



Glass Cleaning Procedures

Glass Cleaning

Introduction

The documents included in this section are designed to help avoid problems when cleaning glass. They should be included with every project to avoid serious damage to glass that may result from improper cleaning procedures.

1. *Proper Procedures for Cleaning Architectural Glass Products*, a Glass Informational Bulletin published by the Glass Association of North America (GANA). This document highlights important information on proper glass cleaning procedures, including the following:

- Start cleaning from bottom-up or top-down.
- Advice for cleaning stucco and concrete slurry spots from glass.

- Best time of day for cleaning glass
- Avoid glass to metal contact
- What type of detergent to use
- Razor scraping is quicker, but it causes other headaches
- A quick reference list of Dos and Do Nots for cleaning glass.

2. *Heat-Treated Glass Surfaces Are Different*, a Glass Informational Bulletin published by the Glass Association of North America. This document highlights important information on the differences, between annealed and heat-treated glass surfaces, that relate to proper cleaning procedures.

Additional Glass Cleaning Tips

The following important glass cleaning tips highlight areas not covered in the above two GANA Glass Information Bulletins:

- Commence cleaning as soon as the glass is visibly dirty.
- Avoid cleaning tinted and reflective glasses in direct sunlight as the glass will be excessively hot for optimum cleaning.
- Washing of the glass should be preceded by a thorough cold-water flushing to remove all surface grit.
- Glass should be washed using a soft, clean, grit-free cloth and a mild soap, detergent, or slightly acidic cleaning solution. Glass should be rinsed immediately with clean water, and the excess water should be removed with a clean squeegee, or a clean, lint-free cloth.

Do not allow metal squeegee holders to touch the glass surface.

- If paint or glazing compounds have to be removed from the surface, conventional cleaners and solvents should be used. Do not use razor blades or broad knife blades to remove these contaminants.
- Solutions that are strongly alkaline or acidic, fluoride salts or hydrogen fluoride producing compounds, must not be used.
- Fingerprints, grease stains, smears, dirt, scum, sealant residue, scratches and abrasions are more noticeable on coated glass than on uncoated glass. Extra care should be exercised in handling and cleaning to keep such markings off of the glass.
- Abrasive cleaners must not be used on first-surface reflective glass products.

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Proper Procedures for Cleaning Architectural Glass Products

Architectural glass products play a major role in the comfort of living and working environment of today's homes and commercial office spaces. By providing natural daylight, views of the surroundings, thermal comfort and design aesthetics, glass usage and condition often affect our selection of where we live, work, shop, play and seek education.

Architectural glass products must be properly cleaned during construction activities and as a part of routine maintenance in order to maintain visual and aesthetic clarity. Since glass products can be permanently damaged if improperly cleaned, glass producers and fabricators recommend strict compliance with the following procedures for properly cleaning glass surfaces.

As dirt and residue appear, interior and exterior glass surfaces should be thoroughly cleaned. Concrete or mortar slurry that runs down (or is splashed on) glass can be especially damaging and should be washed off as soon as possible. Before proceeding with cleaning, determine whether the glass is clear, tinted or reflective. Surface damage is more noticeable on reflective glass as compared with the other glass products. If the reflective surface is exposed, either on the exterior or interior, special care must be taken when cleaning, as scratches to the reflective glass surface can result in coating removal and a visible change in light transmittance. Cleaning tinted and reflective glass surfaces in direct sunlight should be avoided, as the surface temperature may be excessively hot for optimum cleaning. Cleaning should begin at the top of the building and continue to the lower levels to reduce the risk of leaving residue and cleaning solutions on glass at the lower levels. Cleaning procedures should also ensure that the wind is not blowing the cleaning solution and residue onto already cleaned glass.

Cleaning during construction activities should begin with soaking the glass surfaces with clean

water and soap solution to loosen dirt or debris. Using a mild, nonabrasive commercial window-washing solution, uniformly apply the solution to the glass surfaces with a brush, strip washer or other nonabrasive applicator. Immediately following the application of the cleaning solution, a squeegee should be used to remove all of the cleaning solution from the glass surface. Care should be taken to ensure that no metal parts of the cleaning equipment touch the glass surface and that no abrasive particles are trapped between the glass and the cleaning materials. All water and cleaning solution residue should be dried from window gaskets, sealants and frames to avoid the potential for deterioration of these materials as the result of the cleaning process.

It is strongly recommended that window washers clean a small area or one window, then stop and examine the surface for any damage to the glass and/or reflective coating. The ability to detect certain surface damage, i.e., light scratches, may vary greatly with the lighting conditions. Direct sunlight is needed to properly evaluate a glass surface for damage. Scratches that are not easily seen with a dark or gray sky may be very noticeable when the sun is at a certain angle in the sky or when the sun is low in the sky.

The glass industry takes extreme care to avoid glass scratches by protecting all glass surfaces during glass manufacturing and fabrication, as well as during all shipping and handling required to deliver the glass to the end user. A large percentage of damaged glass results from non-glass trades working near glass. These will include painters, spacklers, ironworkers, landscapers, carpenters and others who are part of the construction process. They may inadvertently lean tools against the glass, splash materials onto the glass and/or clean the glass incorrectly, any of which can permanently damage glass.

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Proper Procedures for Cleaning Architectural Glass Products

One of the common mistakes made by non-glass trades people, including glass cleaning contractors, is their use of razor blades or other scrapers on a large portion of the glass surface. Using 2, 3, 4, 5 inch and larger blades to scrape a window clean carries a large probability of causing irreparable damage to glass. The entire industry of glass manufacturers, fabricators, distributors and installers neither condones nor recommends widespread scraping of glass surfaces with metal blades or knives. Such scraping will often permanently damage or scratch the glass surfaces. When paint or other construction materials cannot be removed with normal cleaning procedures, a new 1" razor blade may need to be used only on noncoated glass surfaces. The razor blade should be used on small spots only. Scraping should be done in one direction only. Never scrape in a back-and-forth motion as this could trap particles under the blade that could scratch the glass. This practice may cause hairline concentrated scratches, which are not normally visible when looking through the glass, but may be visible under certain lighting conditions.

Job site storage and construction conditions can lead to stains on the glass surface. Cleaning and removal of such stains may require the use of a more aggressive cleaning solution and procedure.

If conditions are found that cannot be cleaned using the above procedures, contact the glass supplier for guidelines on stain removal.

Members of the Glass Association of North America (GANA) publish information relating to job site protection and cleaning of architectural glass products. In order to ensure long-term performance of the glass in a building, GANA encourages glazing contractors, general contractors, building management and owners to be aware of conditions that can damage glass, and to follow the handling and cleaning guidelines provided by their glass producer and fabricator.

The Glass Association of North America (GANA) has produced this Glass Informational Bulletin solely to provide general information as to basic proper procedures for cleaning architectural glass products. The Bulletin does not purport to state that any one particular type of glass cleaning process or procedure should be used in all applications or even in any specific application. The user of this Bulletin has the responsibility to ensure the cleaning instructions from the glass supplier are followed. GANA disclaims any responsibility for any specific results relating to the use of this Bulletin for any errors or omissions contained in the Bulletin and for any liability for loss or damage of any kind arising out of the use of this Bulletin.

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Quick Reference Guide to Cleaning Architectural Glass Products

The following “Dos” and “Do Nots” are offered as a supplement to the Glass Association of North America (GANA) Glass Informational Bulletin—*Proper Procedures for Cleaning Architectural Glass Products*:

The following are things to DO:

- DO** clean glass as soon as dirt and residue appear visibly.
- DO** determine if coated glass surfaces are exposed.
- DO** exercise special care when cleaning coated glass surfaces.
- DO** avoid cleaning tinted and coated glass surfaces in direct sunlight.
- DO** start cleaning at the top of the building and continue to lower levels.
- DO** soak the glass surface with a clean water and soap solution to loosen dirt and debris.
- DO** use a mild, nonabrasive commercial window cleaning solution.
- DO** use a squeegee to remove all of the cleaning solution.
- DO** dry all cleaning solution from window gaskets, sealants and frames.
- DO** clean one small window area and check to see if procedures have caused any damage.
- DO** be aware of and follow the glass supplier’s specific cleaning recommendations.
- DO** caution other trades against allowing other materials to contact the glass.
- DO** watch for and prevent conditions that can damage the glass.
- DO** read the entire GANA Bulletin on glass cleaning before starting to clean glass.

The following are things to NOT do:

- DO NOT** start cleaning without reading the entire GANA Bulletin on glass cleaning.
- DO NOT** use scrapers of any size or type for cleaning glass.
- DO NOT** allow dirt and residue to remain on glass for an extended period of time.
- DO NOT** begin cleaning glass without knowing if a coated surface is exposed.
- DO NOT** clean tinted or coated glass in direct sunlight.
- DO NOT** allow water or cleaning residue to remain on the glass or adjacent materials.
- DO NOT** begin cleaning without rinsing excessive dirt and debris.
- DO NOT** use abrasive cleaning solutions or materials.
- DO NOT** allow metal parts of cleaning equipment to contact the glass.
- DO NOT** trap abrasive particles between the cleaning materials and the glass surface.
- DO NOT** allow other trades to lean tools or materials against the glass surface.
- DO NOT** allow splashed materials to dry on the glass surface.

Glass Cleaning: Heat-Treated

Heat-Treated Glass Surfaces Are Different

Industry Cleaning Procedures Must be Followed to Avoid Glass Damage

As the use of glass increased over recent years, issues of strength, safety and thermal performance became increasingly important design considerations. The availability of tinted and coated glasses had a dramatic impact on glass use in building projects. The vastly expanded aesthetic options, combined with the improved energy-conserving and comfort capabilities of tinted and coated glasses, allowed architects to use more glass, as well as larger sizes in their designs. A consequence of this trend was a corresponding increase in the use of tempered and heat-strengthened glass in order to meet both thermal and wind load design requirements. The demand for tempered glass increased further with the passing of safety-glazing legislation in 1977, which mandated its use in certain locations.

Currently, there are two types of heat-treated glass as defined in the American Society for Testing and Materials (ASTM) C1048 - *Standard Specification for Heat-Treated Flat Glass – Kind HS, Kind FT Coated and Uncoated Glass*. The two types are heat-strengthened (Kind HS) and fully tempered (Kind FT). Both types of glass are produced using the same equipment. A majority of the heat-treated glass produced over the last 30 years has been fabricated in horizontal roller hearth furnaces. The preparation stage for the heat-treatment process requires annealed float glass to be cut to the required final size, the edges to be treated according to the specified finish (commonly seamed or polished) and the glass to be washed. The process then requires the glass to be transported on horizontal rollers through an oven and heated to approximately 1,150°F (621°C). Upon exiting the furnace, the glass is rapidly cooled (quenched) by blowing air uniformly onto both surfaces simultaneously. The cooling process leaves the surfaces of the glass in a state of compression and the central core in compensating tension.

The color, clarity, chemical composition and light transmission characteristics of glass remain essentially unchanged after heat-treating. Likewise, hardness, specific gravity, expansion coefficient, softening point, thermal conductivity, solar optical properties and stiffness remain unchanged by the heat-treating process. The only physical properties that change are improved flexural and tensile strength, and improved resistance to thermal stresses and thermal shock. Under uniform loading, heat-treated glass is stronger than annealed glass of the same size and thickness. The heat-treating process does change the break pattern of the glass—i.e., fully tempered glass disintegrates into relatively small pieces, meeting the safety-glazing requirements and thereby greatly reducing the likelihood of serious cutting or piercing injuries.

As mentioned, the heat-treating process typically involves the transport of very hot glass on rollers. As a result of this soft glass-to-roller contact, some glass surface changes will occur. Minute glass particles (fines) from the glass cutting and edging process, typical manufacturing plant airborne debris or dust, refractory particles from the tempering oven roof, as well as external airborne dirt and grit carried into the plant by the large volumes of quench air used in the process, may adhere to one or both glass surfaces. Also, the physical contact of the soft glass surface with the rollers may result in a marking or dimpling of the glass surface. Current glass quality specifications contained in ASTM C1036—*Standard Specification for Flat Glass*—establish the size and number of glass imperfections allowed based on specific visual inspection criteria. The glass surface conditions listed above are not usually visible to the eye under normal visual circumstances. These surface do not threaten the visual or structural integrity of the product, and are not reason for rejection of glass under the ASTM consensus standards.

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Glass Cleaning: Heat-Treated

Heat-Treated Glass Surfaces Are Different

However, despite being invisible, such surface conditions can be detectable to the touch. This difference in “feel,” between annealed and heat-treated glass, can lead to issues during cleaning of the glass, as glass cleaning workers attempt to remove microscopic particles. With the best of intentions, they may attempt to scrape particles that can be felt, but not seen, and very often end up scratching and chipping the glass surface.

Additionally, once the glass is delivered to the construction site, construction materials and debris may be deposited on the glass. Paint, stucco, concrete, adhesives and other materials may be splattered on the glass and left there for long periods of time. These materials and the methods for removing them may also damage the glass surface.

It is important to note that the recommended cleaning procedures for heat-treated glass are the same as for annealed glass. The use of scrapers, abrasives, and harsh chemical cleaning agents is not recommended for any glass product because they can cause irreparable damage. With the best of intentions, window cleaners, and other tradesmen, may attempt to remove construction

dirt and debris from the glass surface by scraping the surface. This can lead to glass damage, such as scratching and chipping if any microscopic particles have adhered to the surface and are dislodged and transported across the glass in the scraping process.

Acceptable cleaning procedures are available from glass manufacturers and fabricators. In addition, the Glass Association of North America has published a Glass Informational Bulletin entitled, *Proper Procedures for Cleaning Architectural Glass Products*, which includes industry-recommended cleaning procedures, as well as a list of Dos and Do Nots.

Heat-treated glass products are critical components of today's high-performance coated, insulating, laminated, spandrel, safety glazing, bullet-resistant, blast-resistant, and hurricane-resistant fenestration products. Millions upon millions of square feet of heat-treated glass have been installed and have provided trouble-free performance for almost 50 years. Continued use of acceptable cleaning practices, combined with good judgment, will prevent glass damage and enable the glass to maintain its original attractive appearance for years to come.

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