- High **strength-to-weight** ratio;
- High **modulus of elasticity-to-weight** ratio;
- Good corrosion resistance;
- Good **insulating properties**;
- Low thermal resistance (as compared to metals and ceramics).

Fiberglass materials are used for manufacturing: boat hulls and marine structures, automobile and truck body panels, pressure vessels, aircraft wings and fuselage sections, housings for radar systems, swimming pools, welding helmets, roofs, pipes.

Properties of fiberglasses

(Materials Data)

- **Polyester Matrix Composite reinforced by glass fibers (Fiberglass)**

[to top](#)

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