

Glass Surface Staining

To Our Valued Customer;

Glass is a hard, lustrous, and durable material used in building around the world for centuries. Because of its durability, it may be surprising that glass can be damaged by surrounding construction or something as common as water. However, in certain circumstances water related damage can result in the need for costly restoration or, even more expensive, a complete replacement. The purpose of this bulletin is to help avoid a potentially frustrating and unnecessary experience for both Arch Aluminum and our customers.

Architectural glass products are exposed to moisture from a variety of sources, including rain, condensation, lawn sprinkler systems, building run off etc; if not regularly cleaned, surface contamination can accumulate and react with the glass, its coatings if exposed, or both. Accumulated basic or acidic contaminants can lead to rapid and permanent staining or damage to the glass. While most noticeable in reflective glass products, such damage can occur to any substrate given the right conditions. Visible stain begins to appear as a slight off-angle iridescence; with time, this can progress to a permanent blue, or milky and tactile leachate¹. In the earliest iridescent stage, the stain may be removable with special cleaning procedures; however, if not quickly addressed, staining becomes virtually impossible to remove and may require replacement of the glass. Accordingly, the associated remedial costs increase with the level of damage, potentially rising to total replacement. Of course, in the real world it is seldom an “all or nothing” situation. The staining will vary from lite to lite, showing heavily on some lites, others to a lesser degree, and virtually non-existent on yet other lites. There are many reasons for this variability, including the protective nature of the tin side versus the airside of float glass and possible localized ambient conditions. Additionally, covered areas such as gasket lines, corks and labels offer some protection and may leave a pristine surface when removed. These areas can provide excellent proof as to the condition of the surface prior to installation. Because the mechanism leading to glass surface damage is not well known outside the industry, affected glass is often incorrectly thought to be defective by building owners and other decision makers.

Some causes of surface staining can be addressed in the design phase, such as irrigation sprinkler heads, exposed and weathering steel, building drainage systems, drip ledges or masonry run off. Other contributors to glass damage include site storage for prolonged periods, contamination from other trades, or even poor cleaning techniques that can lead to irreparable damage. These conditions may not be initially obvious, but can be injurious and requires vigilance by the general contractor, glazing contractor, or owner depending on who has assumed the risk of loss. This is an area where a clear and verifiable paper trail of glass cleaning and maintenance schedules, as well as an explicit description of the condition of the glass, is invaluable.

A source of increasing concern involves developers who contract to have buildings erected with out a pre-construction lessee’ or buyer. These buildings are often left unfinished internally, with exposed aggregates, dirt, green concrete floors, dry wall, paint etc, intended to be finished to occupant specifications. Depending on local conditions or season but especially within the coastal and temperate zones, the building may not be heated or ventilated. This can result in high humidity levels and subsequent condensation on many of the fittings and fixtures, including the glass, as the temperature fluctuate through the dew point. Unchecked, the basic and acidic contaminants accumulating on the glass can rapidly increase to the point where glass staining can occur in as little

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as a few weeks. With no occupants or reason to clean the glass, the increasing haziness may be seen on the occasional showing, but not be recognized for the potentially expensive problem that it may become. The glazing contractor, in order to avoid callbacks and the need to prove oneself-innocent, should proactively address these conditions. When the work is complete, address the cleaning and maintenance issue and immediately in writing advise the risk of loss is no longer the glazing contractor's or glass fabricator's responsibility.

This document does not identify every source of surface staining. However, the cause and mechanism are always the same. The main variables will be time and level of exposure. Inspection, as well as routine maintenance and cleaning cannot be an after-thought. Consideration and planning for inspection, cleaning and maintenance from delivery and construction, through occupancy, will provide long and trouble free service. As the old saying goes... "an ounce of prevention is worth a pound of cure". Always recommend regular cleaning and maintenance of the glass rather than waiting until it becomes visibly dirty. Provide appropriate cleaning instructions and advise the potential damage from improper maintenance or neglect.

1 Reprint from TD - 144, Courtesy PPG Industries, Pittsburgh, PA



Figure 3 – Reaction Contaminant
Acid rain/masonry/glazing material
run-down on the glass surface.
Removal requires an acidic solution, or
may not be practically possible.



Figure 4 – Surface Corrosion
Glass corrosion is typically caused by
prolonged exposure to high humidity
and temperature and is often not
removable.