

**Window cleaners and builders alike realize that construction deadlines require the most efficient methods, including properly used scrapers.**

They realize that alternative methods will typically be much more labor intensive, may possibly be harmful to seals and surrounding surfaces, and may be ergonomic or chemical hazards for workers.

Metal scrapers, which won't scratch uncoated glass when properly used, have long been the standard and most practical method for removal of debris such as paint, adhesives, or stickers from uncoated glass, not only during construction cleaning, but throughout the useful life of the window.

However, if microscopic fabricating debris defects are present, they can be dislodged and trapped by a scraper during window cleaning. The result will be scratches caused by fabricating debris, not scrapers.

When tempered glass gets scratched, issues of profit, liability and customer satisfaction emerge. Builders are urged to challenge their suppliers to provide quality tempered glass which, like common annealed glass, will not scratch when cleaned with a properly used scraper.

"Fabricating debris" refers to abrasive microscopic defects, including glass fines, which may become fused to heat treated glass as it contacts rollers in some tempering furnaces.

Current ASTM standards do not address issues of cleanliness for tempering equipment, but fabricating debris is a known quality control issue that can be minimized when fabricators follow all recommended procedures for glass washers, furnace rollers and other tempering equipment.

Quality control testing for heat treated glass is best done prior to installation. The AUWC (Association of United Window Cleaners) advises window cleaners not to assume liability for detecting microscopic fabricating debris defects for builders.



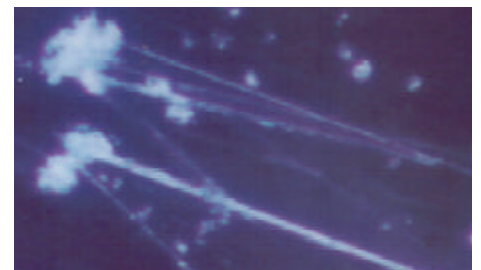
These scratches originated where a moving scraper encountered a fabricating debris defect. Scrapers do not scratch glass.

Fabricating debris defects are usually invisible to the naked eye. Larger or more numerous defects can sometimes be felt, or a gritty sound may be heard when a scraper moves over a clean surface, but there is no reliable field test method to confirm the absence of these microscopic defects.

Scratches caused by fabricating debris defects are typically lighter than scratches caused by common abrasives such as sandpaper. With proper lighting and the aid of a magnifier, some fabricating debris scratches look like comets.

When a "comet scratch" can be located, the cause is obvious. The comet's "head" is fabricating debris, broken and trapped by a scraper, creating a "tail".

Fabricating debris defects can cause more than one scratch.



Most scratched tempered glass is associated with fabricating debris. Many window cleaners now refuse to do post construction window cleaning. Many will no longer work without proper liability waivers.

The AUWC ([www.auwc.org](http://www.auwc.org)) recommends that a heat treated glass scratch liability waiver which has been reviewed by legal counsel be included in all construction cleaning contracts. (Waivers and customer education are also recommended for any maintenance projects involving scraper use.)

Waivers typically state that the builder agrees to scraper use on all (uncoated) glass and that window cleaner will not be held liable for any scratches in heat treated glass. The term "heat treated" should be used in waivers, because it refers to both fully tempered and heat strengthened glass.

It is important to realize that even if somehow protected from scratching initially, heat treated glass with fabricating debris issues presents maintenance issues for the end user, requiring their vigilance for the life of the window, to somehow assure that the use of standard window cleaning scrapers is never necessary, or that alternatives are always used.

Builders who need efficient, practical window cleaning should agree to sign liability waivers for their window cleaners, and should insist on quality heat treated glass from suppliers.