Design Guideline 088000
Glazing

Scope

In general, follow the guidelines below when specifying glazing and related items. Unless otherwise indicated, these guidelines are not intended to restrict or replace professional judgment.

Related Sections

U-M Design Guideline Section:

3.2 – Energy and Water Conservation
6.0 DG 084113 – Aluminum-Framed Entrances and Storefronts
6.0 DG 084413 – Glazed Aluminum Curtain Walls
8.2 Architectural Preferred Manufacturer List
4.8 Fall Protection on Roofs

U-M Master Specification Sections: (A digitally accessible version is pending; please email AEC-Digital Accessibility Support if assistance is needed)

MS088010 – Glazing (Interior Applications)

Reference Documents:

IGCC/IGMA Certification for Insulating Glass Seals GANA "Glazing Manual"
ASTM C 1036 Standard Specification for Flat Glass for Annealed Float Glass
ASTM C 1048 Standard Specification for Heat-Treated Flat Glass – Kind HS, Kind FT Coated and Uncoated Glass for Heat-Treated and Coated Glass
ASTM C1172-09 Standard Specification for Laminated Architectural Flat Glass
16 CFR 1201 Safety Standard for Architectural Glazing Materials for Glass in Hazardous Locations
ASTM E2190-08 Standard Specification for Insulating Glass Unit Performance and Evaluation
ASTM E1300-09a Standard Practice for Determining Load Resistance of Glass in Buildings Insulating Glass Certification Council (IGCC)

Design and Installation Requirements

Design Requirements for Exterior Glazing

General

Specify 1-inch thick, low-e coated, argon gas filled insulating glass in all vertical vision glass panels. Where spandrel glass is used, do not specify units with insulation boards adhered to the inside surface. Where metal filler panels are used, specify 1-inch thick aluminum sandwich panels with rigid insulation cores.

Provide insulating glass units (IG) certified by the Insulating Glass Certification Council (IGCC) and Insulating Glass Manufacturers Alliance (IGMA).

Determine whether heat strengthened glass is required due to the effects of differential shading, tinting/coating of glass, size of units, or other conditions. Typically restrict fully tempered glass to hazardous locations.

Design shall allow option for maximum of one treatment per glazing surface, ie. low e coating and frit on different surfaces.

Tint and Appearance

Most older University buildings, including those with recently retrofitted windows, have non-reflective, bronze tint outer panes paired with clear inner panes. The current standard is insulating units with clear outer and inner panes and solar control low-e coatings which are clear in color. The goal is to maximize visible light transmittance while minimizing solar heat gain. The use of other tints and reflective coatings is discouraged. Review aesthetic, performance and budget implications of glass selection with the Design Manager.

In most retrofit projects in which current ceiling heights are lower than the window head heights, use a non-vision spandrel panel composed of a 1" insulating glass unit with an outboard lite matching the tint and coating of the outboard lites in the vision panels and an inboard light of non-tinted patterned glass. Determine whether the patterned inboard lites require heat strengthening, since patterned units tend to be weaker than clear float glass.

Where bronze tint glass is specified, include bronze anodized spacers unless "warm-edge" spacers are specified. Consider other color coated spacers where appropriate and available.

Require the glazing contractor to submit an adequate number of samples to display the color range of the glass. Because of difficulties with color variation in clear low E glazing, the following language, which is more rigorous than ASTM C 1036 and ASTM C 1376, should be included in the Quality Assurance article of the glazing specification if this type of glazing is included in the Project:

"Sealed Insulating Glass Units: In addition to other requirements in this Section, comply with ASTM D 2244- 09b Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates. Obtain written acceptance by the Architect and the Owner's representative of permissible color tolerance between test specimen and reference and the procedure for calculating the color tolerance for each material and condition of use."

Thermal Performance

Vertical/Slope/Horizontal Glazing

Thermal performance characteristics for all exterior glazing types should be evaluated and selected based on the requirements of DG 3.2, including ECM's.

Since the Energy Code requires that U-value and SHGC maximums be determined for the entire fenestration assembly (not center-of-glass values), U-value and SHGC should ordinarily be specified in the accompanying Div. 8 aluminum framing sections ("Aluminum Storefront", "Glazed Aluminum Curtain Wall" and/or "Aluminum Windows") rather than in the "Glazing" section. Wherever possible, however, utilize very high performance glazing (maximum U-value of 0.3 and maximum SHGC of 0.33)

Other Performance Criteria

- Determine whether control of UV transmittance is required to minimize damage to furnishings, draperies and/or collections. Review with the Design Manager.
- Determine whether controlling visual glare is a project requirement and if so, apply appropriate methods to achieve the desired performance.

Low-e Coating

For most vertical glazing apply low-e coating to the second surface of insulating glass units.

For sloped glazing applications apply low-e coating to the third surface of insulating glass units.

Fritted Glass

Use of fritted glass to improve performance and control glare, especially in skylights, sloped, and horizontal glazing, is acceptable

Fabrication and Installation

Specify pre-glazing wherever possible.

There is some evidence to suggest that wet-dry glazing systems tend to perform better over the long run than dry gasketed systems. However, not all manufacturers' products will support a wet-dry system. Verify glazing details with manufacturers. If sealants are to be used, specify pre-construction testing for sealant compatibility and adhesion.

The Drawings and Specifications should include details and requirements for each glazing condition.

Require insulating glass products to be sealed with a dual seal method.

Fire Rated Glazing

Use the appropriately labeled fire-rated glazing in doors and windows requiring a fire rating.

Sloped Glazing/ Skylights/ Atriums

- Document structural rating of glazing system on the roof plans.
- Include weight capacity accommodated for maintenance personal cleaning or repairing glazing.
- Indicate on drawings location of signage “Warning – skylight. Do not step, stand or sit in the skylight. Access only for cleaning and maintenance by approved personnel".

Special Warranties

Require special project warranty on insulating glass of 10 years.

Require special project warranty on coated glass of 10 years.

Require special project warranty on laminated glass and dual glazed gel-filled fire-rated units of 5 years.