NATIONAL GLASS ASSOCIATION with GANA

Glass Technical Paper **FB65-20 (2020)**

Glass for Personal Protective Barriers

Personal Protective Barriers

Retail, medical, educational and manufacturing facilities are implementing changes due to the worldwide outbreak of COVID-19, a respiratory illness believed to spread primarily by droplets from coughs or sneezes of infected persons to those nearby. Many businesses are installing clear personal protective barriers to physically shield employees from each other and from consumers to reduce potential exposure to the virus. In many applications, the barriers will become a permanent fixture; therefore, aesthetics and cleanability are important design considerations. Barriers can be constructed of plastic sheet or glass. Glass has several advantages in physical barrier applications and may be preferred over plastic, especially for permanent and public-facing barrier installations. Compared to plastic, glass is easy-to-clean, transparent and aesthetically-pleasing.

Figure 1: Safety glass installed for personal protective barriers (left photo) can provide a sleek, professional, sanitary, yet welcoming feel for consumers entering retail stores compared to plastic barriers (right photo) where rough edges and hazy distortion combined with surface scratches detract from the consumer experience and collect dirt and potentially bacteria.

Cleaning Physical Barriers

It is important to routinely clean physical barriers using U.S. EPA-approved and CDC-recommended disinfectants, such as solutions with 70% isopropyl alcohol. Certain plastics used for barriers, such as acrylic and plexiglass, can be susceptible to reaction with cleaning agents and compatibility should be verified. Routine cleaning of plastic surfaces may damage the surface of plastic barriers, degrading the visible appearance by discoloration or crazing.

Plastic is susceptible to aging, becoming brittle over time and with exposure to UV. Scratched or marred plastic surfaces can harbor bacteria and retain moisture, including droplets from coughs or sneezes of infected persons. The

service life of plastic barriers is short due to their compatibility with some cleaning agents and degradation over time, so they must be replaced often.

Glass has an excellent service life and consideration should be given to frequency of replacement of the chosen barrier material. With a smooth, non-porous surface that resists contamination, uncoated glass surfaces can withstand repeated cleaning by most cleaning agents without discoloration or surface degradation. Relative to softer plastic surfaces, the harder, smooth surface of glass is more resistant to scratches and does not craze or discolor over time or with exposure to UV and is, therefore, appropriate for permanent protective barriers. Cleaning instructions are detailed in the *Proper Procedures for Cleaning Architectural Glass Products* NGA Glass Technical Paper. Anti-glare and anti-microbial coatings can be applied to glass for barrier applications requiring additional considerations. Please contact your glass supplier for additional details.

Recommended Glass Types

The types of glass recommended for physical barriers are laminated or fully tempered glass which meet ANSI Z97.1 *Safety Glazing Materials Used in Buildings – Safety Performance Specifications and Methods of Test* and/or CPSC 16CFR 1201 *Safety Standard for Architectural Glazing Materials*. Safety film that passes ANSI Z97.1 and/or CPSC 16CFR 1201 standards may be applied to some glass products. Please contact your fabricator for additional details.

Laminated glass is comprised of two or more lites of glass permanently bonded together with one or more interlayers. The benefit of laminated glass is that, if broken, the glass will stay adhered to the interlayer contained in the opening until it can be removed and replaced. Laminated glass can also meet ANSI Z97.1 and/or CPSC 16CFR 1201 safety glazing requirements. When laminated glass is used, compatibility of the interlayer with all materials used in the glazing system must be considered.

The process of heat-treating glass involves uniformly heating glass close to its softening temperature and then rapidly and uniformly cooling it. This process results in the development of surface compressive stresses, thus increasing the strength of the glass. This increased strength allows for greater impact resistance and when fully tempered, can also meet safety glass requirements. When fully-tempered glass meeting ANSI Z97.1 and/or CPSC 16CFR 1201 breaks, it will shatter into many small pieces rather than large shards, which reduces the risk of cut injuries.

Installation Considerations

Glass is installed as part of an overall finished physical barrier product. It is important that the hardware and components, including the glass itself, are designed with the system in mind so the finished product works as intended.

Edge clamps and adhesives are examples of simple and efficient ways to mount glass panels without designing and drilling holes into the glass. Using this technique, the mounting components should support the glass along a minimum of two edges and bite depth of the edge clamping over the glass edge should be appropriate for the glass thickness (see figure 3), as specified in the *Glazing Manual* and *Laminated Glazing Reference Manual*. Hardware is readily available for glass guards to support the weight of the glass panel without crushing or locally stressing the glass surface.

Figure 2: Examples of glass barriers mounted with edge clamping supporting two or more edges.

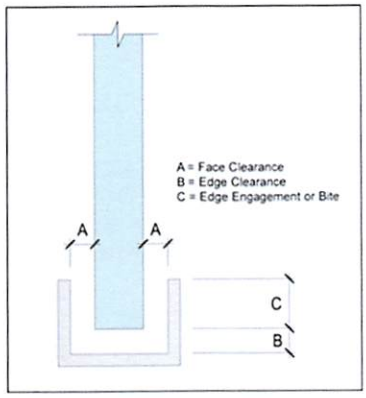

Figure 3: Glass bite depth, C, should be appropriate for the glass thickness, as specified in the Glazing Manual and Laminated Glazing Reference Manual for edge-supported glass mounting techniques.

An alternative mounting technique involves point-supported glazing, where glass panels are supported by through-hole or patch/clamp fittings. Typical hardware includes a bolt and patch plate system, a countersunk bolt, hardware with flexible washers and gaskets within the supporting structure, and hardware with articulated bolts. Refer to ASTM C1048 *Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass* for requirements for fittings and hardware and placement of holes, notches and cutout fillets.

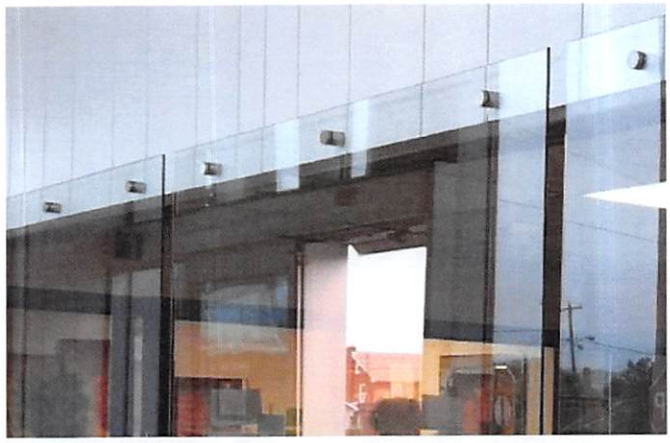

Figure 4: Example of point-supported glass barriers with thru-hole fittings.

Care must be taken through all steps of the fabrication and installation processes to keep the glass free of edge damage. Bump-guard type gasketing or similar edge protection around the perimeter of exposed-edge glass barriers is recommended unless edges are ground and polished.

Material Considerations of Glass for Personal Protective Barriers

- Meets safety glazing requirements (ANSI Z97.1 and/or CPSC 16CFR 1201) when properly fully-tempered or laminated
- Clear, transparent, non-yellowing, non-aging
- Smooth, non-porous surface is resistant to contamination
- Easy to clean and sanitize
- Durable; resists hazing or discoloration from most disinfectants
- If broken, tends to remain in the frame until removed (laminated and surface-applied film)
- Sleek, professional, sanitary, yet welcoming feel for consumer

Resources

- NGA Glass Technical Paper FB01-00 (2016) *Proper Procedures for Cleaning Architectural Glass Products* https://members.glass.org/cvweb/cgi-bin/msascartdll.dll/ProductInfo?productcd=PROPERPROCEDURES
- ANSI Z97.1 *Safety Glazing Materials Used in Buildings – Safety Performance Specifications and Methods of Test*
- CPSC 16 CFR 1201 – *Safety Standard for Architectural Glazing Materials*
- NGA with GANA Glazing Manual https://members.glass.org/cvweb/cgi-bin/msascartdll.dll/ProductInfo?productcd=GANAGLAZINGDOWN
- NGA with GANA Laminated Glazing Reference Manual https://members.glass.org/cvweb/cgi-bin/msascartdll.dll/ProductInfo?productcd=LAMINATEDREFMANUAL
- NGA with GANA Engineering Standards Manual https://members.glass.org/cvweb/cgi-bin/msascartdll.dll/ProductInfo?productcd=ENGINEERINGSTANDARD
- ASTM C1048 *Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass*
- Interim Guidance for Businesses and Employers to Plan and Respond to Coronavirus Disease 2019 (COVID-19): https://www.cdc.gov/coronavirus/2019-ncov/community/guidance-business-response.html
- Guidance on Preparing Workplaces for COVID-19 https://www.osha.gov/Publications/OSHA3990.pdf
- OSHA COVID-19 webpage www.osha.gov/covid-19

Most Glass Technical Papers are available free of charge. Visit www.glass.org/store for the complete list, as well as other flat glass industry reference materials.

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