

Proper Procedures for Cleaning Architectural Glass Products

Architectural glass products play a major role in the comfort of the 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. This document describes procedures that generally apply to most architectural glass products. Certain glass types may require different procedures and care. Glass can be clear or tinted and have pyrolytic or sputtered Low-E or reflective coatings, some of which may be on the exposed surface of the glass. Glass products can be monolithic (single lites), laminated glass or insulating glass units. (See Glass Technical Paper FB15-07 Describing Architectural Glass Constructions). Glass can be of various strengths, i.e., annealed, heat-strengthened or fully tempered. There are also other decorative and functional glass types including spandrel, silk-screened, patterned, acid etched, and sandblasted. There may also be exposed films applied to the interior glass surface, for example security or spill films.

Architectural glass products should be properly cleaned and protected throughout the construction process using a program of regularly scheduled maintenance designed to maintain visual clarity and prevent glass surface damage. Since glass products can be permanently damaged if infrequently or improperly cleaned, glass producers and fabricators recommend strict compliance with the following procedures for cleaning glass surfaces.

Routine Cleaning & Maintenance

For routine maintenance, interior and exterior glass surfaces should be thoroughly cleaned as dirt and residue appear. Cleaning frequencies should be tailored to the individual characteristics inherent to the site conditions, as well as the severity of local environmental factors and atmospheric pollutants that vary from region to region. 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 surface, special care must be taken when cleaning, as damage to the reflective glass surface may result in coating removal and a visible change in light transmittance which is very noticeable. A simple test to determine the location of the reflective coating is to touch the point of a pencil to the glass surface. If the reflection of the pencil point meets the real pencil, the coating is exposed on that side. If there is a gap between the pencil point and the reflections, the coating is not exposed on that side of the glass. Cleaning tinted and reflective glass surfaces in direct sunlight should be avoided, as the surface temperature may be too hot for optimum cleaning. Exterior cleaning should begin at the top of the building and continue to the lower levels to reduce the risk of leaving residue and cleaning solution on glass that has already been cleaned. Cleaning procedures should also include checking that the wind is not blowing the cleaning solution and residue onto already cleaned glass.

Prior to beginning a cleaning project, it is strongly recommended that window cleaners test clean a small area of one window, then stop and examine the surface carefully for any damage to the glass and/or any exposed coating. The ability to detect certain surface damage, such as light scratches, may vary greatly with the lighting conditions. Daylight conditions are 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. In addition, because different backgrounds may yield different observations, cleaning methods should be tested on all glass constructions on the building, including both vision and spandrel units.

Cleaning should begin by soaking the glass surfaces with clean water and a mild, non-abrasive glass cleaning solution. Glass cleaning solutions should not include acids, especially muriatic / hydrochloric and Hydroflouric. Apply generous amounts of solution to the glass surfaces with a brush, strip washer or other non-abrasive applicator, and lightly agitate to loosen the soil and debris. Immediately following the application of the cleaning solution, a window cleaning squeegee should be used to remove all of the cleaning solution from the glass surface. During routine cleaning care should be taken to avoid metal contact with the glass surface; razor blades and metal scrapers should not be part of routine cleaning. The use of sufficient water will help prevent abrasive particles from being trapped between the glass and the cleaning tools being used. However, the window cleaner needs to be diligent in keeping all abrasive particles from scratching the glass.

The International Window Cleaning Association (IWCA) recognizes an additional glass cleaning technique being utilized by some professional window cleaning contractors. This technique employs the use of pure water delivered to the glass surface using a specialized extension pole. Gentle agitation with a non-scratching (non-abrasive) brush is followed by the final pure water rinse. Rinse water is generally allowed to evaporate from freshly cleaned surfaces. Therefore, the pure water used in both the wash and rinse must have a total dissolved solids content (TDS) of 20 parts per million (PPM) or less to prevent spotting and streaking of cleansed surfaces. The use of tap water is not acceptable. Effective water treatment, via ion exchange and/or reverse osmosis equipment should be used in conjunction with delivery & rinse methods at all times. Water quality can be monitored with a handheld TDS or conductivity meter. A reading of 40 micro-Siemens/cm (0.025 Me ohm – cm) represents a TDS level of 20 PPM.

Non-Routine Post-Construction Cleaning & Restoration

Careful communication between the responsible parties should precede the use of aggressive cleaning techniques, as any non-routine cleaning carries a risk of irreparable damage to glass products.

During all stages of construction, the glass must be properly protected from construction debris such as cement, paint, varnish, adhesives and other construction material commonly found on job sites. (See the NGA/IWCA Bulletin FB03-03 Construction Site Protection and Maintenance of Architectural Glass). Extended construction schedules may create the need for multiple cleanings to avoid the accumulation of significant amounts of soil and debris, and to avoid potential damage. In addition to ordinary techniques for protection from construction debris used by various trades, temporary protective window films may be applied to glass. Follow specific manufacturer instructions regarding film application and removal. If the film is removed prior to job completion, additional cleanings may still be needed to prevent glass damage. Failure to remove temporary protective films by the manufacturer's recommended date may result in aggressive methods being required to remove the film.

Glass that is improperly stored or left unprotected during construction may result in glass that cannot be successfully cleaned using routine cleaning procedures. In such situations, more aggressive cleaning and restoration techniques may become necessary, such as the use of razor blades, chemical cleaning and/or mechanical polishing. Glass surface conditions that may require more aggressive cleaning techniques would include, but not be limited to, the accumulation

of paint, stain or varnish overspray; mortar, concrete or cement splashing on glass; silicone sealants and/or lubricants being smeared or sprayed onto glass and frames; and sealer overspray or run-off from adjacent masonry or stone waterproofing operations. In the process of removing tenacious contaminants from unprotected glass, particles may be trapped between the razor blade and the glass, resulting in fine scratches.

While members of NGA neither condone nor recommend scraping of glass surfaces with blades or scrapers for routine cleaning, it is recognized that window cleaners may choose more aggressive techniques, including the use of razor blades, in non-routine cleaning. In such cases, use of razor blades should be limited to the affected areas of the glass. Scraping should be done in one direction only with a new blade. Never scrape in a back and forth motion as this could trap particles under the blade that may cause scratches. These scratches may be visible at all times, but in some cases they may be visible only under certain lighting conditions. Significant care should be taken to ensure the glass is not scratched. Razor blades should never be used on coated glass surfaces. Contact a professional window cleaner proficient in construction window cleaning, such as a member of the IWCA for the most appropriate solution.

Glass Types

When cleaning the glass in architectural windows and doors, it is necessary to determine what type of glass is being cleaned and what, if any, type of coatings may be present on the exposed surfaces. In addition to reviewing the bulletins previously referenced, it is important to review Glass Technical Paper FB02-02 *Heat-Treated Glass Surfaces are Different* before initiating the window cleaning process, as glass may be heat-treated, i.e., heat-strengthened or fully tempered. Heat-treated glass is used in most architectural glass products today for a variety of strength and safety reasons, but it must be understood that heat-treated surfaces require greater care when cleaning as discussed in detail in the above referenced bulletin. The use of razor blades should be the last possible option, especially on heat treated glass.

Some glass may contain a logo that may indicate the glass supplier and if the glass is tempered, heat-strengthened or laminated, but it typically will not indicate the glass type or if exposed coatings are present. A logo may not be visible or present on all heat-treated glass products, so the lack of a logo does not mean the glass is not heat-treated.

High performance windows may be produced with a coating on one or both exposed surfaces. Low-E coatings are typically neutral in color and very difficult to see. Reflective coatings increase the reflectivity of the glass and are normally obvious. Specific glass cleaning procedures must be adhered to when attempting to clean coated glass surfaces. Consult the glass manufacturer's guidelines for specific procedures.

Decorative glass may have unique cleaning requirements. Refer to FB19-08 *Guidelines for Handling and Cleaning Decorative Glass* prior to cleaning decorative glass.

The plastic interlayer in laminated glass is generally exposed around the periphery of the window glass; cleaning fluids and their vapors must be kept away from this area. For cleaning laminated glass, or windows and doors containing laminated glass, do not use anything that is corrosive such as solvents, acids, bases or other chemicals. Examples of some materials that may cause harm include, but are not limited to:

Bleach (or other solutions containing sodium hypochlorite)

- Acids, especially muriatic/hydrochloric and hydrofluoric (often found in glass cleaning and restoration products)
- Ammonia
- Toluene
- Xylene
- Methyl Ethyl Ketone (a.k.a. MEK)
- Acetone

Ethyl Acetate
Mineral Spirits
Turpentine
Methanol
Products with labeling that states they are flammable or corrosive

Contact the laminated glass supplier or interlayer manufacturers for additional recommendations and cautions.

For glass with window film applied to the surface, care must be taken not to scratch the film. Do not use bristle brushes or abrasive cleaning materials. A soft cloth or clean synthetic sponge is recommended for washing. Paper towels or newspapers are not recommended. Do not rub vigorously or use heavy pressure in the cleaning process. Mild detergent or household window cleaning solutions are recommended for cleaning window films. Cleaning solutions containing ammonia may not be suitable for all film types; check with the film supplier for recommended cleaners. Additional caution is recommended when cleaning spliced areas of film. Clean in the direction of the splice.

Insulating glass, laminated glass and decorative glass is glazed in many ways, utilizing glazing sealants, gaskets, and/or tapes. Glazing materials do not provide a sufficient barrier to prevent cleaning agents from entering the glazing pocket and damaging the edge of the glass product or affecting the insulating glass unit seal. The presence of weep holes is recommended but is also not sufficient to overcome the risk of improper cleaning materials coming in contact with the edge of glass products. Exposure to certain chemicals may affect the sealants of insulating glass units and the surface of decorative products. Insulating glass unit longevity may be negatively affected by exposure to certain chemicals. Contact the supplier for additional recommendations and cautions.

The glass industry takes extreme care to avoid glass scratches by protecting glass surfaces during 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. 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.

To ensure long-term performance of the glass in a building, NGA and IWCA encourage glazing contractors, general contractors, building management and owners to be diligent in preserving the integrity of glass products. It is important to be aware of conditions that can lead to glass damage, to follow the handling and cleaning guidelines provided by NGA/IWCA and the glass fabricator, and to adhere to a regular schedule of maintenance cleaning. Generally, twice per year cleaning is sufficient; however, specific regions may require more frequent cleaning due to environmental factors and atmospheric pollutants. Contact a professional window cleaner, such as members of the IWCA, to discuss recommended frequencies for your particular building.

Quick-Reference Guide to Cleaning Architectural Glass Products

The following “Do’s” and “Don’ts” are offered as a supplement to this guide:

The following are things to DO:

- DO clean glass when dirt and residue appear
- DO protect glass during all stages of construction
- 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, non-abrasive commercial window cleaning solution
- DO use a window cleaning squeegee to remove all of the cleaning solution
- DO clean one representative window and check to see if procedures have caused any damage
- DO be aware of and follow the glass supplier’s specific cleaning recommendation
- 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 following Glass Technical Papers before cleaning any heat- strengthened or tempered glass products:
 - FB15-07 Describing Architectural Glass Constructions
 - FB02-02 Heat-Treated Glass Surfaces are Difference
 - FB03-03 Construction Site Protection and Maintenance of Architectural Glass (in collaboration with IWCA)
 - FB19-08 Guidelines for Handling and Cleaning Decorative Glass

The following are things NOT to do:

- DO NOT start cleaning without reading:
 - FB15-07 Describing Architectural Glass Constructions
 - FB02-02 Heat-Treated Glass Surfaces are Difference
 - FB03-03 Construction Site Protection and Maintenance of Architectural Glass (in collaboration with IWCA)
 - FB19-08 Guidelines for Handling and Cleaning Decorative 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 for maintenance cleaning
- DO NOT ever use razor blades on coated glass surfaces
- 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

Visit www.glass.org/store for a complete list of Glass Technical Papers, as well as other glass building products and glazing industry reference materials.

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