

## 1. Quick Guide

### DO:

- clean glass when dirt and residue appear
- determine if coated glass surfaces are exposed
- exercise special care when cleaning coated glass surfaces
- avoid cleaning tinted and coated glass surfaces in direct sunlight
- start cleaning at the top of the building and continue to lower levels
- soak the glass surface with a clean water and soap solution to loosen dirt and debris
- use a mild, non-abrasive commercial window cleaning solution
- use a squeegee to remove all of the cleaning solution
- dry all cleaning solution from window gaskets, sealants and frames
- clean one small window and check to see if procedures have caused any damage
- caution other trades against allowing other materials to contact the glass
- watch for and prevent conditions that can damage the glass

### DO NOT:

- use scrapers of any size or type for cleaning glass
- allow dirt and residue to remain on glass for an extended period of time
- begin cleaning glass without knowing if a coated surface is exposed
- clean tinted or coated glass in direct sunlight
- allow water or cleaning residue to remain on the glass or adjacent materials
- begin cleaning without rinsing excessive dirt and debris
- use abrasive cleaning solutions or materials
- allow metal parts of cleaning equipment to contact the glass
- trap abrasive particles between the cleaning materials and the glass surface
- allow other trades to lean tools or materials against the glass surface
- allow splashed materials to dry on the glass surface

## 2. Glass Cleaning

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 which 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, non-abrasive commercial window washing solution, uniformly apply the solution to the glass surfaces with a brush, strip washer or other non-abrasive 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.

A large percentage of damaged glass results from non-glass trades working near glass. This 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.

One of the common mistakes made by non-glass trades people, including glass cleaning contractors, is their use of razor blades or other scrappers 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 for causing irreparable damage to glass.

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 non-coated 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.

### 3. Laminated Glass Cleaning

In addition to the previous section "Glass Cleaning":

Grease and excess sealant materials can be removed with commercial solvents such as mineral spirits or naphtha. Follow with a normal wash and rinse. Avoid excessive application of all other solvents.

The edges of laminated architectural products must not be exposed to solvents which can react to interlayer(s). Prolonged exposure to water, water vapor, solvents, or solvent vapors may cause delamination or haziness around the periphery.

### 4. Opaci Coated Glass Cleaning

Visit <http://www.icdcoatings.com/> for the most up to date information. The following reference was current at the time of publishing this document:

Between the fabricator's facility and the job site, debris can accumulate on the spandrel coating. Below is a quick procedure for ensuring the spandrel or wall cladding coating is clean for the best possible sealant adhesion:

- Clean, soft, absorbent, lint-free cloths must be used.
- The solvent, isopropyl alcohol (IPA) is easy to find at any drug store as "rubbing alcohol".
- Remove any obvious visible debris, especially where the sealant will be applied.
- Pour or dispense the IPA onto the cloth.
- Wipe the coated surface where the sealant is to be applied with the IPA and cloth.
- Repeat the steps above.
- Wait 5-10 minutes for the alcohol to fully flash off the coating.
- Apply the sealant as recommended by ICD.

### 5. Frit Cleaning

- Glass facades should be cleaned using typical industrial glass cleaners, at least twice per year;
- Cleaners containing hydrofluoric acid must not be used

### 6. Pilkington Energy Advantage Cleaning

Visit <https://www.pilkington.com/en/us> for the most up to date information. The following reference was current at the time of publishing this document:

Although the coating itself is resistant to most chemicals, the nature of the coating surface makes cleaning operations slightly different compared to those for uncoated glass. Do not use razor blades, steel wool or other metallic objects on the coated surface. This would not damage the coating but fine metal marks, looking like scratches in sunlight, could easily be left on the coating. Such marks would need special cleaning techniques to remove them and these are described later in this document.

Hand cleaning a pyrolytic low emissivity coating, to visibly remove accumulated dust or fingerprints, can be accomplished by using a number of different cleaning products which are readily available from domestic supply, grocery and hardware stores. Follow the manufacturer's recommended handling procedures for each product listed.

**Recommended Routine Cleaning Products**

- "Sparkle Glass Cleaner", clear liquid available from grocery stores, produced by A.J. Funk & Co., Elgin, IL. Contains 2-Butoxyethanol.
- "Windex Advanced Glass & Multi-Surface", blue liquid, by SC Johnson & Son, Inc., Racine, WI. Contains 2-Hexoxyethanol and Isopropyl Alcohol.
- "Hi-SHEEN", aerosol spray Glass Cleaner by Sommer & Maca Industries Inc., Cicero, IL. Contains Diacetone Alcohol.
- "Windex Multi-Surface Vinegar Cleaner", clear liquid by SC Johnson. Contains: 2 Hexoxyethanol, Acetic Acid.
- Mixture of one part clear vinegar with one to ten parts clean water.
- Commercially available vinegar-based glass cleaners have generally demonstrated an ability to provide a clean, streak-free coated surface.

Pilkington North America, Inc. does not recommend the use of ammonia or purely alcohol based glass cleaners because these products could leave faint (not permanent) streaks on the coating.

**Routine Cleaning Procedure for Pilkington Energy Advantage™:**

- Flood the coated surface with a spray-on cleaning solution or with a cloth saturated with the cleaning solution, to thoroughly wet the surface and remove any grit particles. Be generous with the amount of solution applied.
- Rub the wetted surface with a clean, lint free towel or cloth, to fully dissolve any dirt on the coating.
- Wipe dry with a dry, clean, lint free towel or cloth. It is preferable not to use a squeegee on the low emissivity surface, simply to avoid the possibility of drag marks from the corners of a soft blade abrading against the hard coating.
- To prevent streaking, stop wiping when the glass is almost dry and there is still a uniform, thin film of moisture left on the glass surface. This film will quickly evaporate leaving a clean surface.

Note: streaking is simply the re-deposition of smears of non-uniform dirt, and detergent from the cleaning solution if there was too much dirt and too little volume of cleaning or rinsing solution.

**Detailed Cleaning Procedure to Remove Large Amounts of Dirt:**

- If the coated surface is heavily contaminated with dirt, such as during installation on a construction site, use a water spray from a hose or garden spray pressure bottle to flush away insoluble particulate matter without risk of creating fine scratches.
- Flood the coated surface with a spray-on cleaning solution or with a cloth saturated with the cleaning solution. Be generous with the amount of solution applied.
- Rub the wetted surface with a clean, lint free towel or cloth, to fully dissolve any dirt on the coating.
- Wipe dry with a dry, clean, lint free towel or cloth. It is preferable not to use a squeegee on the low emissivity surface. To prevent streaking - stop wiping when the glass is almost dry and there is still a uniform thin film of moisture left on the glass surface. This film will quickly evaporate leaving a clean surface.

Note: streaking is simply the re-deposition of smears of non-uniform dirt and detergent from the cleaning solution if there was too much dirt and too little volume of cleaning solution.

If, after the above procedure, and under critical viewing, the glass does not appear clean then a rinse with distilled water should be made after detergent washing - before the cleaning solution has had time to evaporate - to remove the dirt contaminated detergent solution.

When properly done this allows the final evaporation of a thin film of pure, clean rinse water which cannot leave any visible deposits.

**Spot Cleaning:**

Occasional spot cleaning may be required to remove stubborn dirt or foreign materials that have adhered to coated surface. Spot cleaning products containing organic solvents, or a one-time gentle hand application of very fine abrasives, can be used to remove markings from grease, oil, tape adhesive, and crayons or other waxy materials as well as paint and rub-off marks from plastics. Overly aggressive application of abrasives will rub a permanent bright spot into the coating.

**Recommended Spot Cleaning Products:**

- "Soft Scrub<sup>®</sup> with Bleach Cleanser", mild abrasive cleaner, produced by The Clorox Co., Oakland, CA. Contains: Calcium Carbonate and Sodium Hypochlorite.
- "Bar Keepers Friend Liquid<sup>®</sup>", produced by Servaas Laboratories, Indianapolis, IN. Contains: Oxalic Acid and fine abrasive powder.

- “Goof-Off” from Valspar Corp., Wheeling, IL and Lilly Industries Inc., Grand Rapids, MI 49512. Contains Xylene and Ethyl Benzene.
- Denatured Alcohol, Methyl Ethyl Ketone, Acetone or other organic solvents available from hardware stores.

**Spot Cleaning Procedure:**

- Use a cloth saturated with a routine cleaning solution to thoroughly wet the surface and to remove any grit particles.
- Apply a small quantity of one of the cleaners listed above to a clean, wet cloth or towel.
- Rub on areas of coating needing spot cleaning.
- Take particular care to prevent solvents, such as those listed above, from contacting glass sealants, framing and adjacent paintwork.
- Wipe clean using a dry, clean, lint free towel or cloth and immediately follow with the rinsing procedure given above in “Detailed Cleaning Procedure”.

**Specialized Cleaning:**

If metallic objects have contacted the coated surface, a thin layer of metal removed from the object may be deposited onto the coating which results in a discolored stain or mark that looks like a scratch. Such marks cannot be removed using the normal cleaning procedures given above but do require the specialized techniques below.

**Recommended Specialized Cleaning Products for Removal of Metal Marks, etc.:**

- “Lime-A-Way”, by Reckitt Benckiser Inc. Contains Sulfamic Acid, Isopropyl Alcohol and Hydroxyacetic Acid
- Muriatic Acid, (available from hardware stores). 20% Hydrochloric acid solution in water
- “Acid Magic”, Muriatic Acid Replacement (available from hardware stores), produced by Universal Chemicals & Supplies Inc., Div. of Certol International LLC, 6120 E. 58th. Ave., Commerce City, CO. Tel 800 843 3343. Contains: Hydrochloric Acid

**Specialized Cleaning Procedure:**

- Use a cloth saturated with a routine cleaning solution to thoroughly wet the surface and to remove any grit particles.
- Apply a small quantity of one of the specialized cleaning products listed above to a wet, clean cloth or towel.
- Rub only on the areas of glass needing cleaning. Do not allow splashing onto adjacent glazing frames, etc.
- Wipe clean using a dry, clean, lint free towel or cloth. Follow with the rinsing procedure given above in “Detailed Cleaning Procedure”.

**7. EnduroShield Cleaning**

Visit <https://www.enduroshield.com/en/> for the most up to date information. The following reference was current at the time of publishing this document:

**Maintaining the treated surface**

Acting as an invisible shield, the EnduroShield® coating bonds to the substrate and helps protect against dirt, grime and soap scum, and also from staining, etching or discoloring. EnduroShield repels both water (hydrophobic) and oil (oleophobic) leaving an easy to clean surface that is very similar to a non stick fry pan. The coating does not change the look or finish of the surface, it just keeps it looking as good as the day it was treated. You clean less often, with less effort, and the surface won't deteriorate over its life like untreated surfaces. There are no specific after care products to purchase to maintain the coating, saving you time and money.

**Cleaning guide**

Shower glass needs to be cleaned each week using a damp microfiber cloth and a mild detergent (such as washing up liquid) to remove any soap scum, dirt or grime from the surface. For outdoor glass surfaces such as railings and windows, clean as required using water and a mild detergent. Wash the glass with a microfiber cloth, and dry with a good quality squeegee (such as Ettore or Pulex brands). For best results clean the glass in the shade to prevent streaking.

**What to avoid**

Be careful not to use any rough, gritty, abrasive, highly acidic or alkaline cleaners as they may damage the protective coating. This includes products such as Comet (powder), Ajax, or cerium oxide which damage or polish back the actual substrate.

**Acceptable cleaning products**

Accelerated testing undertaken to simulate 10 years of cleaning was undertaken using 6 of the top selling cleaning brands in the US, showing no detriment to the coating.

- Windex
- Lysol 4 in 1 Bathroom Cleaner
- Fantastik Orange Action
- Green Works Natural Glass & Surface Cleaner (by Clorox)
- Clean Shower Daily Shower Cleaner (Arm & Hammer)
- Mr. Clean Magic Eraser when damp

It should be noted that with any cleaner used on the EnduroShield surface a thorough rinse with clean water should follow immediately. Although these cleaners can be used instead of the suggested maintenance, EnduroShield is designed to be an 'easy clean coating' which requires only vinegar and/or a mild detergent that does not contain harsh or toxic chemicals to maintain the surface effectively.

**Hard water areas**

For areas with hard water or bore water, due to a higher concentrate of mineral deposits such as lime and calcium, a build up may occur on the protective coating that may not be easily removed with a mild detergent. A solution of white vinegar and water (1 part vinegar to 4 parts water) should be sprayed onto the glass and allowed to soak for several minutes. This will dissolve any mineral deposits that have built up on the glass surface. Re-spray the glass with the vinegar solution and then wipe firmly with a microfiber cloth. A stronger solution of vinegar to water can be used if needed.

**Tip for extreme hard water areas**

Around the world there are some unique locations which have extremely harsh conditions. In some cases stubborn stains can occur in under 1 year. New Orleans, Louisiana and Perth, Western Australia are examples of cities with very high mineral concentrations. In these harshest of water environments, EnduroShield is a great choice. Without the protection of EnduroShield, your glass may have to be replaced or professionally restored. EnduroShield allows you to have great looking glass, but it takes a little more work due to these specific environmental conditions. In such conditions, minerals are so prevalent in the water that they can still create a build up on top of the coating and become difficult to remove. We recommended using the vinegar / water solution (listed above) every week or so as a cleaning option to reduce this build up on the surface, rather than allowing the build up to accumulate over a long period of time.

**8. References:**

- GANA Glass Informational Bulletin GANA 01-0300
- GANA Laminated Glazing Reference Manual, 2009 Edition
- ICD High Performance Coatings Contractor Manual, November 2016
- EnduroShield website, March 2019
- Pilkington Technical Bulletin ATS-193, August 2013