



## TEMPAR-GLAS®

### TEMPERED SAFETY GLASS

#### MANUFACTURING SPECIFICATIONS AND GENERAL INFORMATION

For over 45 years, Virginia Glass Products Corporation has been a leading manufacturer of precision custom tempered glass, all glass entrances and doors, and ceramic enamel frit spandrel for commercial construction and original equipment manufacturing. In addition, VGP has been a pioneer in the use of the TPS Warm Edge spacer system for manufacturing SureSeal™ Insulating Glass.

**TEMPAR-GLAS®** is the registered trade-name for tempered safety glass manufactured by Virginia Glass Products Corporation.

**Tempering Process** – Glass is uniformly heated in an oscillating, horizontal, roller-hearth furnace until the entire thickness of the glass has reached a temperature of approximately 1200° F. This can range from between less than three minutes for 1/8" glass up to 15 minutes for 3/4" glass. Following heating the glass is rapidly cooled, or quenched, by a blast of air uniformly delivered to the top and bottom surfaces of the glass. Immediately upon quenching the surface cools and becomes rigid. The interior, meanwhile, cools at a slower rate and is prevented from contracting by the surface which

has already become rigid. Thus, the core is permanently placed in tension, causing compressive forces on the surfaces and edges. This incredible residual compression (in excess of 10,000 psi on the surface) must be overcome before the glass will break. It is this state of surface compression that gives tempered glass its strength as well as its safety characteristics if broken.

**Safety** – Tempar-Glas® is certified by the Safety Glazing Certification Council to meet the requirements for safety glazing materials as defined by the American National Standards Institute, specification ANSI Z97.1, and the Consumer Products Safety Commission, specification number CPSC 16 CFR 1201, category II. If Tempar-Glas® were to break, it will disintegrate into innumerable, small, rounded particles which are unlikely to produce deep, piercing injuries normally associated with shards of broken annealed glass.

**Strength** – Tempar-Glas® is three to five times stronger than annealed glass of the same thickness. The surface compression of Tempar-Glas® is not less than 10,000 psi and the edge compression is not less than 9,700 psi.

**Thermal Shock Resistance** – Due to the potential for thermal stresses that curtain walls, fenestrations, or other glass applications might be subjected, heat treating must be considered. The requirement to heat treat glass for thermal shock resistance is dependent upon the application and type of glass being used, either monolithically or in combination with other glass in an insulating glass unit. (Refer to Technical Bulletin TG-7 for important information concerning the use of heat-strengthened glass vs. fully-tempered glass.) Tempar-Glas® can sustain a temperature differential of up to 400° F between two surface areas, and can withstand a uniform temperature of up to 550° F without serious loss of its temper. Tempered glass is not a fire retardant material, however.

**Design & Glazing** – Care should be exercised to insure sufficient clearances in frame members to allow for thermal expansion and proper fit. The glass should never become load bearing. All design and glazing should be in accordance with the Glass Association of North America's *Glazing Manual*.

**Flatness** – As is characteristic of the tempering (and heat-strengthening) process, a slight deviation from the normal flatness associated with annealed glass will be found. The amount of deviation depends upon glass thickness, length, width, and other factors. However, the overall bow and warpage will not exceed that which is allowed by the American Society for Testing and Materials (ASTM) specification number C1048-04, Table 2. In addition, a very slight surface wave may be caused by contact with the furnace rollers. This waviness can sometimes be detected when viewing reflected images on the glass surface from a distance.

**Design Consideration** – Design criteria such as structural integrity, strength, thermal movement, air infiltration, static pressure and other structural and performance considerations are the sole responsibility of design professionals such as structural engineers and/or architects. Virginian Glass Products Corporation furnishes quotations for; and upon receipt of a written purchase order, glass and accessory hardware as requested by the customer. Virginia Glass Products Corporation is not selling a prepackaged system.

#### Manufacturing Specifications:

- Glass thickness: 1/8", 3/16", 1/4", 3/8", 1/2", 5/8", 3/4"
- Maximum size: 96" X 180" (depending upon thickness)
- Minimum size: 12" X 12"

- Dimensional Tolerances: Rectangular shapes – per ASTM C 1048-04, Table 1  
Pattern-cut shapes – consult factory

**Fabrication** – No fabrication may be performed to glass after heat treating. All fabrication requirements must be performed prior to heat treating and shall be subject to factory approval. Virginia Glass Products Corporation has fabrication capabilities to provide holes, notches, flat polished edgework, mitered edgework, radius-cut pattern shapes, straight-cut pattern shapes, and sandblasting of patterns and logos.

**Delivery** – Products provided by Virginia Glass Products Corporation are either boxed and may be delivered by means of our company operated tractor-trailer fleet, or are loose-lite and delivered by our fleet of rack trucks. Our tractor-trailers utilize boom lift cranes that allow for convenient and safe unloading of our product at our customers' facility or job site. (Consult factory for geographic areas served by each type of delivery.)

**Limited Warranty** – Tempar-Glas® tempered glass will meet or exceed the applicable requirements of the following specifications:

- ASTM Specification C1048-04
- ASTM Specification C1036-01
- Glass Association of North America, Tempering Division Specifications
- American National Standards Institute, ANSI Z97.1-1984
- Consumer Product Safety Commission, CPSC 16CFR, Category II

The nature of heat treated glass is such that despite careful processing by the Company the glass may, on occasion, break without apparent reason after installation. This may be the result of certain impurities in glass received by the Company, of scratching during installation, of improper mounting or maintenance, or of impact by foreign objects. Because this breakage may be the result of these circumstances over which the Company has no control, THE COMPANY DOES NOT WARRANT AGAINST GLASS BREAKAGE. WE MAKE NO WARRANTY OF MERCHANTABILITY, NO WARRANTY THAT THE MATERIAL IS FIT FOR ANY PARTICULAR PURPOSE OR USE AND NO OTHER WARRANTY, EXPRESSED OR IMPLIED, with the exception that the products are warranted to conform with the applicable specifications as stated in our Terms and Conditions of Sale. The Company shall not be liable for the cost of removal or installation of, or any incidental, consequential or other damages in connection with such material.

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