



## ACID ETCHED\*

**Definition:** Glass that has been chemically treated with an acidic material, such as hydrofluoric acid, to produce a surface finish that will diffuse transmitted light, reduce glare and has a “frosted” appearance. The treatment on glass is used to diffuse light, reduce glare and obtain a translucent appearance. It can be used for both interior and exterior applications. The treatment on mirror is used to obtain a soft matted reflection. The treatment can be applied to provide different levels of translucence, either uniformly over the entire surface or in selected areas creating decorative patterns. Also see etched glass, frosted glass, satin etch.

### Applications:

**Interior:** Dividing walls; wall coverings; office partitions and enclosures; shower and bath enclosures; floors, stairs and railings; doors; displays and shelving; elevator cabs; kitchen cabinets; furniture components

**Exterior:** Sealed units, spandrels, balustrades, bus shelters, skylights, canopies, atriums, doors

### Custom options available:

- Etching possible on any North American float glass substrate
- Colors: clear, bronze, grey, black, blue, green and ultra-clear
- Finish: varying levels of glass translucency and mirror reflection
- Coverage: full surface, single-sided, double-sided, partial surface, patterns
- Any type of custom pattern is possible

**Fabrication options available:** cutting, polishing, beveling, laminating\*, bending, drilling, tempering. \* Acid-etched glass can be laminated in the same manner as un-etched glass, provided the un-etched surface is facing the laminate interlayer.

### Unique characteristics:

- Durability: product is glass only; no coatings or films are added to the surface
- Consistent finish and appearance
- Easy cleaning and maintenance
- Resistance to scratch and stains is equal to that of un-etched glass
- Can be exposed to exterior weather conditions



The Diana Center at Barnard College in New York features sealed units that incorporate Textures Velour acid-etched glass from Walker Glass Co., Montreal, in addition to Terracotta ceramic paint. Velour is part of the Walker Textures line of acid-etched glass that creates a translucent satin appearance to obscure view while maintaining a high level of light transmittance.

## BENT/CURVED

**Definition:** Flat glass which has been formed into a curved shape or profile using extreme heat and a mold or frame. Bent or curved glass can be heat-treated, or further fabricated into laminated or insulating units, and can incorporate a variety of decorative features.

### Applications:

**Interior:** Office partitions, stair rails, elevators

**Exterior:** Skylights, curtain walls, residential and commercial windows, revolving doors, and more

### Custom options available:

- All curved glass is custom made
- Any type of glass can be used, including tinted, patterned, acid-etched, reflective, hard coated Low-E and many soft coated post-temperable Low-E
- Various shapes are available, including parallelograms, conical curves and curves that have flat parts at the end of the glass
- Laminated curved glass can incorporate virtually any interlayer. For example, colored PVB, XIR, switchable glass, Sentry Glas or a printed interlayer

### Fabrication options available:

- Annealing
- Laminating
- Tempering. Curved glass is also available as tempered laminated.
- Holes and notches (for curved tempered glass products)
- Insulating glass units, with opportunity to use laminated glass as the IGU lites
- Incorporation of silkscreened patterns, using a ceramic frit

### Unique characteristics:

- Myriad of colors, printed designs, lighting arrangements or printed wording can be incorporated

### Why use bent or curved glass?

Curved glass fulfills a design need where the designer or architect is looking to create special aerodynamics in the building or interior application. A curve's organic shape is perfectly complemented when created in glass, and curved glass allows architects to express their imagination in many different ways, expanding the limits of what they can build.



The Mexico City Fire Department building features curved, annealed, Laminated Creanza, flat tempered Laminated Foggy, Traxion glass with a dot design from Cristacurva, with North American headquarters in Houston. The company offers a variety of curved and decorative glass products.

## CAST GLASS AND SLUMPED GLASS

**Definitions:** Cast glass is glass with a textured “hot cast” surface produced by pouring and pressing molten glass onto or into a mold (also see slumped, patterned). Slumped glass or “kiln-formed” glass is produced by placing float glass into a kiln over a mold having the desired shape or pattern and heating to the temperature where the glass softens and “slumps” to the form of the mold. The formed glass is then annealed and can be further processed or fabricated.

### Applications:

**Interior:** Walls, doors, windows, countertops, shower enclosures, furniture, water features, sculptures

**Exterior:** Doors

### Custom options available:

- Colors, patterns and textures are infinitely customizable

### Fabrication options available:

- Tempering (most common)

- IGUs
- Fire-rated
- Bullet and blast resistant
- Curved
- Laminating
- Edge finishing options, including polished chipped edge, mitering, flat polishing and kiln-polishing
- Notches, holes
- Curved edges, and curved and tempered panels

### Unique characteristics:

- Variations in depth of texture
- Ability to have great detail and control over finished look
- Feel of handmade art glass
- Unlimited colors, metallic and custom finishes
- Can combine custom textures with photographic and/or digital images

### Why use cast or slumped glass?

Cast glass' unique beauty lies in the way light interacts with texture. It can be used to create a tactile environment, and offers the opportunity to combine color with texture.



Meltdown Glass Art & Design, Tempe, Ariz., provided the cast glass for the “Enchanted Forest” mural at the Midwestern University Chapel in Downer’s Grove, Ill. The cast glass sculptural mural features 24 panels with cold-applied pearled paints. Meltdown Glass is continually developing new effects with kiln-fired glass and offers products for a variety of applications

## CERAMIC FRIT

**Definition:** A pigmented glass enamel fired onto the glass at temperatures in excess of 1,200 degrees Fahrenheit and permanently fused to the glass surface. Ceramic frit can be applied using a full coverage coating process, a silkscreen process or a pre-printed ceramic decal. This type of decorative glass is available in many colors, patterns and translucencies, and is used for both exterior and interior applications.

### Applications:

**Interior:** Glass doors with custom logo or pattern, office and restaurant partitions, stair rails, glass handrails, decorative stair treads and glass flooring, shower enclosures, donor walls, conference tables, wall-mounted art pieces, back splashes when combined with back paint, glass columns, door side lites, decorative mirror when laminated, corporate logos, digital photographs

**Exterior:** Glass canopies, building facades, signage, bus shelters, doors and door side lites

### Custom options available:

- Can be applied to almost any type of glass: clear, low-iron, acid-etched, tinted

- Completely customizable
- Allows for unlimited color matching
- Screen printing requires a separate screen for each unique image
- Digital printing requires a separate image file for each unique image

### Fabrication options available:

- Ceramic frit glass decoration can be combined with other processes to produce tempered, bent tempered, laminated, backpainted, and IG units
- Glass can be fabricated with edgework, holes, notches, and other features for use as shower doors, entrance doors, handrails, flooring, etc.

### Unique characteristics:

- Ceramic frit ink consists of colored glass particles that actually melt and fuse to the glass sheet during tempering, making it permanent, durable, and easy to clean
- Frost-colored ceramic frits can be on the inside of laminated glass, as opposed to sandblast or acid-etched, which turns clear when laminated against the interlayer.



An REI store in Round Rock, Texas, features DecoTherm digital ceramic frit glass by M3 Glass Technologies, Irving, Texas. Digital application of ceramic frit is high resolution, and no screens are required, resulting in cost savings, shorter lead-times, and the ability to vary each lite as desired.

## CHANNEL GLASS

**Definition:** A structural glass system that creates light transmitting walls. A perimeter frame is used with various widths and sizes of U-shaped glass channels. As exterior window wall, channel glass respective to windload requires only one perimeter frame, eliminating need for vertical or horizontal frame members. The system also allows for glass openings to be formed into arcs, serpentine walls, and columns or tower designs. Non-tempered float glass channels have a cast surface that provides privacy and light diffusion.

### Applications:

**Interior:** Partitions that can be configured as single- or double-glazed, and oriented either vertically or horizontally

**Exterior:** Curtain walls, rain and decorative screens, and Trombe and Barra walls

### Custom options available:

- Variety of textures
- Low-iron glass for an almost colorless cast
- Sandblasted finish for a diffuse, frosted aesthetic
- Choice of hundreds of enamel colors

- Protective coating to reduce fingerprints and stains

### Fabrication options available:

- Channel glass is available in a fully tempered form that is four times stronger than annealed glass
- A safety film meeting the requirements of ANSI Z 97.1, Safety Glazing Materials Used in Buildings: Safety Performance Specifications and Methods of Test, and Consumer Product Safety Commission Title 16 Part 1202, can be applied to the three inside faces of annealed channel glass to qualify it as a safety glass.
- Additionally, heat-soak testing of all exterior applied tempered glasses is available to reduce the possibility of spontaneous breakage from nickel sulfide inclusions.
- Laminated safety channel glass is available for elevator hoist ways and other similar applications.

### Unique characteristics:

- Colored channel glass is produced by firing enamel frits onto the inside face of the channel. The result is a fade-resistant, permanent, durable, and scratch-resistant finish.



New Jersey's Montclair State University Student Recreation Center features channel glass from Bendheim Wall Systems, Passaic, N.J. The company is the exclusive distributor of LINIT channel glass by Lamberts. Lamberts LINIT channel glass can reach heights of 23 feet, tempered or annealed. Six surface textures in regular or low-iron glass are available, in addition to sandblasted and solar coated options, and hundreds of enameled colors.

## DIGITAL ART

**Definition:** Digital art is a visual feature created on a computer in digital form. The digital file can be purely computer generated or taken from another source, such as a scanned photograph or image drawn using vector graphics software. Digital art can be transferred by printing onto glass, interlayers or other films and substrates.

### Applications:

**Interior:** Countertops, tabletops, cabinetry, interior partitions, wall cladding, doors, shelving, shower doors, stairways

**Exterior:** Curtain walls, signs, doors, storefronts, transportation shelters

### Custom options available:

- Completely customizable
- Can be printed on any glass with one smooth surface, including patterned glass
- Printing can be done in thousands of shades, colors and opacities, at any scale, at high resolution



### Fabrication options available:

- Glass can be fully fabricated, tempered, laminated, heat-soaked, bent insulating, coated

### Unique characteristics:

- Permanent. Images won't fade, peel, scratch or crack
- Control over opacity
- Impeccable control over imaging and layout

New York City's Harlem Hospital façade consists of 429 individually printed panes of glass that make up a historic mural design. General Glass International, Secaucus, N.J., fabricated the mural glass using its Alice digital, direct-to-glass printing technology. The Alice technology allows any design to be printed on glass quickly and cost-effectively.

## FUSED GLASS

**Definition:** A decorative glass article created by melting in a kiln and fusing together two or more types and colors of glass. Many art glass pieces and ornate tableware are made from fused glass.

**Applications:**

**Interior:** tiles, vanity, counter tops, table tops, sculptures

**Exterior:** tiles, sculptures

**Custom options available:**

- Each panel can be custom fabricated
- All panels can be colored with a transparent, translucent or opaque finish
- Variety of colors

**Fabrication options available:**

- The main limitation is weight. Panels get heavy very quickly, which might create installation challenges.
- Fused glass does not allow for tempering. Generally, based on the application, it is not required. The glass still can be laminated to meet safety requirements but that often adds to the overall weight of the square footage, which can cause installation problems.

**Why use fused glass?**

Fused glass is generally used to create artistic pieces, thick counter or table tops, and glass tiles for interior and exterior applications. Aesthetically, fused glass gives the option to create a design that would not be available with two-dimensional glass techniques.



A corporate office features Desert Stones kiln-fused glass from Joel Berman Glass Studios, Vancouver, British Columbia. The company offers more than 35 handmade, kiln-cast and kiln-fused textures.

## LAMINATED DECORATIVE GLASS

**Definition:** Glass consisting of an assembly of two or more lites of glass permanently bonded with an interlayer that retains the glass in place when shattered. Interlayers may be in clear, translucent and opaque forms with colors and graphic designs. Laminates may include one or more decorative components. Laminates can be produced by using a decorative glass, a decorative interlayer or by incorporating a variety of decorative materials such as films, metallic foils, fabrics, rice paper, photographs and such. See ASTM C 1172 standard for laminate specifications.

**Applications:**

**Interior:** counter tops, floors, furniture, office dividers, stair treads, art gallery exhibits and displays

**Exterior:** Vision and non-vision windows, balustrades and guardrails, canopies, overhead glazing/fallout protection, signs, storefronts

**Custom options available:**

- Large variety of glass types and interlayers, ranging from ultra-clear polycarbonates to vivid colors
- Infinite screen-printing options

**Fabrication options available:**

- Holes, hinge cutouts and notches
- Polished edges
- Screen printing
- IGU manufacturing

**Unique characteristics:**

- Combines the structural safety and security of laminated glass with brilliant color

**Why use laminated decorative glass?**

Due to its multi-layer construction and safety characteristics, laminated glass can also be used in structural, ballistic- and blast-resistant, hurricane impact, sound-control and solar-control applications. These aren't attributes typically associated with decorative glass; however, they are tools that allow architects and glass professionals to design public gathering spaces and high security applications with both privacy and transparency, as well as beauty.



The Eagle Feather Fan at the front entrance of the Blackfoot Crossing Historical Park in southern Alberta, Canada, features decorative laminated glass from Lami Glass Products, Vancouver, British Columbia, a division of Hartung Glass Industries. Lami Glass offers Impact decorative laminated glass that combines the structural safety and security of laminated glass with the brilliant color of film. In addition to exceptional strength and acoustical characteristics, Impact provides users the ability to create unique glass combinations by laminating different layers of films, colors, textures and patterns into a single lite.

## NON-SLIP SURFACE

**Definition:** A surface treatment that results in an increased static coefficient of friction, typically used for glass flooring systems, floor tiles and stair treads. The walkable surface is roughened either evenly across the entire surface or in a decorative pattern to provide increased safety and add a creative element to the flooring design.

### Applications:

**Interior:** Glass treads/steps, landings, lobby floors, and more

**Exterior:** Walkable skylights, exterior decks, glass treads/steps, landings, bridges, and more

### Custom options available:

- Custom colors and textures
- Various anti-slip surfaces
- Photographic imagery can be provided inside of the glass
- Hologram and dichroic interlayers
- Custom shapes and sizes
- Monolithically polished edges on exposed edges

### Fabrication options available:

- Tempered
- Laminated
- Note, all products will need to meet the appropriate ASTM standard, currently under development as ASTM Work Item 9258 Standard Practice for the Design and Performance of Supported Glass Walkways

### Unique characteristics:

- A stunning addition to any interior or exterior decor, anti-slip glass can serve as a beautiful and inspiring focal point

### Why use non-slip glass?

The main consideration is safety. If you want glass flooring, you need an anti-slip walking surface. Only UL tested and classified anti-slip glass surfaces should be used, so request documentation from your supplier. Work only with an experienced manufacturer/supplier, and ask for references. Make sure to use a structural engineer to determine the makeup of the glass panels. Make sure the glass allows for the maximum amount of light to pass through, and that an obscure product is used in public applications to avoid improprieties.



Floor featuring anti-slip glass from Jockimo, Inc., Laguna Hills, Calif. The company offers the following anti-slip glass options: custom colors and textures; various UL classified anti-slip surfaces; custom anti-slip surfaces; photographic imagery inside of the glass; hologram and dichroic interlayers; as well as monolithically polished edges on exposed edges. The company is the first in the industry to be UL classified, it reports.

## PAINTED/BACK PAINTED

**Definition:** A coating applied to glass that completely covers the surface, is virtually opaque and available in various solid and metallic colors. In some applications, the glass can be partially coated with clear areas for design. Typical applications for painted glass are wall cladding, spandrel glass and furniture.

**Interior applications:** Backsplashes, shower walls, cabinet inserts, closet doors, countertops, table tops, walls, tiles, and dry erase surfaces

### Custom options available:

- Millions of color options are possible, including fluorescent colors and metallic

### Fabrication options available:

- Glass can be fully fabricated, including beveling, edging, water jet cutting, and more



Bathroom featuring Dreamwalls Color Glass from Gardner Glass Products, North Wilkesboro, N.C. Dreamwalls Color Glass is a back-painted glass using ultra clear, low-iron Starphire glass. Gardner's proprietary, state-of-the-art paint technology is used to manufacture and fabricate Dreamwalls Color Glass in limitless color options using a durable heat-cured, two coat system. The glass is suitable for commercial and residential applications.

## PATTERNED GLASS

**Definition:** Glass whose surface has been imprinted with a texture or pattern at high temperatures while still in the molten or malleable state. Also known as textured or obscure glass. Also see cast, slumped, rolled.

### Applications:

**Interior:** Shower and tub enclosures, partitions, shelves, decorative glazing, lighting fixtures

**Exterior:** Patio furniture, privacy windows, entry/exit doors

### Custom options available:

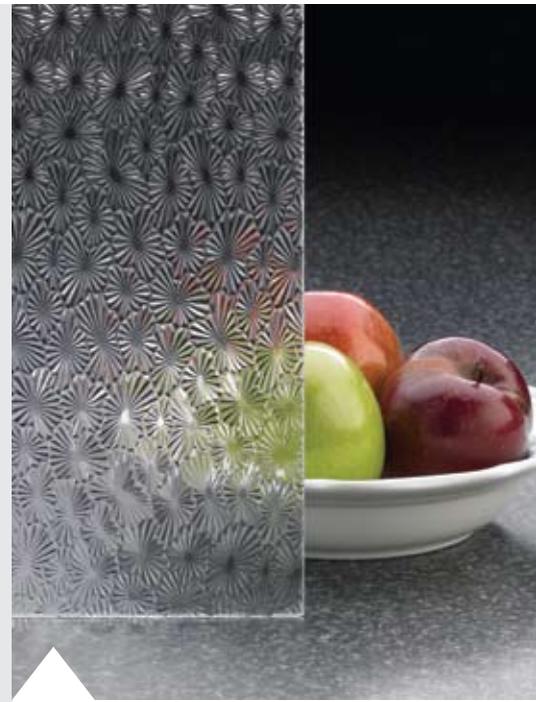
- Variety of patterns, for different levels of light diffusion

### Fabrication options available:

- Tempered and heat-strengthened
- Can be cut, laminated, edged, or notched
- Holes
- V-groove patterned glass

### Why use patterned glass?

Patterned glass allows architects and designers to choose innovative ways to use light and space in creating attractive and useful environments. The patterns are effective as the primary design or as an enhancement to other architectural features. Patterned glass creates subtle, shifting translucent light that opens a whole new dimension in design freedom.



Floralite patterned glass from Guardian Industries Corp., Auburn Hills, Mich. Guardian offers seven distinct patterns: Bubble, Floralite, GlueChip, Niagara, P516, Spraylite and Tetra.

## SANDBLASTED GLASS

**Definition:** Glass produced by using high velocity air to spray a stream of hard, abrasive particles against one or both surfaces giving the area a frosted or etched appearance. Also see carved, frosted.

### Applications:

**Interior:** Shower doors, kitchen cabinet inserts, tabletops, and furniture; doors, sidelites, and transoms; booth dividers, bar mirrors, room dividers, folding screens, conference room walls; corporate ID, logos, government seals, and donor walls (plaques); awards and gifts

**Exterior:** Canopies and skylights; doors, sidelites, and transoms

### Custom options available:

- Sandblasting can be performed on many types of glass, wood, stone, metal, and acrylic surfaces
- Unlimited etched designs, either hand-drawn or computer-generated
- Airbrush effects or multi-stage deep carved sculpture, depending on the project
- Etched glass sealer to provide fingerprint protection and ease of maintenance

### Fabrication options available:

- Glass can be painted, lacquered or metal leafed to add color and texture

### Unique characteristics:

- Can be one-of-a-kind or mass produced
- Sandblasting can be performed in the field on existing surfaces

### Why use sandblasted glass?

Traditionally, sandblasting was done one panel at a time by hand in a contained booth. Newer computerized machines allow for multiple pieces to be blasted with consistency and can be programmed for special effects like gradations and fade-outs. A sandblasted surface is permanent and will not wear off, chip or yellow.



A private residence featuring sandblasted glass from Classic Glass Inc., with locations in Alexandria, Va., and Bladensburg, Md. The company's automated sandblasted glass system and computer-plotted designs ensure consistent etching of patterns and logos across hundreds of panels. Classic Glass artists can also etch glass by hand to create sculpted and shaded effects.

## SILICONE COATINGS

**Definition:** A pigmented glass coating, applied after the tempering process or to annealed glass, which is chemically bonded to the glass surface. Silicone coatings can be applied using a full range of coverage coating processes; silkscreening, roller, spray and curtain coating. This type of decorative glass is available in many colors, patterns and metallic, and is used for both exterior and interior applications.

### Applications:

**Interior:** Interior wall cladding, backsplashes, countertops, furnishings

**Exterior:** Exterior wall cladding, spandrel

### Custom options available:

- Unlimited colors
- Metallics
- Variety of patterns

### Fabrication options available:

- Fabricators can spray it, roller-coat it, or screen print it. They can also do their own color matching if they buy in bulk.

### Unique characteristics:

- Adheres well to glass
- Can stick to any substrate (pyrolytic, reflective, standard, etc.)
- Offers an elastomeric quality that holds the glass together if broken

### Why use silicone coatings?

Silicone is robust enough to be used in exterior and interior applications alike. Environmentally, it does not use heavy metals and has a low VOC content, and in some cases, no VOCs at all.



Photo by ICD High Performance Coatings, Vancouver, Wash. The company offers high performance coatings, with an eye towards products that add value to green and sustainable building practices.

## SILKSCREENED /SCREEN-PRINTED

**Definition:** Decorative glass created by applying inks to the substrate through a screen-printing process. The ink can be applied in solid coverage over the entire surface or selectively to create a decorative pattern. Silkscreened glass is available in various colors, patterns and translucencies and is typically treated at higher temperatures with ceramic enamels or at lower temperatures with silicone or other organic inks.

### Applications:

**Interior:** Partitions, flooring, ceiling tiles, railings and balustrades, signage, shower enclosures, counter or vanity tops

**Exterior:** Used in many exterior applications, usually within insulating or laminated units, as spandrel, transit shelters, glass canopies, storefronts, sunshades, exterior signage, window walls and public art pieces. Many curtain-wall applications also contain silkscreened glass.

### Custom options available:

- Available in virtually any color, pattern or translucency, even in metallic finishes

### Fabrication options available:

- Glass can be edged and fabricated prior to silkscreening and heat treating
- Silkscreened glass can be used as a monolithic lite, but can also be fabricated into insulating or laminated units

### Unique characteristics:

- Cost-effective, low maintenance solution
- Virtually any color, image or texture can be applied to glass to achieve a particular light transmission, color or effect
- Low maintenance as it has a non-porous surface that is easy to keep clean and sterile, and is also graffiti-resistant
- Does not need ongoing maintenance
- Can contribute towards LEED credits

### Why use silkscreened glass?

Silkscreened glass is a highly durable and completely customizable product that can be used in many different applications. High detail, half-tone images can also be applied that are close to photographic quality. In addition, silkscreened glass can help contribute towards LEED credits as an integral part of the daylighting strategy in a building, as well as help with solar and thermal control.



The Illinois Institute of Technology in Chicago features silkscreened glass from Goldray Industries, Calgary, Alberta. In addition to silkscreen/screen-printed products, the decorative glass supplier offers traction control frit for glass flooring, opaque coated glass cladding, satin etch translucent glass, decorative laminated glass, technographic interlayer, tempered and fabricated glass and doors, and glass marker boards.

## SILVERED GLASS

**Definition:** Glass with a surface treatment applied to create a reflective or mirrored quality. The substrate may be any type, pattern or color of glass in float or heat-treated form resulting in various reflective appearances.

**Interior applications:** Vanity mirrors, mirrored walls, mirror doors, framed mirrors, display cases, medicine cabinets, media centers, elevators, decorative trim and accents

**Custom options available:**

- Variety of colors and thicknesses
- Can be cut to virtually any pattern

**Fabrication options available:**

- Tempered, laminated and tape back are all available for safety and security needs and specifications



A residential vanity mirror featuring silvered glass from Vitro Architectural Products, Memphis. In addition to mirrors, Vitro offers the Imaginations decorative glass line. The line includes laminated decorative glass with color vinyl interlayers, and ceramic frit and acid-etched products.

**Custom Reprints**

**-or- AS Forum ad**

## ADDITIONAL PRODUCTS AND TERMS:

### **ANNEALED GLASS (NON-TEMPERED)**

Basic float glass that has been treated through a heating and controlled cooling process to result in a product with internal stresses reduced to a level that it can be handled, cut, finished and fabricated.

### **CARVED GLASS**

Glass into which a three-dimensional sculpted image or design has been created by sandblasting or etching to different depths within the surface. Also see etched, sandblasted.

### **DECAL TRANSFER**

Process used to create decorative glass by application of a ceramic decal. Decals are directly transferred to the glass. Decals can provide fine half-tone detail, consistent light registration and multicolor images.

### **DECORATIVE FILMS**

Decorative films are generally thin substrates, with decorative features, in roll or sheet form, that can be applied to glass or incorporated into laminated or insulating glass units. Films can be transparent, translucent, opaque, colored or metallic with patterns, designs and images.

### **DICHROIC GLASS**

Glass created by applying and fusing multiple micro-layers of metal oxides to the glass surface to transmit or reflect discreet wavelengths of light resulting in an array of colors. The thin layers of oxides have a total thickness of 3 to 5 millionth of an inch and are kiln fired to fuse to the glass surface.

### **ETCHED GLASS**

Generic term used to describe glass that has been modified in such a way to provide a surface that will diffuse transmitted light, reduce glare and have a frosted appearance. Etched glass can have different levels of transparency, either uniformly over the entire surface or in selected areas to create decorative patterns. Also see acid etched, frosted glass, sandblasted glass, laser etched glass, ceramic frit, silkscreen/screen-printed.

### **FROSTED GLASS**

Generic term used to describe glass whose surface tends to diffuse or scatter incident light

and has a “frosted” appearance. Frosted glass is produced by a variety of methods including etching with chemicals, using abrasives, engraving, application of ceramic inks or decals and by attaching or incorporating translucent films. (See also etched, sandblasted).

### **FULLY TEMPERED GLASS**

Flat or bent glass that has been heat-treated to have either a minimum surface compression of 10,000 psi (69 MPa) or an edge compression not less than 9,700 psi (67 MPa) in accordance with the requirements of ASTM C 1048, kind FT or meet the requirements of ANSI Z97.1 or CPSC 16 CFR 1201. Outside of North America, sometimes called “toughened glass.”

### **HEAT-SCULPTED GLASS**

Art glass pieces produced using the application of heat to cause changes in shape or texture. Once the final form is achieved, the glass is re-annealed to ensure structural stability.

### **HEAT-STRENGTHENED GLASS**

Flat or bent glass that has been heat-treated to have a surface compression between 3,500 and 7,500 psi (24 to 52 MPa) and meet the requirements of ASTM C 1048, kind HS. Heat-strengthened glass is not a safety glazing material and will not meet the requirements of ANSI Z97.1 or CPSC 16 CFR 1201.

### **LASER ETCHED GLASS**

Decorative glass that has had an image engraved into the surface using laser technology. Laser etching can provide a high detail, crisp engraved image. Although this method employs heat to etch the glass, the heat is localized and does not require subsequent re-annealing.

### **MIRRORED GLASS**

See silvered glass.

### **MOLDED GLASS**

See cast, slumped glass

### **OBSCURE GLASS**

See patterned glass

### **ROLLED GLASS**

Glass onto which a recurring texture or pattern has been impressed, on one or both sides,

by passing the glass, while still in a soft or malleable state, between rolls with the desired design. Also known as patterned, textured or obscure glass.

### **SATIN ETCH**

See acid etched, etched glass.

### **SPANDREL GLASS**

Opaque coated glass, generally heat-strengthened or tempered, used in non-vision areas of a building envelope. Various types of opacifiers can be used to create spandrel glass including ceramic frit, silicone coatings, organic coatings and opacifying films.

### **STAINED GLASS**

Colored glass pieces combined to form decorative or pictorial designs, typically set in a lead framework.

### **TEMPERED GLASS**

Glass that has been treated by a heating and rapid cooling process to induce compressive stresses on the surface balanced by interior tension resulting in increased strength.

### **TEXTURED GLASS**

See patterned glass

### **V-GROOVE**

Glass having a shallow groove engraved into the surface in a “V” shape to form two small bevels. This process is available on most types of flat glass and mirror and in various decorative patterns ranging from straight lines to ornate curved designs. Glass can be heat treated after engraving. 