

08 00 00 OPENINGS - consolidate window requirements

Modify 08 00 00 main heading title and consolidate/edit body of text under heading 08 00 00, and Sections 08 50 00 and 08 80 00 per the following (deletions are shown struck through and additions are double underlined). Other Sections in the Division are unchanged.

08 00 00 ~~DOORS, WINDOWS, GLASS, AND HARDWARE~~OPENINGS

~~01 Owners General Requirements and Design Intent:~~

~~A. Safety Glazing~~

- ~~1. Comply with all building code requirements.~~
- ~~2. Also see, Section 01 05 05.01 Space Planning, Safety Considerations~~

~~B. Visual~~

- ~~1. Refer to Section 01 81 13 Sustainable Design Requirements for daylighting and glare control.~~
- ~~2. Glazing systems shall be selected with spectrally selective coatings to filter damaging UV wavelengths in order to increase the life of interior furnishings.~~
- ~~3. Renovations to historic buildings shall require special window detailing. Professional shall select and specify companies offering high performance products that can provide the desired appearance, fitting with the period and style of the historic building, while maintaining energy efficiency.~~

~~C. Moisture Protection~~

- ~~1. Select glazing and frame thermal performance to avoid condensation problems. Higher performance glazing assemblies are required in higher indoor moisture applications such as indoor pools, food preparation, or certain research facilities.~~
- ~~2. Design shall be integrated with building envelope to include careful construction detailing to maintain the continuity of exterior moisture, air infiltration and interior vapor barriers at the perimeter of doors, windows and glazed wall assemblies.~~

~~D. Energy and Thermal Comfort:~~

- ~~1. Refer to Section 01 81 13 Sustainable Design Requirements for integrated design criteria of fenestration assemblies within building envelope to optimize energy and thermal comfort performance.~~

- ~~2. All exterior fenestration shall be specified with thermally broken exterior frames and thermally broken/insulated internal edge spacers between panes.~~

~~E. Sound (Acoustics)~~

- ~~1. Select and specify door and window units with adequate Outdoor—Indoor Transmission class rating to maintain indoor noise levels within allowable ranges.
 - ~~a. Include careful construction detailing to maintain continuity of sound transmission rating of entire wall/fenestration assembly.~~~~

~~F. Performance Longevity and Sustainability~~

- ~~1. Insulated glass units shall conform to ASTM E 2190 *Standard Specification for Insulating Glass Unit Performance and Evaluation* and be certified and labeled accordingly.~~
- ~~2. Insulated glass units shall be glazed in accordance to Insulating Glass Manufacturers Alliance (IGMA) standards~~
- ~~3. Designer shall select and specify insulated glass units with unit construction details that will ensure (guarantee) the longest service life when comparing major cost competitive manufacturers. This is to minimize life cycle costs and long term landfill waste stream. Insulated glass units are not typically recycled.~~
- ~~4. Performance Criteria: All glazing assemblies shall be certified by the National Fenestration Rating Council (NFRC). **Energy performance values (U-value and SHGF) shall always be specified to be certified for the whole assembly**, not merely the center of glass.
 - ~~a. Refer to Glazing section below for further detail.~~
 - ~~b. Permanently unconditioned spaces shall not require insulated glass, high performance glazing.~~~~

~~G. Maintainability and Repairability~~

- ~~1. Window units shall allow for easy repair and replacement of flexible seals between glazing units and framing since these seals must be replaced periodically to maintain effectiveness.~~

08 50 00 WINDOWS (EXTERIOR INSULATING GLAZING UNITS)

.01 Owners General Requirements and Design Intent:

H.A. Safety Glazing

- 1. Comply with all building code requirements.**

2. Also see, Section 01 05 05.01 Space Planning, Safety Considerations

I.B. Visual

1. Refer to Section 01 81 13 Sustainable Design Requirements for daylighting and glare control.
2. Glazing systems shall be selected with spectrally selective coatings to filter damaging UV wavelengths in order to increase the life of interior furnishings.
3. Renovations to historic buildings shall require special window detailing. Professional shall select and specify companies offering high-performance products that can provide the desired appearance, fitting with the period and style of the historic building, while maintaining energy efficiency.

4. Daylighting (visible light transmittance – VLT)

- a. Select VLT for most effective utilization of daylighting, balanced with need for glare control.
- b. In general, window areas above 7'6" are considered to be daylight glazing. Use high VLTs (0.50-0.70) in these areas. Window areas between 2'6" and 7'6" are considered vision glazing. Use VLT's in the range of 0.35-0.50 to achieve recommended lower SHGF values in these areas.
- c. Exceptions: Lower VLT's may be required to prevent glare, especially on the east or west facades, low sun angles, or for higher window-wall ratios, or light-colored, highly reflective adjacent exterior horizontal surfaces.

5. Tint and Coatings

- a. If selective coatings are included in design, ensure the coating is fully and properly specified for each specific perimeter orientation or application.

a.—

J.C. Moisture Protection

1. Select glazing and frame thermal performance to avoid condensation problemscondensation problems. Higher performance glazing assemblies are required in higher indoor moisture applications such as indoor pools, food preparation, or certain research facilities.
2. Design shall be integrated with building envelope to include careful construction detailing to maintain the continuity of exterior moisture, air infiltration and interior vapor barriers at the perimeter of doors, windows and glazed wall assemblies.

K-D. Energy and Thermal Comfort Performance:

1. Refer to At a minimum, comply with U-value and SHGC prescriptive Building Envelope Requirements in the High-Performance Building Design Standards referenced in Section 01 81 13 Sustainable Design Requirements, .02 Owner's High-Performance Requirements for integrated design criteria of fenestration assemblies within building envelope to optimize energy and thermal comfort performance.
2. All exterior fenestration shall be specified with thermally broken exterior frames and thermally broken/insulated internal edge spacers between panes. Additional Energy Conservation Option Alternate Bid for Extra High-Performance Insulated Glass: Refer to .05 Owner's Additional Energy Conservation Options - Alternate Bid Requirements in Section 01 81 13 Sustainable Design Requirements. On projects that include new insulated glass in the base scope, include an Alternate Bid to provide extra high-performance glazing that will meet the following intent and criteria:
 - a. Reduce energy consumption beyond minimum performance prescribed by the High-Performance Building Design Standards referenced above;
 - b. Improve indoor comfort conditions via passive methods to comply with criteria in ASHRAE 55;
 - c. Reduce mechanical and electrical system capacity and installed cost;
 - d. Additional investment can be paid for by energy savings within an acceptable period;
 - e. Demonstrated to be the lowest total cost of ownership for the life of the project.
3. High-Performance Solar Control Film Option for Existing Facilities: Evaluate and Include high-performance window film as an energy conservation option on renovation projects that do not otherwise include complete window replacement. The film shall be selected and applied to improve thermal comfort, reduce HVAC capacity, and reduce glare.

2.—

L-E. Sound (Acoustics)

1. Select and specify door and window units with adequate Outdoor—Indoor Transmission class rating to maintain indoor noise levels within allowable ranges.
 - a. Include careful construction detailing to maintain continuity of sound transmission rating of entire wall/fenestration assembly.

M.F. ~~Performance Longevity and Sustainability~~ **Quality Assurance**

1. Insulated glass units shall conform to ASTM E-2190 *Standard Specification for Insulating Glass Unit Performance and Evaluation* and be certified and labeled accordingly.
2. Insulated glass units shall be glazed in accordance to ~~Insulating Glass Manufacturers Alliance~~ Insulating Glass Manufacturers Alliance (IGMA) standards
- ~~3. Designer shall select and specify insulated glass units with unit construction details that will ensure (guarantee) the longest service life when comparing major cost competitive manufacturers. This is to minimize life cycle costs and long term landfill waste stream. Insulated glass units are not typically recycled.~~
- 4.3. Performance Criteria: All glazing assemblies shall be certified by the National Fenestration Rating Council (NFRC). **Energy performance values (U-value and SHGF) shall always be specified to be certified for the whole assembly, not merely the center of glass.**
 - a. Refer to Glazing section below for further detail.
 - b. Permanently unconditioned spaces shall not require insulated glass, high performance glazing.

N.G. ~~Maintainability and Repairability~~ **Service Life**

1. Window units shall allow for easy repair and replacement of flexible seals between glazing units and framing since these seals must be replaced periodically to maintain effectiveness.
2. Designer shall select and specify insulated glass units with unit construction details that will ensure (guarantee) the longest service life when comparing major cost competitive manufacturers. This is to minimize life cycle costs and long term landfill waste stream. Insulated glass units are not typically recycled.

.01-02 ~~Windows (All Vertical Glazed Assemblies)~~ **Product Requirements**

A. General: All glass and glazing shall be in compliance with applicable codes.

B. Windows:

1. All sash and frames are to be nonferrous, extruded aluminum in corrosion resistant, protective finish of type and color approved by the University, with complete thermal barrier construction. If operable, using sliding, projected, or hopper with integral weather stripping; no outward projecting sash will be permitted on the ground floor.

2. Wood windows with extruded aluminum clad exterior may be considered for non-institutional, non-commercial, non-student housing, individual or multi-family residential applications.
3. Vinyl clad wood or frames/sash constructed of extruded vinyl are not permitted.
4. For maintenance purposes, all windows should be arranged, manufactured, and installed, so that complete maintenance can be accomplished from the room side. This should include glazing, washing, screening, and normal repairs.
5. Windows with fixed sash should be designed to allow the "fixed" sash to be operable only for cleaning and maintenance; i.e., utilize side pivoted or tilting type sash at normally "fixed" sash locations in high-rise buildings.

6. Windows with flush-type moulding preferred.

C. Insulating Glass Units:

1. All exterior fenestration shall be specified with thermally broken exterior frames and thermally broken/insulated internal edge spacers between panes.

2. Shall comply with all general requirements in Part .01 above.

3. Alternate Bid for Extra High-Performance Insulated Glass:

a. General: Refer to Additional Energy Conservation Alternate Bid Requirements.

b. Manufacturers: Subject to compliance with requirements, manufacturers offering extra high-performance insulated glass products that may be incorporated into the Work include, but are not limited to, the following:

1) Southwall Insulating Glass, Heat Mirror IG -

<http://www.eastman.com/brands/HeatMirror/Pages/Overview.aspx>

~~B.—Consideration should be given to the use of spectrally selective glass and/or special external shading design at certain areas where orientation will lead to excessive solar heat gain.~~

~~C.—Comply with Section 01-05-05.01 Space Planning, Safety Considerations.~~

~~D.—Performance Criteria: All glazing assemblies shall be certified by the National Fenestration Rating Council (NFRC). **Energy performance values (U-value and SHGF) shall always be specified to be certified for the whole assembly**, not merely the center of glass.~~

~~1.—Refer to Glazing section below for further detail.~~

~~2. Permanently unconditioned spaces shall not require insulated glass, high performance glazing.~~

~~3. Windows with flush-type moulding preferred.~~

E-D. Glazing, glazing compounds and sealants:

1. Refer to manufacturer's requirements and Flat Glass Jobbers Association (FGJA) "Glazing Manual" for special applications using elastic compounds, tape, polysulfide elastomer sealants, and compression materials.

E. High-Performance Solar Control Film:

1. Solar Control Film: shall have the following performance characteristics when applied to the interior surface of single-pane, 3-mm clear glass:

- a. Total Solar Transmittance: 19 percent.
- b. Total Solar Reflectance: 49 percent.
- c. Total Solar Absorptance: 32 percent.
- d. Visible Light Transmission: 33 percent.
- e. Visible Light Reflection - Exterior: 48 percent.
- f. Visible Light Reflection - Interior: 30 percent.
- g. U-Value, Winter Median: 0.60.
- h. Shading Coefficient: 0.28.
- i. Total Solar Energy Rejected (TSER): 76 percent.
- j. Emissivity: 0.07.
- k. Solar Heat Gain Coefficient (SHGC): 0.24.
- l. Ultraviolet Rejection: 99 percent.
- m. Light-to-Solar Heat Gain Ratio (LSG): 1.38.
- n. Winter Heat Loss Reduction: 42 percent.
- o. Summer Solar Heat Gain Reduction: 72 percent.
- p. Glare Reduction: 63 percent.
- q. Thickness without Liner: 60 μ .
- r. Film Color: Warm neutral.

2. Accessories: Provide accessories either manufactured by or acceptable to solar control film manufacturer for application indicated, and with a proven record of compatibility with surfaces contacted in installation. Install in accordance with manufacturer's written instructions.

3. Field Quality Control: After installation, view film from a distance of 10 feet against a bright uniform sky or background. Film shall appear uniform in appearance with no visible streaks, wrinkles, banding, thin spots or pinholes. If installed film does not meet these criteria, remove and replace with new film.

4. Basis-of-Design Product: Vista Enerlogic 35 series.

<http://www.enerlogicfilm.com/commercial-use/35/performance> manufactured by Eastman Chemical Company, Web Site: www.enerlogicfilms.com.

08-80-00-GLAZING

.01-Glass and Glazing

A.—Incorporating Insulated, High-Performance, Spectrally Selective Glazing into the envelope design is required. Professionals shall analyze and optimize the following performance factors of the windowglazing systems:

1.—Thermal (U-value)

a.—Select the U-value to minimize energy loss through the envelope and to maintain relatively high internal surface temperature in winter in order to provide thermal comfort condition requirements (allowable radiant temperature asymmetry, MRT, per ASHRAE Standard 55 — 2004 or current). These values supercede Energy Code or ASHRAE 90.1 minimum requirements.

i.—In residential, office, classroom or similar spaces in which sedentary occupants will be located close to glazed areas, the glazed assembly U-value shall not exceed three times the opaque wall assembly or 0.20 (whichever is more stringent).

ii.—In transient spaces, U-values and internal surface temperatures are not as critical for human comfort but reducing heat loss in cold climates is still important. In these locations, the U-value shall not exceed 0.35 or 30% less than the maximum U-value prescribed by current Energy Code/ASHRAE 90.1, (whichever is more stringent).—

2.—Solar (solar heat gain coefficient — SHGC)

a.—Windows (vision glazing) with low SHGC values (0.25-0.35) shall be used on all West, East and South facing walls.

b.—If the project specifically intends to use passive solar heating, south facing windows glazing shall have a high SHGC coupled with exterior shading devices.

3.—Daylighting (visible light transmittance — VLT)

a.—Select VLT for most effective utilization of daylighting, balanced with need for glare control.

b. In general, window areas above 7'6" are considered to be daylight glazing. Use high VLTs (0.50-0.70) in these areas. Window areas between 2'6" and 7'6" are considered vision glazing. Use VLT's in the range of 0.35-0.50 to achieve recommended lower SHGF values in these areas.

i. Exceptions: Lower VLT's may be required to prevent glare, especially on the east or west facades, low sun angles, or for higher window-wall ratios, or light-colored, highly reflective adjacent exterior horizontal surfaces.

4. Tint and Coatings

a. If selective coatings are included in design, ensure the coating is fully and properly specified for each specific perimeter orientation or application.

B. Manufacturers:

1. Southwall Technologies

<http://www.southwall.com/southwall/Home/Commercial/Products/HeatMirrorInsulatingGlass.html>

2. Or equivalent in performance.

END of revision

Update Commentary:

Section was updated primarily for the following reasons:

- 1) *To rename main heading of Division to match current industry practice*
- 2) *To consolidate requirements associated with windows (insulated glass units)*