



What every window cleaner should know...

# GENERAL INFORMATION ON Quality Tempered Glass

by Daniel A. Fields

*The information presented here is to help educate, simply and without unnecessary rhetoric, speculation or opinion, what you may need to know about tempered glass - its uses, mode of manufacture, possible problems that may arise during the cleaning of tempered glass, and how to identify such glass. This information is presented in an outline format for easier understanding and reference.*

## A. Tempered glass is safer than normal annealed glass

1. *Strength is 4 times that of annealed glass*
  - a. Will more effectively resist wind and impact than annealed glass
2. *Glass will break into small, relatively harmless fragments, called "dicing"*
  - a. Dicing reduces the likelihood of serious injury, as there are no large sharp jagged edges
3. *Higher temperature threshold before cracking*
4. *Tempered glass is used in areas more prone to exposure of human impact (e.g., tub enclosures, glass doors, interior glass)*

## B. Manufacturing procedure of tempering glass (most common):

1. *Sizing of glass*
  - a. Glass cut to desired size because glass cannot be cut or modified after tempering
2. *Diamond wheel grinding and other edge work*
  - a. Create cleaner edge for safer handling
3. *Washing of glass, prior to tempering.*
  - a. This is recommended and is common practice but is not required or enforced by regulation or standard
4. *Actual tempering process*
  - a. Glass is heated in a tempering furnace to approximately 1200 degrees, followed by a rapid air quench immediately upon removal from furnace to a temperature of 400 - 600 degrees. The prompt and sustained air quenching produces the temper.

## b. There are three basic methods for producing tempered glass

1. Vertical position of glass through the furnace, with each light of glass being held by metal tongs (older method)
2. Horizontal position of glass through the furnace on rollers of stainless steel or high strength ceramic. This is the most common method.
3. Another method for moving glass through a tempering furnace in the horizontal position is on a bed of gas, at a 5 degree slope, moved through the furnace on edge rollers

## C. Facts about tempered glass

1. *Hardness of tempered glass is unchanged by the tempering process (same hardness as annealed glass)*
2. *Entire glass is tempered from surface to surface. (Both sides equal in hardness)*
3. *Surface of tempered glass is not any more porous than annealed glass*
4. *There is no standard for location for tempered label (facing in or facing out) on dual-pane glass*

## D. Misconceptions about tempered glass

1. *Harder than annealed glass*
2. *Softer than annealed glass*
3. *Harder on one side than the other*
4. *Softer on one side than the other*
5. *Only one side of glass is tempered*
6. *More porous than annealed glass*
7. *Tempered glass stamp always in the same location (inside or outside)*

#### **E. Tempered glass precautions and problems:**

1. The vast majority of tempering furnaces employ a "roller" hearth to transport glass through furnace
2. Not all tempering manufacturers wash all glass prior to entering furnace. (At present it is not required by any regulation or standard)
3. Unwashed glass with excessive debris can result in a less than desirable surface condition

*Results: As glass moves through the furnace on support rollers, any debris that does not burn off could be embedded into the glass or rollers causing a blemished surface, often not apparent, on the roller side of the glass. Sometimes this debris consists of bits of glass still present after sizing and diamond grinding the edges. The furnace and roller conditions will continue to deteriorate if the glass, rollers and furnace are not maintained in a clean environment.*

*Problem: As a result of this blemished glass surface, normal cleaning techniques to remove construction debris cannot be used without scratching the surface of the glass. The debris that caused the blemish will scratch the glass when it is dragged across the glass.*

#### **F. How to detect the problem:**

1. First establish the location of tempered glass in the building
  - a. All glass and patio doors
  - b. Tub and shower enclosures
  - c. Windows in tubs and shower location within 5' of the floor
  - d. Side windows that are within 24" of a door or opening
  - e. Windows within 18" of the floor
2. Confirm that it is tempered glass by locating the identification label which identifies the manufacturers distinctive marks and any other information required by regulatory bodies governing the use of tempered glass.

*Note: These labels are usually applied by sandblasting, on the furnace roller side of the glass just prior to tempering. Occasionally, a ceramic paint stencil is applied on the opposite side of the furnace rollers to prevent furnace rollers from smearing the label during tempering.*

3. Test surface of tempered glass on a window that has not been exposed to construction debris or has yet been cleaned by anyone
  - a. Wet glass with soapy water (soap reduces normal surface resistance)
  - b. With a new razor blade (moving only in one direction) make several long strokes across glass and listen for anything that sounds like there is sand or grit on the glass. Be sure to lift razor blade from surface when starting a new stroke
  - c. Locate tempered glass label and determine if the surface you just tested is the same side as the label or opposite the label
  - d. Test several windows to be sure you have enough data from both surfaces of the glass (the label side and the non-label side) to determine if there is a pattern.
  - e. Review results - (With sand or gritty surface)
    1. Glass surface with tempered label had gritty sound and scratched, but opposite side did not, or
    2. Glass surface opposite tempered label (ceramic paint stencil) had gritty sound and scratched, but opposite side did not
    3. Either of these results indicates a blemished surface caused during the tempering process

*Conclusion: Notify job superintendent of your findings so the quality of the tempered glass can be reviewed with all parties involved, the distributor, fabricator and tempering company PRIOR TO CLEANING ANY SUCH GLASS. Early detection is a must to alert everyone involved and to prevent future damage to tempered glass.*

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