Fiberglass Manufacturing

Fiberglass refers to products made from individual glass fibers combined into a variety of forms. The major ingredients are silica sand, limestone, and soda ash. Glass fibers can be divided into two major groups:
- continuous fibers used in yarns and textiles
- discontinuous (short) fibers used as batts, blankets, or boards for insulation and filtration.

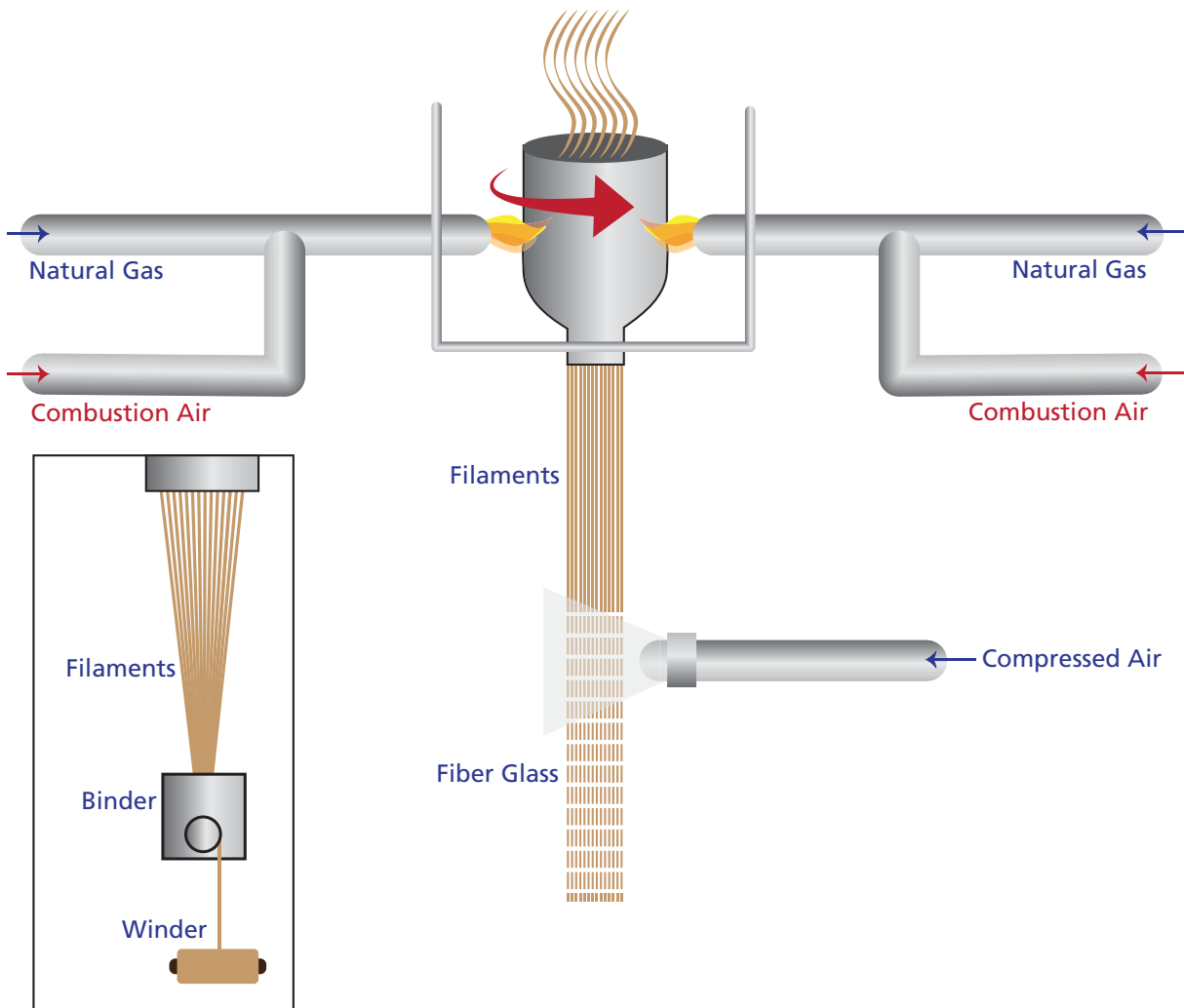## The Manufacturing Process

Melting
Once the batch of raw materials is prepared, it is melted in a furnace. Temperature must be precisely controlled to maintain a smooth, steady flow of glass (about 2500°F (1371°C). The molten glass is then sent to the former.

Forming into fibers
Several different processes are used to form fibers, depending on the type of fiber. Textile fibers may be formed from molten glass directly from the furnace, or the molten glass may be fed first to a machine that forms glass marbles of about 0.62 inch (1.6 cm) in diameter. In both methods, the molten glass is fed through heated bushings (spinnerets) with anywhere from 200 to 3,000 very fine orifices, coming out as fine filaments.

Continuous-filament process
To produce a long, continuous fiber, multiple strands are caught up on a high-speed winder after the glass flows through the holes in the bushing. The winder revolves at about 2 miles (3 km) a minute, much faster than the rate

Natural Gas

Natural Gas

Combustion Air

Combustion Air

Filaments

Filaments

Binder

Fiber Glass

Compressed Air

Winder

of flow from the orifices. The tension stretches the filaments while still molten, forming strands a fraction of the diameter of the openings. A chemical binder is applied, which helps keep the fiber from breaking during later processing, and then it is then wound onto tubes. It is now able to be twisted and plied into yarn.

Staple-fiber process

As the molten glass flows through the bushings, jets of air rapidly cool the filaments. The turbulent bursts of air also break the filaments into lengths of 8-15 inches (20-38 cm). These filaments fall through a spray of lubricant onto a revolving drum, where they form a thin web which is pulled into a continuous strand of loosely assembled fibers. This strand can be processed into yarn by the same processes used for wool and cotton.

Chopped fiber

Instead of being formed into yarn, the continuous or long-staple strand may be chopped into short lengths. The chopped fiber is formed into mats to which a binder is added before it is cured in an oven. Various weights and thicknesses produce products for shingles, built-up roofing or decorative mats.

Glass wool

The rotary or spinner process is used to make glass wool. As the container spins rapidly, horizontal streams of glass flow out of the holes. The molten glass streams are converted into fibers by a downward blast of air, hot gas, or both. The fibers fall onto a conveyor belt, where they form a fleecy mass. This can be used for insulation, or the wool can be sprayed with a binder, compressed into the desired thickness, and cured in an oven. The resulting product may be a rigid or semi-rigid board, or a flexible batt.

Protective coatings

In addition to binders, other coatings can be required for fiberglass products:
• Lubricants
• Anti-static agents
• Sizing
• Coupling agents

Forming into shapes

Fiberglass shapes are made using several processes. For example, fiberglass pipe insulation is wound onto rod-like forms directly from the forming units, prior to curing. The cured lengths are then de-molded lengthwise, and sawn into specified dimensions. Facings are applied if required, and the product is packaged for shipment.

Many fiberglass fabricators actually produce fiberglass-reinforced plastics (FRP), not glass fibers. Many types of products can be, and are, reinforced with fiberglass. Common reinforced products include pipes, tanks, scrubbers, grating and custom manufacturing equipment.

Hoffman & Lamson Blowers

The furnace temperature must be precisely controlled to maintain a smooth, steady flow of molten glass. The reliable feed of combustion air, provided by Hoffman & Lamson multistage centrifugal blowers, helps to ensure that the melting process is steady and accurate.