

CONSTRUCTION MASTER SPECIFICATION

SECTION 08800{PRIVATE }

GLAZING

******* This guide section can be used for specifying the following types of glass, which may be used in numerous project applications:**

Clear	Mirror
Tinted	Heat strengthened
Low emissivity	Fully tempered
Spandrel	Laminated
Patterned	Monolithic
Wired	Insulating

It is convenient and ensures consistency to specify all types of glass required for a Project in Section 08800, “Glazing”. Other sections which require glazing, such as a window specification, are then cross referenced to Section 08800, “Glazing”. This eliminates the redundancy of repeating a glass specification in several sections and the inherent possibility for conflicting information. It also ensures that when tinted coated glass is used in several products and applications the glass will be identical in all instances and present a uniform appearance for the project.

This section does not include plastic, bullet resistant, blast resistant glazing, and factory or site applied films applied to glass to provide solar control, safety, security, and blast resistance. If required, these topics can be added to this section or specified separately in other sections. Generic gaskets, sealants, and other glazing accessories are included in this section. However, special applications such as butt glazing, sloped glazing, structural glass curtain walls, and structural silicone sealant glazing will need to be added if required for project.

The specifier will need to edit this section for a specific project to reflect the options and applications being used. The guide section has been written so that most editing can be accomplished by deleting unnecessary requirements and options. Depending on project requirements, some additional information will need to be added by the specifier. Options are indicated by []. Notes to assist the specifier in selecting options and editing the specification guide are printed in bold and indicated with *****. For final editing, all brackets and notes will need to be deleted from the guide and this specification will need to be made into a Construction Special Specification.

Throughout this product guide specification, references are made to other specification sections that might be contained in the project manual. These references are presented as examples and coordination reminders. *****

CONSTRUCTION MASTER SPECIFICATION**SECTION 08800****GLAZING**

	<u>Page</u>
<u>PART 1 - GENERAL</u>	
1.01 Summary.....	3
1.02 References	4
1.03 Definitions.....	5
1.04 System Description.....	6
1.05 Submittals.....	6
1.06 Quality Assurance	7
1.07 Delivery, Storage, And Handling.....	8
1.08 Warranty.....	8
<u>PART 2 - PRODUCTS</u>	
2.01 Acceptable Glass Manufacturers.....	9
2.02 Primary Glass Products	9
2.03 Heat Treated Glass	12
2.04 Laminated Glass	13
2.05 Spandrel Glass.....	13
2.06 Mirror Glass	14
2.07 Fabricated Glass Units.....	14
2.08 Accessories.....	17
<u>PART 3 - EXECUTION</u>	
3.01 Schedule	18
3.02 Factory Glazed Products	19
3.03 Field Glazed Products	19
3.04 Preparation.....	20
3.05 Installation.....	20
3.06 Mirror Installation	22
3.07 Cleaning.....	22

CONSTRUCTION MASTER SPECIFICATION

SECTION 08800

GLAZING

PART 1 - GENERAL

1.01 SUMMARY

******* Edit the following to reflect type of glass required for project. *******

- A. Section includes [clear] [tinted] [low emissivity] [spandrel] [patterned] [wired] [mirror] [heat strengthened] [fully tempered] [laminated] [monolithic] [insulating] glass and glazing accessories for:
1. [Steel] [aluminum] [wood] doors [and] [frames].]
 2. Manufactured [fixed] [and] [operable] [wood] [aluminum clad wood] [steel] [aluminum] [tubular plastic] windows.]
 3. _____.]

******* List other specification sections dealing with work directly related to this section such as the following. *******

- B. Related sections:
1. Section 08110, "Steel Doors and Frames": Hollow steel doors and frames to be field glazed.
 2. Section 08210, "Wood Doors": Vision lights in wood doors to be factory glazed.
 3. _____.]

1.02 REFERENCES

******* List by number and full title reference standards referred to in remainder of specification section. Delete non-applicable references. *******

- A. American Architectural Manufacturers Association (AAMA):
 - AAMA 800 - Voluntary Specifications and Test Methods for Sealants.
- B. American National Standards Institute (ANSI):
 - ANSI Z97.1 - Safety Glazing Material Used in Buildings- Safety Performance Specification and Method of Test R.
- C. American Society of Civil Engineers (ASCE):
 - ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
- D. American Society of Testing and Materials (ASTM):
 - ASTM C509 - Elastomeric Cellular Preformed Gasket and Sealing Material.
 - ASTM C864 - Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.
 - ASTM C920 - Elastomeric Joint Sealants.
 - ASTM C1036 - Flat Glass.
 - ASTM C1048 - Heat Treated Flat Glass, Kind HS, Kind FT, Coated and Uncoated.
 - ASTM C1115 - Dense Elastomeric Silicone Rubber Gaskets and Accessories.
 - ASTM C1172 - Laminated Architectural Flat Glass.
 - ASTM C1281 - Preformed Tape Sealants for Glazing Applications.
 - ASTM E546 - Frost Point of Sealed Insulating Glass Units.
 - ASTM E576 - Frost Point of Sealed Insulating Glass Units in Vertical Position.
 - ASTM E773 - Accelerated Weathering of Sealed Insulating Glass Units.
 - ASTM E774 - Classification of the Durability of Sealed Insulating Glass Units.
 - ASTM E1300 – Standard Practice for Determining Load Resistance of Glass in Buildings.

ASTM E2010 – Test Method for Positive Pressure Fire Tests of Window Assemblies.

E. Associated Laboratories, Inc. (ALI):

F. Code of Federal Regulations (CFR):

CFR 16CFR 1201 - Safety Standard for Architectural Glazing Materials.

G. Glass Association of North America (GANA):

GANA- Glazing Manual.

H. Insulating Glass Certification Council (ICCC)

I. National Accreditation and Management Institute (NAMI)

J. National Fire Protection Association (NFPA):

NFPA 80- Standard for Fire Doors and Fire Windows

K. National Fenestration Rating Council (NFRC)

NFRC 100- Procedure for Determining Fenestration Product U-Factors

NFRC 200- Procedure for Determining Fenestration Product Solar Heat Gain Coefficients at Normal Incidence.

NFRC 300- Test Method for Determining Solar and Infrared Optical Properties of Glazing Materials and Fading Resistance of Systems.

L. Underwriters Laboratories, Inc. (UL)

UL 9- Fire Tests of Window Assemblies

1.03 DEFINITIONS

A. Visible Light Transmittance (T-vis): Percentage of sun's visible energy transmitted through glass.

B. Ultra Violet Transmittance: Percentage of sun's ultra violet or infrared energy transmitted through glass.

C. U-value: Overall indication of heat flow through glass where a lower value indicates less heat flow and hence better thermal performance. Winter nighttime values are calculated using outdoor air temperature of 0 degrees F, indoor temperature of 70 degrees F, and 15 MPH outdoor air velocity. Summer daytime U-values are calculated using outdoor air temperature of 89 degrees F, indoor

temperature of 75 degrees F, 7.5 MPH outdoor air velocity, and solar intensity of 248 BTU.

- D. Shading Coefficient (SC): Ratio of total solar energy passing through glass relative to amount passing through 1/8 inch thick clear glass under same conditions. A lower coefficient indicates better performance in reducing heat gain.
- E. Solar Heat Gain Coefficient (SHGC): Solar heat gain through glass relative to the amount of solar radiation. It is equal to 86 percent of the shading coefficient.
- F. Light-to-Solar Gain Ratio (LSG): Ratio of visible light transmittance (T-vis) to solar heat gain coefficient (SHGC), $LSG=(T-vis)/(SHGC)$. The higher the ratio, the better the glass is at reducing unwanted solar heat and maximizing light transmittance.

1.04 SYSTEM DESCRIPTION

- A. Provide and install glass in accordance ASTM E1300 to withstand thermal movement and wind and impact loads without breakage, loss, failure of seals, product deterioration, and other defects.
 - 1. Wind and snow design loads: Determined by ASCE 7.
 - 2. Thermal movement design conditions:
 - a. Ambient temperature range: 120 degrees F, (48.8 degrees C).
 - b. Material surfaces range: 180 degrees F, (82.2 degrees C).
- B. Provide and install gaskets, sealants, and other glazing accessories to resist water and air penetration.
- C. Center-of-Glass U-Values: NFRC 100 methodology using LBL-35298 WINDOW 4.1 computer program or latest version, expressed as Btu/ sq. ft. x h x deg F (W/sq. m x K).
- D. Center-of-Glass Solar Heat Gain Coefficient: NFRC 200 methodology using LBL-35298 WINDOW 4.1 computer program or latest version.
- E. Solar and Infrared Optical Properties: NFRC 300.

1.05 SUBMITTALS

- A. Provide in accordance with Section 01330, "Submittal Procedures":
 - 1. List of proposed products and product data.

2. Glazing schedule: List glass type, size, and thickness for each opening. Use same designations as Drawings.
3. Shop drawings detailing glass setting methods and materials.
4. Samples: 4 by 6 inches minimum size for each type of [tinted] [patterned] [wired] [spandrel] glass.
5. Glass manufacturer, glass fabricator, and installer qualifications as required by Paragraphs [1.5.A, B, and D.]
6. Manufacturer's certificates that:
 - a. Glazing materials meet or exceed specified requirements.
 - b. Sealants have been tested for adhesion to and compatibility with glass and glazing substrates.
7. Fabricator's certificates: Certify that safety glass units and sealed insulating glass units meet or exceed specified requirements.
8. Manufacturer's installation and protection instructions.
9. Copy of warranties required by Paragraph [1.6] for review by Contracting Officer.
10. Material Safety Data Sheets (MSDS): Submit MSDS information for glass materials including sealant, tape and gasket.

1.06 QUALITY ASSURANCE

- A. Glass manufacturer: Company specializing in manufacture of clear, tinted, coated, and other glass products with 10 years minimum successful experience.
- B. Source quality control: To ensure uniformity, all tinted and coated glass used for Project shall be obtained from single manufacturer.
- C. Glass fabricator: Company specialized in fabricating insulating, heat strengthened, tempered, laminated, glass units with 5 years minimum successful experience.
- D. Glass installer: Company installing glass on site shall specialize in this type of work and have 5 years minimum successful experience.
- E. Safety glazing: Comply with CFR 16CFR 1201, ANSI Z97.1, and other applicable safety requirements. Each piece of safety glazing shall be permanently labeled with appropriate marking.

******* Include the following paragraph if insulating glass is required. *******

- A. Insulating glass units: Permanently labeled with one of the following testing agency certifications.
 - 1. Insulating Glass Certification Council (IGCC).
 - 2. Associated Laboratories. Inc. (ALI).
 - 3. National Accreditation and Management Institute (NAMI).

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect glass and glazing materials during delivery, storage, and handling in accordance with manufacturer's instructions.
- B. Prevent edging chipping and damage from condensation, temperature changes, and exposure to sunlight.
- C. Insulating glass units: Comply with fabricator's instructions for venting and sealing when units are exposed to substantial altitude changes.

1.08 WARRANTY

- A. Provide under provisions of Section 01770, "Closeout Procedures":

******* Delete warranties for glass types not required for project. *******

- 1. Coated glass units: 10 years manufacturer's warranty to cover replacement in event of peeling, cracking, and deterioration of coating.
- 2. Insulating sealed glass units: 10 years fabricator's warranty to cover replacement in event of seal failure and interpane dusting, misting, and filming.
- 3. Laminated glass units: 5 years fabricator's warranty to cover replacement in event of delamination, edge separation, and blemishes exceeding referenced standard.
- 4. Mirror glass units: 5 years manufacturer's warranty to cover replacement in event of peeling, cracking, and deterioration of coating.

PART 2 - PRODUCTS

2.01 ACCEPTABLE GLASS MANUFACTURERS

- A. AFGD Glass, Atlanta, Georgia; www.afg.com.
- B. Guardian Industries Corporation; Carleton, Michigan; www.guardian.com.
- C. Interpane Glass Company; Clinton, North Carolina; www.interpane.com.
- D. Pilkington; Toledo, Ohio; www.pilkington.com.
- E. PPG Industries, Inc., Pittsburgh, Pennsylvania; www.ppgglass.com.
- F. Viracon, Owatonna, Minnesota; www.viracon.com.
- G. Manufacturers of equivalent products submitted and approved in accordance with Section 01330, "Submittal Procedures". Contracting Officer reserves right to reject proposed substitutions on basis of color tint and reflective appearance even though material and performance values are equivalent.

2.02 PRIMARY GLASS PRODUCTS

******* This article contains primary glass products provided by manufacturers such as those firms listed in Paragraph 2.1. These products are typically used by regional fabricators to produce insulating, laminated, heat strengthened, and fully tempered glass units in sizes required for a specific project. Fabricators may also be responsible for field installation of glass or a separate installer may be used.**

Clear glass is typically used for interior applications and as the inside lite of insulating units. Clear glass is also used for exterior applications where a colored tint is not desired. Include the following paragraphs to specify clear glass. For thickness other than 1/4 inch, modify performance attributes. *****

- A. Clear glass:
 - 1. Type: Clear, transparent, flat, annealed, float glass, conforming to ASTM C1036, Type I, Class 1, Quality q3.
 - 2. Thickness: [1/4] [_____] inch.
 - 3. Performance attributes:
 - a. Visible Light Transmittance (T-vis): [89] [_____] percent.

- b. Ultra Violet Transmittance: [65] [_____] percent.
- c. Winter Nighttime U-value: [1.09] [_____].
- d. Summer Daytime U-value: [1.03] [_____].
- e. Shading Coefficient (SC): [0.94] [_____].
- f. Solar Heat Gain Coefficient (SHGC): [0.81].
- g. Light-to-Solar Gain Ratio (LSG): [1.10].

******* Many tinted glass products are available from glass manufacturers. They are used in exterior applications, typically as the outside lite of insulating units, to provide a distinctive appearance for the building exterior. Tinted glass has the additional benefit of reducing glare and solar heat transmission. Most manufacturers provide tints that are similar to colors provided by other manufacturers although some tints are distinctive to a single manufacturer. Use the following paragraphs to specify tinted glass. Select specific tinted glass and use attributes listed in manufacturer's product literature to establish desired requirements. *******

B. Color tinted glass:

- 1. Type: [Blue] [Light green] [Dark green] [Light gray] [Medium gray] [Dark gray] [Bronze] tinted glass: Color tinted, annealed, float glass conforming to ASTM C1036, Type I, Class 2, Quality q3; [_____] as manufactured by [_____].
- 2. Thickness: [1/4] [_____] inch].
- 3. Performance attributes:
 - a. Visible Light Transmittance (T-vis): [_____] percent.
 - b. Ultra Violet Transmittance: [_____] percent.
 - c. Winter Nighttime U-value: [_____].
 - d. Summer Daytime U-value: [_____].
 - e. Shading Coefficient (SC): [_____].
 - f. Solar Heat Gain Coefficient (SHGC): [_____].
 - g. Light-to-Solar Gain Ration (LSG): [_____].

******* Low emissivity (low-E) glass products are produced by applying to clear glass a neutral coating which blocks a significant percentage of solar energy and greatly improves**

energy efficiency. Typically, low-E glass is combined with either clear or tinted glass and with or without a reflective coating, to produce an insulating glass unit. The low-E glass is typically placed as the inside lite of an insulating unit but can also be used as the outside lite. Refer to manufacturer's product literature for assistance in selecting low-E glazing options and performance attributes. *****

C. Low emissivity (low-E) glass:

1. Type: Clear glass with neutral coating pyrolytically applied to produce durable surface with unlimited shelf life and product which can be easily cut and tempered and resulting in improved thermal performance and reduced solar heat gain; [_____] as manufactured by [_____].
2. Thickness: [[1/4] [_____] inch].
3. Performance attributes:
 - a. Visible Light Transmittance (T-vis): [0.44 minimum] [_____] .
 - b. Winter Nighttime U-value: [0.35 maximum] [_____] .
 - c. Summer Daytime U-value: [0.36 maximum] [_____] .
 - d. Light-to-Solar Gain Ration (LSG): [1.15 minimum] [_____] .
 - e. Solar Heat Gain Coefficient (SHGC): [_____] . As appropriate to comply with above requirements for T-vis and LSG

******* Patterned glass is formed by rolling which imparts a distinctive pattern on the glass surface resulting in decorative, translucent glazing. Refer to manufacturer's product literature for available patterns. Some patterns are available fully tempered and can be used as safety glazing. *******

D. Patterned glass:

******* Include the following paragraph if patterned glass is not required to be fully tempered. *******

1. Type: Clear, annealed, flat glass with distinctive pattern on one side and conforming to ASTM C1036, Type II, Class 1, Form 3, Quality q8, Finish f1; [_____] as manufactured by [_____].

******* Include the following paragraph if fully tempered, patterned, safety glass is required. *******

2. Type: Clear, fully tempered, flat glass with distinctive pattern on one side and conforming to ASTM C1048, Kind FT, Type II, Class 1, Form 3, Quality q8, Finish f1; [_____] as manufactured by [_____].
3. Thickness: [1/4] [_____] inch.
4. Pattern: [Linear, p1] [Geometric, p2] [Random, p3] [Special, p4].

E. Wired glass:

******* Wired glass is formed by rolling and has an embedded wire mesh to prevent shattering and to withstand fire exposure. It is currently accepted as safety glazing in fire-rated doors and windows. Options for wired glass are diamond or square mesh and polished both sides or patterned on one side. *******

1. Type: Clear, annealed, flat glass, conforming to ASTM C1036, Type II, Class 1, Quality q8. Glass for fire-rated doors shall comply with NFPA 80, ASTM 2010 and UL 9, labeled and listed by UL or other testing and inspecting agency.
2. Surface: [Form 1, polished both sides.] [Form 2, patterned.]
3. Thickness: [1/4] [_____] inch.
4. Mesh: Woven stainless steel wire in [diamond, Mesh m1] [square, Mesh m2] pattern.

2.03 HEAT TREATED GLASS

****** Clear and tinted annealed glass can be heat treated to increase strength and resistance to thermal stress. Not all coatings applied to glass are suitable for subsequent heat treatment and the specifier should refer to manufacturer's product literature for limitations. There are two types of heat treatment - heat strengthened and fully tempered. Heat strengthened glass is approximately twice as strong as annealed glass of equal thickness. However, it does not qualify as safety glass in compliance with ANSI Z97.1 and CFR 16CFR 1201. Use the following paragraph to specify heat-strengthened glass. *******

- A. Heat strengthened glass: Provide heat strengthened, annealed glass components where indicated or required to adequately support imposed loads, to allow for large glass size, and resist anticipated thermal stresses in accordance with ASTM C1048, Kind HS.

******* Fully tempered glass is approximately four times as strong as annealed glass of**

equal thickness. Tempered glass does qualify as safety glass in compliance with ANSI Z97.1 and CFR 16CFR 1201. Tempered glass tends to break into small cubical pieces. Use the following paragraphs to specify fully tempered safety glass. *****

B. Fully tempered glass:

1. Provide heat tempered, annealed glass components where indicated or required to adequately resist loading conditions, size of units, and anticipated thermal stresses in accordance with ASTM C1048, Kind FT.
2. Fully tempered glass shall meet requirements of ANSI Z97.1 and CFR 16CFR 1201 to qualify as safety glass.

2.04 LAMINATED GLASS

******* Safety glass can be fabricated by bonding two or more glass panes with a transparent, flexible interlayer material. Laminated glass does qualify as safety glass in compliance with ANSI Z97.1 and CFR 16CFR 1201. When broken, laminated glass tends to remain in place with glass particles adhered to interlayer. Glass lamination is typically accomplished by fabricators of glass units. Use the following paragraphs to specify laminated safety glass. *******

- A. Laminated glass: Fabricate by bonding two or more glass panes with transparent, flexible interlayer material in accordance with ASTM C1172.
- B. Laminated glass shall meet requirements of ANSI Z97.1 and CFR 16CFR 1201 to qualify as safety glass.

2.05 SPANDREL GLASS

******* Clear and tinted glass can be coated on the inside face with opaque coatings to provide opacity for non-vision areas. The intent is for spandrel glass panels to match appearance of vision lites. Tinted glass is used for fabricating spandrel glass as required to match appearance of adjacent vision lites.**

There are two methods for fabricating spandrel glass. One is to apply a black or other colored polyester film to the inside face of a tinted glass. Spandrel glass can also be fabricated by heat fusing a colored ceramic frit to the interior surface of clear glass. Due to high thermal stresses common in opaque glazing areas, it is usual for spandrel glass to be either heat strengthened or fully tempered. *****

******* Use the following paragraph for specifying spandrel glass with colored polyester**

film opaque coating. *****

- A. Film coated spandrel glass: [Heat strengthened] [Fully tempered] [clear] [tinted] float glass with colored polyester film applied to interior surface to provide opacity for non-vision areas and conforming to ASTM C1036, Type 1, Quality q3 and C1048, Kind [HS] [FT], Condition C.

******* Use the following paragraph for specifying spandrel glass with ceramic opaque coating. *******

- B. Ceramic coated spandrel glass: [Heat strengthened] [Fully tempered] [clear] [tinted] float glass with colored ceramic frit coating heat fused to interior surface to provide opacity for non-vision areas and conforming to ASTM C1036, Type 1, Quality q3 and C1048, Kind [HS] [FT], Condition B.

2.06 MIRROR GLASS

******* Include this article if large, unframed, adhesive mounted mirrors are required. Small, metal-framed mirrors are typically specified in Section 10800, "Toilet Accessories". *******

- A. Mirror glass: Mirror glass, clear float tempered safety type with copper and silver coating, organic overcoating, beveled edges 1/4 inch thick, with safety film. Sizes as scheduled on Drawings.
- B. Adhesive: Asphaltic bitumen for installation of mirrors on walls.

2.07 FABRICATED GLASS UNITS

******* The various glass products specified in the above paragraphs will typically be cut and fabricated into specific glass products to be used in various applications for a project. These include monolithic, insulating, heat strengthened, tempered, laminated, and spandrel units. Each type of glazing unit will need to be described including thickness and if glazing is monolithic, insulating, safety, heat tempered, clear, tinted, and low-E coated. It is convenient to assign type numbers to the various glazing units. In this manner they can be easily referenced on the drawings. *******

- A. Fabricate the following glazing units listed below for use on Project using glass products specified in Paragraphs 2.2 through 2.[_____]. Refer to Drawings for required sizes and locations.

1. Thickness: Indicated glass thickness are minimums. Provide glass units with thickness as required for glass type, size, and to accommodate performance requirements specified in Paragraph 1.4.
2. Heat treatment: Provide heat strengthened or fully tempered glass units where indicated or as required to accommodate performance requirements specified in Paragraph 1.4.
3. Clean cut glass units to accommodate opening sizes and edge and bite conditions.

******* Use the following paragraphs as a format for specifying monolithic fabricated glass units. For each type of monolithic glass unit, include appropriate options and performance attributes. *******

B. Monolithic glass units:

1. Type G[_____]:
 - a. Type: [Annealed] [Heat strengthened] [Fully tempered safety] [Laminated safety] glass.
 - b. Thickness: [[1/4] [_____] inch].
 - c. Color: [Clear] [[_____] tinted].

******* Insulating glass can be fabricated using two glass panes, referred to as lites, separated by an air space with the interpane space purged with dry hermetic air and sealed. The air space provides insulation and reduces heat transfer as well as limiting condensation and sound transmission. There are numerous insulating glass options since the units can be almost any combination of clear, color tinted, low E coated, and spandrel glass products. The specifier will need to identify the exact type of glass being used for both the outside and inside lites and list what applied coatings, if any, are being used, and the surface on which the coating is applied. With a double pane-insulating unit there are four surfaces:**

- 1 - Outside facing surface of outside lite.
- 2 - Inside facing surface of outside lite.
- 3 - Outside facing surface of inside lite.
- 4 - Inside facing surface of inside lite.

Thickness of insulating glass varies from 7/16 to 1-1/4 inches. 1-inch total thickness with two 1/4-inch lites and 1/2-inch air space is typical.

At SNL, anti-intrusion or burglar resistant insulating glass is accomplished with fully

tempered outside lite and laminated inside lite. *****

- C. Insulating glass units: Fabricate insulating glass units with two lites separated by [1/2] [_____] inch air space. Seal edge and purge interpane space with dry hermetic air. Comply with ASTM E546, ASTM E576, ASTM E773, and ASTM E774.

******* Use the following paragraphs as a format for specifying insulating fabricated glass units. For each type of insulating glass unit select appropriate options and performance attributes. *******

1. Type G[_____]: Insulating glass, double pane unit with [1/2] [_____] inch air space.
 - a. Total thickness: [1] [_____] inch.
 - b. Outside lite:
 - (1) Type: [Annealed] [Heat strengthened] [Fully tempered safety] [Laminated safety] glass.
 - (2) Thickness: [[1/4] [_____] inch.
 - (3) Color: [Clear] [[_____] tinted].
 - (4) Low-E coating on inside face: [_____] .]
 - c. Inside lite:
 - (1) Type: [Annealed] [Heat strengthened] [Fully tempered safety] [Laminated safety] glass.
 - (2) Thickness: [1/4] [_____] inch.
 - (3) Color: [Clear] [[_____] tinted].
 - (4) Low-E coating on inside face: [_____] .]

******* Performance values for an insulating unit are a combined result of the performance attributes of the two glass lites. The specifier will need to refer to the performance value tables in manufacturer's product literature and select the appropriate values for the insulating glass unit being specified. *******

- d. Performance attributes:
 - (1) Visible Light Transmittance (T-vis): [44 minimum] [_____] percent.
 - (2) Ultra Violet Transmittance: [_____] percent.

- (3) Winter Nighttime U-value: [0.35 maximum] [_____].
- (4) Summer Daytime U-value: [0.36 maximum] [_____].
- (5) Shading Coefficient (SC): [_____].
- (6) Light-to-Solar Gain Ratio (LSG): [1.15 minimum] [_____].
- (7) Solar Heat Gain Coefficient (SHGC): [_____]. As appropriate to comply with above requirement for T-vis and LSG.

2.08 ACCESSORIES

- A. Provide glazing accessories for specific applications of type recommended by glass manufacturer and glass fabricator and as required for complete, functional, weather tight installation.
- B. Cleaners and primers: Compatible with substrate and glazing materials and application condition.
- C. Setting blocks: Elastomeric material with Shore A durometer hardness between 80 and 90.
- D. Spacer shims: Elastomeric material blocks or extrusions with 50 to 60 Shore A durometer hardness.
- E. Edge blocks: Elastomeric material of hardness required to limit lateral movement of glass.
- F. Glazing tape: Preformed butyl compound, non-staining, non-migrating in contact with non-porous surfaces, coiled on release paper, [black] [_____] and complying with ASTM C1281 and AAMA 800.
- G. Glazing gaskets: Provide type, profile, and hardness as required to maintain watertight seal.
 - 1. Dense compression type: Molded or extruded material, [black] [_____].
 - a. EPDM gasket complying with ASTM C864.
 - b. Silicone complying with ASTM C1115.
 - c. Thermoplastic polyolefin rubber complying with ASTM C1115.
 - 2. Soft compression type: Molded or extruded, closed-cell, integral-skinned, [black] [_____] gasket complying with ASTM C509, Type II.
 - a. EPDM.

- b. Silicone.
- c. Thermoplastic polyolefin rubber.

H. Sealants: Liquid applied, chemically curing type complying with ASTM C920, compatible with materials and conditions, and capable of anticipated joint movement without watertight seal failure.

PART 3 - EXECUTION

******* Glazing Schedule may be located on Drawings or included in Section 08800, "Glazing". To eliminate potential for conflicts, do not include schedules in both locations. Glazing types should be as defined in Part 2 - Products. *******

3.01 SCHEDULE

******* The following paragraphs are examples of how various types of glazing can be scheduled. *******

- A. Provide Type G[_____] glass:
 - 1. Interior hollow [steel] [aluminum] [_____] window framing not required to be safety glass.
- B. Provide Type G[_____] safety glass:
 - 1. Interior hollow [steel] [aluminum] [_____] window framing required or indicated on Drawings to be safety glass.
 - 2. Interior [wood] [hollow [steel] [aluminum]] [_____] doors not required to be fire rated.
- C. Provide Type G[_____] safety glass:
 - 1. Exterior hollow [steel] [aluminum] glazed doors.
 - 2. Exterior hollow [steel] [aluminum] framed sidelights.
 - 3. Exterior hollow [steel] [aluminum] windows required or indicated on Drawings to be safety glass.

D. Provide Type G[_____] glass:

1. Exterior hollow [steel] [aluminum] windows not required or indicated on Drawings to be safety glass.

E. Provide Type G[_____] glass:

1. [_____].
2. [_____].

3.02 FACTORY GLAZED PRODUCTS

******* To ensure consistency, all glass for project should be specified in Section 08800, "Glazing". Sections where factory glazed products are specified should cross reference to this section rather than repeat glass specifications in several separate sections. Any special factory glazing requirements should be stated in the section where the factory glazed product is specified. *******

A. Factory glaze the following products in accordance product manufacturer's standard procedures. Coordinate tinted and coated glazing of all factory-glazed products to ensure consistency and compatibility.

1. Wood doors specified in Section 08210, "Wood Doors".
2. Manufactured windows specified in Section, "08510 - Steel Windows", Section 08520, "Aluminum Windows", "Section 08550, "Wood Windows", "Section 08560, "Plastic Windows", Section, [_____] - [_____].]
3. _____.]

3.03 FIELD GLAZED PRODUCTS

******* To ensure consistency, all glass for project should be specified in Section 08800, "Glazing Glass". Sections where field glazed products are specified should cross reference to this section rather than repeat glass specifications in several separate sections. This guide specification only includes general field glazing requirements. If special glazing techniques such as butt glazing, structural silicone glazing, sound control glazing, and lock-strip gasket glazing are required, they will need to be added to this section or preferably included in the appropriate section where the field glazed product is specified. *******

- A. Field glaze the following products in accordance with general requirements of this Section, specific requirements of Section where field glazed product is specified, referenced standards, and written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials. Where requirements conflict, more stringent requirement shall prevail unless otherwise approved by Architect.
1. Hollow steel [interior] [exterior] window frames specified in Section 08110, "Steel Doors and Frames".
 2. Aluminum] [_____] skylight system specified in Section 08630, "Metal-Framed Skylights".
 3. Aluminum] [_____] curtain wall framing system specified in Section 08900, "Glazed Curtain Wall".
 4. _____.]

3.04 PREPARATION

- A. Verify glass framing is accurately sized, structurally sound, square, and without bow.
- B. Verify surfaces of glazing channels and recesses are clean, free of obstructions, and ready to receive glazing.
- C. Inspect edges of glass. Install only glass with clean-cut edges. Do not bump, drag, or brush edges against sash or hard objects. Avoid scratching.
- D. Immediately prior to glazing, clean contact surfaces with solvent and wipe dry.
- E. Prime surfaces as required for adhesion of sealants.

3.05 INSTALLATION

******* Edit the following paragraphs to reflect project-glazing conditions. Add additional requirements as required and delete requirements that are not applicable. *******

- A. Comply with GANA Glazing Manual, approved shop drawings, and manufacturer's instructions.
- B. Damaged glass: Do not install glass with edge damage or other imperfections. Remove from site and replace.
- C. Install setting blocks and spacers as recommended by referenced glazing standards and glass manufacturer's recommendations. Set blocks in sealant.

- D. Provide edge blocking as required to prevent sideway movement of glass in glazing channel.
- E. Ensure glazing channels and stops provide required bite on glass, minimum edge and face clearances, and adequate sealant thickness.
- F. Tape glazing:
 - 1. Cut glazing tape to length and set continuously against permanent stops and projecting slightly above sightline.
 - 2. Tape joints: Butt joints. Do not overlap tape. Seal joints with compatible sealant.
 - 3. Rest glass on setting blocks and push against tape for full contact at perimeter of lite.
 - 4. Remove tape release paper immediately prior to placing glass.

******* Include the following paragraph for dry tape glazing. *******

- 5. Dry tape glazing: Install dense compressible gasket against glass and secure with removable glazing stop.

******* Include the following paragraph for dry/wet tape glazing. *******

- 6. Dry/wet tape glazing:
 - a. Place spacers below sightline and install removable glazing stop against spacers.
 - b. Fill gap between glass and removable glazing stop with sealant to uniform line level with bite of frame.
- 7. Knife trim protruding edge of glazing tape.
- G. Gasket glazing:
 - 1. Fabricate two-piece compression gaskets to exactly fit openings.
 - 2. Install soft compression gasket against permanent stops. Miter cut and bond together corners.
 - 3. Rest glass on setting blocks. Insert dense compression gasket to press glass against soft gasket and lock in place against removable stop.
 - 4. Apply sealant to gasket joints.

5. Install gaskets to protrude slightly beyond glazing stops.
- H. Wet sealant glazing:
1. Install spacers and sealant backing between glass and stops. Position to control depth and width of sealant.
 2. Apply sealant to glazing channels without voids. Ensure complete bond of sealant to glass and channel surfaces.
 3. Tool exposed sealant surfaces to provide wash away from glass.

3.06 MIRROR INSTALLATION

- A. Coordinate with other trades to ensure that surfaces to receive mirrors are not painted, coated, or otherwise treated in a manner detrimental to mirror adhesion.
- B. Ensure walls are rigid, plumb, smooth, clean, dry, and free of foreign materials.
- C. Apply one coat moisture-resistant paint to back of mirror and allow to completely dry.
- D. Set mirrors with mechanical fasteners and adhesive applied in accordance with manufacturer's instructions.
 1. Apply adhesive to mirror back with 25 percent coverage. Set mirror in place and hold firmly until adhesive sets.
 2. Support bottom of mirror with L-shaped bar mechanically fastened to wall blocking.
 3. Provide 2 clips minimum at top and each side of mirror. Mirrors greater than 6 square feet shall have 3 clips minimum at top.
- E. Place plumb and level without visible distortion.

3.07 CLEANING

- A. Clean glass immediately following installation. Remove sealants and other glazing materials from adjacent finished surfaces.
- B. Remove labels.
- C. Prior to final inspection, clean all glass.

END OF SECTION