MARLIN WINDOWS, INC.

PROTECTING FLAT GLASS SURFACES

Flat glass must be protected during shipment and storage. Only by proper handling and storage techniques can the integrity and clarity of the glass be assured before installation. After installation, appropriate precautions and proper maintenance are needed for long and trouble free service. In this bulletin we will explore the various causes of glass surface damage, means of prevention, and methods of identification and removal of stains. The specific cause of glass surface damage can be difficult to diagnose, and stain removal is usually costly. Therefore, prevention of such damage is better than any "cure." To prevent glass surface damage, follow the procedures for storage, installation, and maintenance that are recommended below.

CAUSES OF GLASS SURFACE DAMAGE

Water Attack

Once installed, glass can withstand large amounts of water without significant surface damage. However, water can accumulate when there is inadequate separation between lites in storage. Even small amounts of water trapped in this way can cause surface deterioration. Glass in contact with water enters into a series of complex chemical reactions which result in alkaline solutions. The trapped water reacts slowly initially, but in time the reaction accelerates, resulting in a rapidly increasing alkali concentration. The alkaline solution attacks the glass surface by dissolving away surface ingredients (sodium) which results in hazing and roughness. Initial attack may cause only faint whitening of the glass surface due to the changes in the glassy silicate structure. At this stage, a light polishing or special chemical treatment would probably restore the glass surface. However, the condition worsens in time. The final stages of attack result in decomposition and a further deterioration of the glass surface which is even more visible.

Chemical Air Pollutants

Certain airborne chemicals can also deteriorate glass surfaces. While glass is resistant to most acids, even dilute forms of hydrofluoric and phosphoric acids quickly react with silica in glass. A variety of other chemicals can also attack glass surfaces. These substances, when in the form of airborne sprays and mists, can be carried for some distances, not only in industrial, but also in rural and residential areas. Even solid particulates can break down into destructive compounds when held against glass surfaces by water condensation.

Even water alone can damage the surface of glass. Certain types of hard water, for instance, may leave harmful deposits if allowed to dry on glass surfaces. These deposits can be formed in washing or rinsing the glass, or accidentally by the evaporation of water from such sources as lawn sprinklers. It is difficult or impossible to remove such residue without excessive polishing.

Alkali Attack
Building materials and construction methods can cause surface damage to glass. A very common cause of such problems is alkalis being leached from precast concrete panels by rain, or fluorides in the washoff from concrete floors. These materials will stain or etch the glass if allowed to remain for a few days. When this occurs, there is no practical method of restoring the glass surface. Other sources of damaging alkalis are some lubricants used during installation of neoprene structural gaskets and locking strips. When using lubricants for such installations, avoid those containing high levels of alkaline ingredients. The gasket manufacturer should recommend a suitable lubricant. Potentially harmful alkalis are also sometimes present in marking materials used on glass installations during construction. Such markings are, of course, useful in making the glass more visible, thus reducing accidental breakage. However, the marking materials may stain the glass if they contain alkalis, or if water vapor is allowed to condense on them.

Physical Damage
Glass surfaces can be altered by physical abrasion such as scratches and, rub marks. These can come during handling, installation, and storage. Such damage may be similar in appearance to chemical deterioration; however, the difference can be determined under microscopic examination and various stain removal tests. Further surface damage is accelerated by the abraded glass powder because any moisture present produces strongly alkaline solutions which attack the glass.

On a job site, the welding of metal close to window areas is often necessary and results in sparks which can damage unprotected glass surfaces. The welding sparks which come in contact with the glass surface cause a thermal shock which results in a pitting of the surface of the glass. As well as detracting from the appearance of the glass, this pitting reduces the strength of the glass. The reduction in glass strength may have little relationship to the size of the pits since a smaller pit may have vents originating from it which are not visible to the naked eye. In comparison, a much larger pit may only be a relatively harmless smooth spall. A microscopic examination of each pit would be necessary to determine the effect on the glass. Even with such a detailed but unrealistic examination, an assessment of the glass strength reduction would only be speculative.

Metals which oxidize, weathering steel for example, can leave a stain on the glass which is difficult to remove. This oxidation of the steel stabilizes over a period of time, depending on frequency of rainfall and other climatic conditions. However, the washoff from the steel during the initial oxidation can leave a residue of rust (iron oxide) on adjacent materials including glass. It may be difficult to remove this residue from the glass if it is allowed to accumulate.