

Operation & Maintenance

Glass is a hard and brittle material. However, even though hard it is susceptible to damage from a variety of causes predominately due to its brittle nature and requires care and regular maintenance to retain its original appearance. Since the primary purpose of glass is to be viewed through, damage to glass can easily detract from its original condition and clarity. Viewing on delivery/installation is as per standards set by the GGF. Great care is taken to prevent glass damage during manufacture, processing, storage and delivery. It is therefore worthwhile taking precautions to prevent possible contamination and damage to glass during installation. Preventative measures are often faster and more effective than subsequent ordinary cleaning techniques available. The following is not fully comprehensive to all situations but is to be taken as a general guide.

Handling & Storage

Delivery, handling and storage procedures can only be agreed on a job-by-job basis due too many variable factors in product type, size and installation type. Upon delivery, check the paperwork and labels on glass to ensure compliance with the specification. Edges and corners of glass are particularly vulnerable to damage during handling, storage and installation so pay attention to these. Also inspect the cut edges and any sealing of the glass for excessive flaws or subsequent damage that may compromise the strength or performance of the glass. Check all surfaces for any signs of damage. If in doubt seek advice from Glass Services Ltd before proceeding.

Glass should not be stored or stacked horizontally. Store items on edge at an angle of 3° to 6° from the vertical, with sufficient lateral support to prevent bowing, in a clean dry, ventilated place, avoiding direct sunshine and other sources of heat. With large or heavy IGU's make sure the bottom support is perpendicular to the angle of lean and is of a suitable material that isn't too hard (non-knotted softwood). This is important to prevent panes slipping and subsequent issues with sizing and compromised sealing. It is very important to fully support laminated glass in a flat and relaxed state when in storage. Bending of laminated over prolonged periods will result in the glass taking the form of the bend applied. Subsequent installation into frames that are flat will induce peak stresses resulting in breakage. This is particularly relevant with laminated fire glasses.

Factory applied protection such as pads or surface protection film should not be removed until the glass is ready for installation. It should be noted that some surface protection films/labels become difficult to remove after prolonged periods of application in sunlight. Films should be checked on a regular basis to ensure they will release without issue. Do not store glass in a situation where moisture or condensation can sit between panes of stacked glass. Separate immediately and dry thoroughly, otherwise permanent staining may result. If water remains in contact with the glass for an extended period, it can form a concentrated alkaline solution and will attack the glass surface causing permanent damage and in extreme cases even "welding" the sheets together. Carefully inspect all glass before installation.

Installation

Installation is to be carried out to the frame manufactures recommendations or by following recognized glazing standards for the product in question. It is extremely important to check and use compatible sealants and glazing materials on installation with adequately prepared frames. Timber

frames must be primed to prevent acids and solvents migrating across into the perimeter sealing of IGU's. Failure to do so can ultimately result in premature failure of laminated glass or sealing of IGU's. Equally important is supporting the glass on glazing blocks in a way to allow free drainage in vented systems and equal support to all glass panes. Extra care should be made in not allowing IGU's to be supported only by the perimeter sealing. In doing so the glass will move or the blocking will displace the perimeter sealant. It is also worth checking that frames are flat, structurally sound and that no point loading is applied by the framing onto the glazed items during or after installation. Installation should be carried out by experienced or qualified tradesmen.

After Installation

It is recommended that glass be protected during any further work on site to avoid harmful contamination for example from concrete, paint and plaster. Protecting the glass will simplify the cleaning process after construction work finishes. If the glass is not protected it should be cleaned frequently during construction as dirt and residue appears both externally and internally. Frequent cleaning is required whilst construction continues since chemicals in dust and particularly in cement may be activated by rain and cause permanent corrosion of the glass surface. Paint or plaster should not be allowed to splash or run onto the glass. Any that does get onto the glass should be cleaned off immediately whilst still wet. Production labels and transport pads affixed onto the glass for delivery to site should be removed within 24 hours of glazing. If left on the glass for an extended period and exposed to sunlight the adhesive can harden making it more difficult to remove. A solvent such as acetone may be used in small amounts to spot clean residues of adhesive left on the glass taking care not to allow contact with glazing seals, gaskets, any paint finishes or the perimeter edge seal of an insulating glass unit.

Before Cleaning

Before proceeding with cleaning, determine whether the glass is clear, tinted or reflective. Surface damage can be more noticeable on reflective glass when compared with clear uncoated glass. If the reflective coated surface is exposed, either externally or internally, special care must be taken when cleaning as scratches can remove the coating and result in visible changes to the light transmittance. Specialist glasses such as 'Self Clean' requires particular cleaning methods and the specific instructions for this product must be followed (Refer to Pilkington Activ® for specific instructions).

Tinted and coated glasses should not be cleaned in direct sunlight, as the glass may be too hot for optimum cleaning. The cleaning solution will dry before effective cleaning has occurred and the dry Surface may also promote scratching. Excessive temperature changes of the glass should also be avoided, for example splashing hot water on cold glass or cold water on hot glass.

It is recommended that cleaning operators begin by cleaning a small area or window first then stop and examine the surface for any damage to the glass or coating bearing in mind that some types of scratches may be more visible under certain lighting conditions or times of the day.

Cleaning operations should commence at the top of the building and continue down to lower levels to reduce the risk of leaving residue and cleaning solution on glass.

Standard Cleaning Procedure

Cleaning during continuing construction work differs from ordinary routine cleaning mainly through the careful removal of debris from the glass surface. This is a delicate procedure and should be carried out by specifically trained professionals. Cleaning should start by thoroughly soaking the glass with clean water and soap solution to loosen dirt or debris.

Using mild, non-abrasive commercial window washing solution, uniformly apply the solution to the glass surfaces by spraying, clean grit-free cloth or grit-free sponge. Using a circular motion and light to medium pressure, wipe the cleaning solution on the glass. Rinse the glass immediately with generous amounts of clean water making sure to remove all the cleaning solution. Use a clean lint-free cloth or a squeegee to dry the glass surface.

Care should be taken to ensure that no metal parts of the cleaning equipment make contact with the glass surface and that no abrasive particles are trapped between the glass and cleaning materials.

All water and cleaning solution residue should be dried from window frames, seals and gaskets to avoid any potential deterioration of these materials. If residues are still present on the glass the steps above should be repeated.

Abrasive cleaners, powder based cleaners, scouring pads or other harsh materials should not be used to clean the glass or frame surrounds.

Excess glazing compounds and sealants should be carefully removed from the glass and frame Surrounds, taking care not to scratch the finished surfaces with tools or abrasives. Avoid scraping the glass with metal scrapers or blades. A solvent such as white spirit or professional glass cleaner may be used to remove any glazing compound, finger marks or grease taking care not to allow contact with glazing seals, gaskets, any paint finishes or the perimeter edge seal of an insulating glass unit. The glass can then be cleaned following the procedure above.

When paint or other construction materials cannot be removed by standard cleaning procedures, a new 25mm razor blade may be used on non-surface treated or non-coated glass surfaces. It should be used only on small spots and scraping carried out in one direction only. Note that this practice can cause a concentration of small hairline scratches that may be visible under certain lighting conditions and is best carried out by a professional.

Glass Staining

Water runoff flowing over the facade of a building may carry contaminants onto the surface of the glass. These contaminants cause stains on the glass and can be extremely difficult to remove sometimes even chemically bonding to the glass surface. The most effective way of addressing this problem is to prevent runoff reaching the glass at the design stage by use of suitable drainage techniques employing flashings, reveals or drips for example.

Limescale and concrete stains can occur where rainwater has passed over masonry, concrete or mortar onto the glazing below. Insoluble salts of calcium crystallise on the glass surface and become chemically bound to it making it extremely difficult to remove using standard cleaning

procedures. Organic sealants may leach out solvents, oils or plasticisers and these may adhere very strongly onto the glass surface and cause staining. The sealant may not necessarily need to be adjacent to the glass to cause this problem as they could be carried over the glass by water runoff. This tends to be a greater problem when the building is new. Consult the sealant manufacturer for advice and follow their recommendations.

Weathering metals release oxides as they age and can cause staining on adjacent glazing. They occur where rainwater passes over metal flashing or other architectural elements and deposits metal oxides onto glazing. Iron, zinc, lead and copper are particularly prone to cause problems of this nature. The oxides adhere tenaciously onto the glass and expensive chemical cleaning techniques may be required if they are left on the glass for any length of time.

Glass should be examined frequently during construction to see if any build up is occurring. If so the glass should be cleaned immediately.

Lead Oxidisation

Occasionally acidic water run-off (predominantly from new oak frames for instance) will cause externally applied leading to produce a white fur-like appearance. Under these circumstances lightly clean the leading with soapy water taking care not to abrade the lead surface. The oxidation of the lead is a natural process that needs to occur and after time should settle. If the leading continues to show signs of acidic attack then the cause of the acidic run-off will need to be investigated and rectified.

Over-heating

Consideration should be taken during design, installation and service of insulated units as to the operation temperatures they are exposed to. This can be in extreme direct sunlight with high levels of thermal build-up within buildings. The resulting combination can lead to the gases within units being heated to the point where they can cause sufficient pressure to develop and blow the hermetic sealing ultimately resulting in units displaying symptoms of failure at a later date.

Weld Spatter

This causes a rough and pitted surface on glass. Any glass that has been damaged by weld spatter should be replaced, as the strength of the glass will have been unpredictably reduced. Temporary screens should be installed if welding, sandblasting or other potentially damaging construction process is being carried out near the glass.

Regular Maintenance

It is essential that all installations are inspected and maintained during the lifetime of the building at regular intervals as recommended by the sealant and framing system manufacturers. The regular routine cleaning of the glass following the standard cleaning procedure detailed above will help to preserve the original appearance and performance characteristics.

Quick Reference Guide

- Store glass in a safe manner in a suitable dry ventilated area out of direct sunlight and away from other sources of heat.
- Check the specification of the glass products concerned to determine if they are tinted, coated or reflective and follow any specific instructions.
- Avoid cleaning the glass in direct sunlight, particularly tinted or coated glasses.
- Clean frequently as and when dirt and residues appear on the glass both on the external surface and the internal surface.
- Don't allow splashed materials to dry on the glass surface.
- Start cleaning at the top of the building and work downwards.
- Start by cleaning a small area first and assessing it to see if the cleaning procedures have caused any damage.
- Begin by thoroughly soaking the glass surface with clean water and soap solution to loosen debris and dirt.
- Don't use aggressive or abrasive cleaning solutions or materials.
- Avoid use of metal scrapers and blades.
- Make sure all cleaning solution is dried from gaskets, seals and frame surrounds.
- Regularly inspect and maintain the glazing throughout the lifetime of the building and take remedial action as necessary or as recommended by the framing and sealant manufacturers.