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BuildingName
The Description of the Project
P00000000 0000

SPECIFICATION DIVISION 8

END OF CONTENTS TABLE

DIVISION 08 OPENINGS
SECTION 088000 - GLAZING

UPDATED TO INCORPORATE CURRENT MANUFACTURERS AND CURRENT CODES, INCLUDING ENERGY CODES.

USE THIS SECTION FOR EXTERIOR APPLICATIONS. INTERIOR GLAZING IS COVERED IN ANOTHER DIVISION 08 SECTION. THIS SECTION DOES NOT INCLUDE SLOPED GLAZING. ADD IF NEEDED FOR PROJECT.

THIS SECTION WILL ALMOST ALWAYS BE ACCOMPANIED BY SECTIONS 084113, 085113, AND/OR 084413. EDIT THIS SECTION AFTER THE OTHER SECTIONS ARE SUBSTANTIALLY COMPLETE. NOTE THAT THERMAL PERFORMANCE VALUES (U-VALUE AND SOLAR HEAT GAIN COEFFICIENT) ARE SPECIFIED IN THESE OTHER SECTIONS BECAUSE ASHRAE 90.1 REQUIRES THE VALUES TO BE FOR THE ENTIRE ASSEMBLY, NOT JUST FOR CENTER-OF-GLASS.

FOR PROJECTS LIMITED TO REPLACEMENT OF GLASS, SEE EDITOR'S NOTES IN PART 2.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Standard General Conditions, Supplemental General Conditions, Division 01 Specification Sections, and other applicable Specification Sections, apply to this Section.

B. Related Sections:

1. Division 07 Section "Joint Sealants".
2. Division 08 Section "Aluminum-Framed Entrances & Storefronts"
3. Division 08 Section "Aluminum Windows".
4. Division 08 Section "Glazed Aluminum Curtain Walls".

1.2 SUMMARY

A. Section Includes: Glass and glazing work for both field and pre-glazed units for the following types:

MODIFY LISTING BELOW TO SUIT PROJECT.

1. Window units.
2. Glazed curtain wall.
3. Storefront framing.
4. Entrances and other doors.
5. Skylight units.
6. Sloped glazing systems.
7. Replacement of glazing in existing aluminum framing.

1.3 DEFINITIONS

DELETE DEFINITIONS BELOW IF NOT APPLICABLE TO PRODUCTS RETAINED FOR PROJECT.

A. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.

B. Deterioration of Coated Glass: Defects developed from normal use which are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.

C. Deterioration of Insulating Glass: Failure of hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

D. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1.4 SUBMITTALS

A. Product data including manufacturer's technical data for each glazing material and fabricated glass product required; installation and maintenance instructions.

B. Samples for initial selection, consisting 12-inch square samples of the full range of manufacturer's standard product line for the following types of glass units:

USUALLY DELETE FIRST EXAMPLE BELOW. RETAIN ONLY IF PROJECT INCLUDES TINTED GLASS.

1. Tinted glass.
2. Low-emissivity coated glass.

C. Samples for verification purposes, of 1 set of 12-inch square samples of each type of glass indicated except for clear single pane units.

USUALLY DELETE BELOW.

1. Provide 1 set of 12-inch long samples of each color required (except black) for each gasket sample between two strips of material representative of adjoining framing system in color.

D. Certificate: Submit certificates from respective manufacturers attesting that glass and glazing materials furnished for project comply with requirements.

USUALLY RETAIN BELOW.

1. Separate certification will not be required for glazing materials bearing manufacturer's permanent labels designating type and thickness of glass, provided labels represent a quality control program involving a recognized certification agency or independent testing laboratory acceptable to Owner.

DELETE PARAGRAPH BELOW IF NO COMPATIBILITY TESTING IS REQUIRED UNDER "PERFORMANCE REQUIREMENTS" ARTICLE.

E. Compatibility and Adhesion Test Report: Submit statement from sealant manufacturer indicating that glass and glazing materials have been tested for compatibility and adhesion with glazing sealants and interpreting test results relative to material performance, including recommendations for primers and substrate preparation needed to obtain adhesion.

USUALLY RETAIN PARAGRAPH BELOW.

F. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 QUALITY ASSURANCE

A. Manufacturers and Products: The products and manufacturers specified in this Section establish the standard of quality for the Work. Subject to compliance with all requirements, provide specified products from the manufacturers named in Part 2.

ALWAYS INCLUDE BELOW IF INSULATING GLASS IS TO BE PROVIDED ON PROJECT.

B. Insulating Glass Manufacturers: Provide insulating glass manufactured by firm with at least 5 years of experience with similar projects and possessing current IGCC membership.

1. Insulating Glass Certification Program: Provide insulating glass units permanently marked either on spacers or at least one component pane of units with appropriate certification label of Insulating Glass Certification Council (IGCC).

C. Single Source Responsibility for Glass: To ensure consistent quality of appearance and performance, provide materials produced by a single manufacturer or fabricator for each kind and condition of glass indicated and composed of primary glass obtained from a single source for each type and class required.

D. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

EDIT TO BE PROJECT SPECIFIC

1. Glass Association of North America (GANA) Publications: GANA Glazing Manual [and GANA Laminated Glass Reference Manual].
2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use.".

RETAIN PARAGRAPH AND SUBPARAGRPHS BELOW ONLY FOR GLASS INSTALLED WITH GLAZING SEALANTS.

E. Preconstruction Adhesion and Compatibility Testing: Submit to elastomeric glazing sealant manufacturers, for testing according to ASTM C 1087, samples of each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member that will contact or affect elastomeric glazing sealants:

1. Use test methods standard with sealant manufacturer to determine if priming and other specific preparation techniques are required for rapid, optimum glazing sealants adhesion to glass and glazing channel substrates.
   a. Perform tests under normal environmental conditions during installation.
2. Submit not less than nine pieces of each type and finish of glass-framing members and each type, class, kind, condition, and form of glass (monolithic, insulating units) for adhesion testing, as well as one sample of each glazing accessory (gaskets, setting blocks and spacers) for compatibility testing.
3. Schedule sufficient time to test and analyze results to prevent delay in the Work.
4. Investigate materials failing compatibility or adhesion tests and get sealant manufacturer's written recommendations for corrective measures, including using special primers.
5. Testing is not required when glazing sealant manufacturer can submit required preparation data that is acceptable to Architect and is based on previous testing of current sealant products for adhesion to and compatibility with submitted glazing materials.

DELETE BELOW IF NO SAFETY GLAZING IS REQUIRED. COORDINATE WITH PART 2 ARTICLES SPECIFYING MONOLITHIC, INSULATING AND LAMINATED GLASS PRODUCTS.

F. Safety Glazing Standard: Comply with the following:

1. Provide safety glass where indicated and where otherwise required by the Michigan Building Code.

REVISE PARAGRAPH BELOW FROM CATEGORY II MATERIALS TO CATEGORY I MATERIALS IF GLASS PANES ARE STATIONARY OR IN SWINGING DOORS AND ARE LESS THAN 9 SF IN AREA. REFER TO HTTP://WWW.ACCESS.GPO.GOV/NARA/CFR/WAISIDX_03/16CFR1201_03.HTML FOR COMPLETE DESCRIPTION OF CATEGORY I AND CATEGORY II MATERIALS.

2. Where safety glass is indicated, provide type of products indicated which comply with ANSI Z97.1 and testing requirements of 16 CFR Part 1201 for category II materials.
   a. Subject to compliance with requirements, provide safety glass permanently marked with certification label of Safety Glazing Certification Council (SGCC) or other certification agency acceptable to Owner.

PARAGRAPH BELOW IS USEFUL IN TRYING TO INSURE THAT COLOR OF LOW-E GLAZING DOESN'T VARY EXCESSIVELY FROM PANE TO PANE.

G. Sealed Insulating Glass Units: In addition to other requirements of this section, comply with ASTM D2244. 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. Each material and condition of use may require specific color tolerances.

1.6 DELIVERY, STORAGE AND HANDLING

A. Protect glass and glazing materials during delivery, storage, and handling to comply with manufacturer's directions and as required to prevent edge damage to glass, and damage to glass and glazing materials from effects of moisture including condensation, of temperature changes, of direct exposure to sun, and from other causes.

1. Glass shall be fully identified, and each pane shall be clearly labeled with manufacturer's name and product designation.

1.7 PROJECT CONDITIONS

A. Environmental Conditions: Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by glazing material manufacturer or when joint substrates are wet due to rain, frost, condensation or other causes.

1. Install liquid sealants at ambient and substrate temperatures above 40 degrees F (4.4 deg. C).

1.8 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form, made out to Owner and signed by coated-glass manufacturer agreeing to replace coated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

1. Warranty Period: Manufacturer's standard but not less than 10 years after date of substantial completion.

B. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form, made out to Owner and signed by insulating-glass manufacturer agreeing to replace insulating-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

1. Warranty Period: Manufacturer's standard but not less than 10 years after date of substantial completion.

DELETE WARRANTY REQUIREMENT BELOW IF NO LAMINATED GLASS INCLUDED.

C. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form, made out to Owner and signed by manufacturer agreeing to replace units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following manufacturers:

ALWAYS INCLUDE PRIMARY GLASS PARAGRAPH BELOW, SINCE PRIMARY GLASS IS A COMPONENT OF INSULATING GLASS AND LAMINATED GLASS.

B. Primary Glass:

1. AGC Flat Glass North America, Inc.
2. Guardian Industries Corp.
3. Pilkington North America, Inc.
4. PPG Industries, Inc.

DELETE PATTERNED GLASS IF NONE IN PROJECT.

C. Patterned Glass:

1. AGC Flat Glass North America.
2. Guardian Industries Corp.

D. Laminated Glass:

1. AGC Flat Glass North America.
2. Guardian Industries Corp.
3. Oldcastle Glass Group.
4. Viracon, Inc.

E. Insulating Glass Units:

EDIT LIST AFTER SELECTING DESIRED CHARACTERISTICS OF INSULATING GLASS UNITS.

1. AGC Flat Glass North America.
2. Guardian Industries Corp.
3. Oldcastle Glass Group
4. Viracon, Inc.

F. Glazing sealants:

1. Dow Corning Corp.
2. GE
3. Pecora Corp.
4. Tremco, Inc.

REFER TO DELEGATED DESIGN REQUIREMENTS IN THE "ALUMINUM WINDOWS" AND "GLAZED ALUMINUM CURTAIN WALL" SECTIONS.

2.2 PERFORMANCE REQUIREMENTS

A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

FIRST PARAGRAPH AND SUBPARAGRAPHS BELOW ASSUME GLASS THICKNESSES ARE INDICATED ON DRAWINGS OR IN ARTICLE 2.5. IF NOT, REVISE ACCORDINGLY. STRUCTURAL ENGINEER SHALL PERFORM A WIND PRESSURE ANALYSIS PER THE MICHIGAN BUILDING CODE.

B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses and strengths (annealed or heat treated) by analyzing Project loads and in-service conditions as required to meet or exceed the following criteria:

1. Glass Thicknesses: Comply with ASTM E 1300, according to the following requirements:
   a. Design Wind Loads: As indicated on Drawings.
2. Normal thermal movement is defined as that resulting from an ambient temperature range of 120 deg. F (67 deg. C) and from a consequent temperature range within glass and glass framing members of 180 deg. F (100 deg. C).

2.3 PRIMARY GLASS PRODUCTS

A. General: Refer to [“Aluminum Entrances and Storefront”] [“Aluminum Windows”] [“Glazed Aluminum Curtain Wall”] section for performance requirements of assembled units composed of insulating units and aluminum framing.

B. Clear Annealed Float Glass: ASTM C 1036 Type I (transparent glass, flat), Quality q3 (glazing select), of class indicated and with the following characteristics:

ENTER VALUES FOR VISIBLE LIGHT TRANSMITTANCE AND REFLECTANCE BELOW AFTER REVIEWING PROJECT REQUIREMENTS. DELETE BELOW IF COVERED UNDER INSULATED GLASS SECTION IN PART 2.

1. Visible Light Transmittance: [ ]
2. Reflectance: [ ]

DELETE BELOW UNLESS PROJECT IS A RETROFIT MATCHING EXISING TINTED GLAZING. TINTED GLASS IS NOT ACCEPTABLE ON NEW CONSTRUCTION.

C. Tinted Float Glass: Type I (transparent glass, flat), Class 2 (tinted heat absorbing and light reducing), Quality q3 (glazing select) and as follows:

BELOW IS A GENERAL DESCRIPTION FOR TINTED BRONZE GLASS. OBTAIN SAMPLES AND MATCH TO EXISTING GLAZING AS CLOSELY AS POSSIBLE. CONSIDER LIMITING ACCEPTABLE PRODUCTS IF NOT ALL MANUFACTURERS HAVE A CLOSE MATCH.

1. Bronze: Tint matching existing units.

D. Heat-Treated Float Glass

1. Manufacturing Process: Manufacture heat-treated glass by horizontal (roller hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.

BELOW SPECIFIES BOTH COATED AND UNCOATED CLEAR STRENGTHENED OR TEMPERED GLASS.

PROVIDE KIND HS (HEAT-STRENGTHENED) FLOAT GLASS IN PLACE OF ANNEALED FLOAT GLASS WHERE NEEDED TO RESIST THERMAL STRESSES INDUCED BY DIFFERENTIAL SHADING OF INDIVIDUAL GLASS LITES AND TO COMPLY WITH GLASS DESIGN REQUIREMENTS SPECIFIED IN PART 1 "PERFORMANCE REQUIREMENTS" ARTICLE.

2. Clear Heat-Treated Float Glass: ASTM C 1048 Type I (transparent glass, flat), Class 1 (clear), Quality q3 (glazing select),and with the following characteristics:

SELECT ONE OR BOTH BELOW

a. For uncoated glass, comply with requirements for Condition A.
b. For coated vision glass, comply with requirements for Condition C (other coated glass).

DELETE SUBPARAGRAPH BELOW IF LOCATIONS OF KIND FT FLOAT GLASS FOR SAFETY GLASS APPLICATIONS ARE SPECIFIED IN OTHER PART 2 ARTICLES OR ON DRAWINGS.

c. Provide Kind FT (fully tempered) float glass in place of annealed or Kind HS (heat-strengthened) where safety glass is indicated, required by Code or performance requirements listed elsewhere in this Section.

BELOW SPECIFIES TINTED HEAT-STRENGTHENED OR TEMPERED GLASS. PROVIDE KIND HS (HEAT-STRENGTHENED) FLOAT GLASS WHERE NEEDED TO RESIST THERMAL STRESSES INDUCED BY DIFFERENTIAL SHADING OF INDIVIDUAL GLASS LITES AND TO COMPLY WITH GLASS DESIGN REQUIREMENTS SPECIFIED IN PART 1 "PERFORMANCE REQUIREMENTS" ARTICLE. USE OF TINTED GLASS IS RESTRICTED TO REPLACEMENT OR MATCHING OF EXISTING TINTED UNITS.

3. Tinted Heat-Treated Float Glass: ASTM C 1048; Type I(transparent glass, flat); Class 2 (tinted heat absorbing and light reducing), Quality q3 (glazing select), with tint color and performance characteristics for 1/4 inch thick glass matching those indicated for non-heat-treated float glass; kind as indicated:

a. For uncoated glass, comply with requirements for Condition A.
b. For coated vision glass, comply with requirements for Condition C (other uncoated glass).

DELETE SUBPARAGRAPH BELOW IF LOCATIONS OF KIND FT FLOAT GLASS FOR SAFETY GLASS APPLICATIONS ARE SPECIFIED IN OTHER PART 2 ARTICLES OR ON DRAWINGS.

c. Provide Kind FT (fully tempered) float glass in place of Kind HS (heat-strengthened) where safety glass is indicated.

DELETE BELOW IF NO PATTERNED GLASS REQUIRED. IF USING IN NON-OPAQUE SPANDREL PANEL ALWAYS SPECIFY HEAT STRENGTHENED GLASS.

E. Patterned Glass: ASTM C 1048 Type II (patterned and wired glass, flat), Form 3 (patterned), Quality q8 (glazing), Finish f1 (patterned one side), of pattern and class indicated below:

BELOW IS THE ONLY PATTERNED GLASS WITH AN OVERALL OBSCURING PATTERN AVAILABLE AS OF AUGUST, 2011, IN ONE QUARTER-INCH THICKNESS. OTHER PATTERNS ARE AVAILABLE IN 3/16" THICKNESS FROM AGC AND GUARDIAN.

1. Pattern p3 (random), Class 1 (translucent).
   a. Product: Subject to compliance with requirements, provide "Serenity" by AGC Flat Glass North America.

RETAIN THICKNESS HERE OR ON DRAWINGS.

2. Thickness: 1/4-inch.

BELOW SPECIFIES STANDARD OPAQUE SPANDREL COATED GLASS WITH A CERAMIC FRIT APPLIED TO THE INBOARD SURFACE OF THE LITE. DELETE IF NONE IS INCLUDED IN PROJECT. COORDINATE WITH DESIGN MANAGER BEFORE USE.

F. Ceramic Coated Heat-Treated Spandrel Glass: ASTM C 1048 Condition B (spandrel coated glass, one surface ceramic coated), Type I (transparent glass, flat), Quality q3 (glazing select), and complying with the following requirements:

1. Kind HS (heat strengthened).

ALTHOUGH IT IS POSSIBLE FOR UNBACKED HEAT-STRENGTHENED SPANDREL COATED GLASS TO PASS TEST IN SUBPARAGRAPH BELOW, APPLYING TAPE TO BACK OF SPANDREL COATED GLASS IS NORMALLY REQUIRED.

2. Fallout Resistance: Provide spandrel coated units identical to those passing the fallout-resistance test for spandrel coated glass specified in ASTM C 1048.

G. Low-E Glazing General: Performance characteristics designated for coated glass products are nominal values based on manufacturer's published test data for 1/4 inch thick glass products, unless otherwise indicated. Refer to primary and heat-treated glass product requirements relating to properties of glass products to which coatings are applied.

1. Provide heat-treated coated float glass of kind and where indicated or, if not otherwise indicated, provide heat-strengthened units where recommended by manufacturer for application indicated, and tempered where coated safety glass is designated or required.

H. Sputter-Coated Float Glass: ASTM C 1376, (except for provisions regarding color tolerances, which are modified in this Section) float glass with metallic-oxide or -nitride coating deposited by vacuum deposition process after manufacture and heat treatment (if any), and complying with other requirements specified.

DELETE THE FOLLOWING ARTICLE IF NO LAMINATED SAFETY GLASS REQUIRED.

2.4 LAMINATED GLASS PRODUCTS

A. General: Refer to float glass, heat-treated glass and coated glass requirements relating to properties of glasses making up laminated glass products.

B. Laminated Glass: ASTM C 1172, and complying with other requirements specified and with the following:

1. Interlayer: Polyvinyl butyral of thickness indicated with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.
2. Products: Subject to compliance with requirements, provide one of the following:
   Saflex; Solutia, Inc.
   Butacite; E.I. DuPont De Nemours and Co., Inc.

C. Laminating Process: Fabricate laminated glass using laminator's standard heat-plus-pressure process to produce glass free from foreign substances and air/glass pockets.

D. Laminated Safety Glass: Two panes of glass of equal thickness, laminated together with not less than [0.030] [0.060] inch thick plastic interlayer and complying with requirements indicated below:

1. Glass Characteristics: Float glass, complying with requirements for class, tint, kind and thickness of each pane (ply) indicated below:
   a. Class 1 - clear for both panes.

SELECT ONE OF TWO BELOW.

   b. Kind HS (heat-strengthened).
   c. Kind FT (Fully tempered).
   d. Thickness: 1/4 inch.
2. Color of Plastic Interlayer: Clear.

COORDINATE REQUIREMENTS SELECTED IN THIS ARTICLE WITH THOSE IN OTHER ARTICLES ON GLASS PRODUCTS WHICH RELATE TO PANES MAKING UP INSULATING UNITS.

2.5 SEALED INSULATING GLASS UNITS

A. General: Provide factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace filled with argon gas, and with other requirements specified for glass characteristics, air space, sealing system, sealant, spacer material, corner design and desiccant. Provide insulating glass units complying with and labeled with appropriate certification label of IGCC/IGMA Certification Program.

1. For properties of individual glass panes making up units, refer to product requirements specified elsewhere in this Section applicable to types, classes, kinds and conditions of glass products indicated.

INDICATE LOCATIONS OF HEAT-STRENGTHENED UNITS ON DRAWINGS OR SCHEDULES.

2. Provide Kind HS (heat-strengthened) glass where indicated, or if not indicated, where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified elsewhere in Section.
3. Provide tempered panes where indicated or if not indicated, where safety glass is designated or required.
4. Performance characteristics designated for coated insulating glass are nominal values based on manufacturer's published test data for units with 1/4 inch thick panes of glass and 1/2 inch thick air space filled with argon gas.
5. Sealing System: Dual seal, using butyl primary seal and silicone secondary seal.

BELOW IS SPECIFICATION FOR STANDARD ALUMINUM SPACER. BETTER THERMAL PERFORMANCE CAN BE OBTAINED BY USING "WARM EDGE" SPACERS OF STAINLESS STEEL OR OTHER MATERIALS.

6. Spacer: Fabricated from anodized aluminum, incorporating either molecular sieve, silica gel or combination type dessicant as standard with manufacturer.

SELECT ONE OF THE FOLLOWING.

a. Color: Clear.
b. Color: Match finish color of aluminum framing system.
c. Color: Dark bronze.

SELECT SEALANT SYTEM WITH BEST PERFORMANCE AND WHICH IS ACCEPTABLE TO ALUMINUM FRAMING MANUFACTURERS.

2.6 SEALANT SYSTEMS GENERAL

A. Products:

1. Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

ALWAYS RETAIN BELOW. IF PROJECT IS LEED, VERIFY VALUE BELOW FOR LEED CREDIT.

2. Sealants used inside the framing and glazing shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Cleaners, Primers and Sealers: Type recommended by manufacturer of sealants.

C. Setting Blocks: Elastomeric material with 80 to 90 Shore, type A durometer hardness.

D. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material as required for compatibility with glazing sealant, of size and hardness required to limit lateral movement (side-walking) of glass.

WET-DRY SYSTEM USES A TOOLED SEALANT CAP BEAD OVER A GLAZING GASKET ON THE EXTERIOR AND A DRY GASKET ON THE INTERIOR. THIS SYSTEM PROVIDES BETTER WEATHER PROTECTION BUT REQUIRES THAT GLAZING BE DONE FROM THE EXTERIOR. ADDITIONALLY, NOT ALL ALUMINUM FRAMING MANUFACTURERS PRODUCE A FRAMING SYSTEM THAT ACCEPTS WET-DRY GLAZING.

2.7 WET-DRY GLAZING SEALANT SYSTEM MATERIALS

A. Glazing Gaskets: Manufacturer's standard compression types; replaceable, molded or extruded, of profile and hardness required to maintain watertight seal on interior.

BOND-BREAKER TAPE IS TYPICALLY USED WITH WEATHERSEAL SEALANTS IF CONVENTIONAL SEALANT BACKING CANNOT BE USED BECAUSE OF DIMENSIONAL LIMITATIONS. IT IS ALSO USED TO AVOID THREE-SIDE ADHESION THAT MAY BE DETRIMENTAL TO PROPER SEALANT MOVEMENT.

B. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.

RETAIN PARAGRAPH BELOW IF USING TAPE INSTEAD OF GASKET.

C. Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.

D. Glazing Sealants: As recommended by manufacturer for joint type, and as follows:

REVIEW WEATHERSEAL-SEALANT REQUIREMENTS WITH ALUMINUM-FRAMED-SYSTEM MANUFACTURERS. BELOW IS NEUTRAL CURE. CONFIRM WITH MANUFACTURER OF SPECIFIED FRAMING SYSTEM.

1. Silicone Weatherseal Sealant: ASTM C 920 for Type S, Grade NS, Class 50, Uses NT, G, A, and O; single-component neutral-curing formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and aluminum-framed-system manufacturers for this use.

2.8 DRY GASKET SYSTEM MATERIALS

A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:

RETAIN ONE OR BOTH OF SUBPARAGRAPHS BELOW. USE COMPONENTS COMPLYING WITH WINDOW, STOREFRONT, CURTAIN WALL AND DOOR MANUFACTURER'S REQUIREMENTS. NEOPRENE IS NOT COMPATIBLE WITH SILICONE GLAZING SEALANTS.

1. EPDM complying with ASTM C 864.

2. Silicone complying with ASTM C 1115.

GASKETS IN FIRST PARAGRAPH BELOW ARE FOR USE BETWEEN GLASS AND FRAME (OR FIXED STOP) WHERE THEY WILL BE COMPRESSED BY INSERTING DENSE COMPRESSION GASKETS OR BY PRESSURE-GLAZING STOPS.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, EPDM or silicone gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.

1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.

2.9 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

2.10 INSULATED-GLASS TYPES

PARAGRAPH AND SUBPARAGRAPHS BELOW DESCRIBE TYPICAL U-M INSULATED GLAZING PANEL.

A. Clear Low-E Insulating Glass Units for Vertical Applications: Manufacturer's standard units complying with the following requirements:

1. Thickness of Each Pane: 1/4-inch.

SELECT TYPE OF GLASS FOR EACH PANE.

2. Exterior Pane: [Clear float glass] [Heat strengthened float glass] [Fully tempered float glass], low-emissivity coating applied to the second surface.
3. Interior Pane: [Clear float glass] [Heat strengthened float glass] [Fully tempered float glass], uncoated.
4. Air Space Thickness: 1/2-inch.
   a. Fill air space with argon gas.
5. Composite Thickness: 1-inch.
6. Performance Characteristics: Provide insulating glass units complying with ASTM E 774 for Class A, and the following:

MODIFY AS REQUIRED TO MEET PROJECT REQUIREMENTS.

   a. Visible light transmittance: Not more than 70 percent.
   b. UV Transmittance: 15 percent.
   c. Outdoor reflectance: Not more than 12 percent.

NORMALLY, SPECIFY U-VALUE AND SHGC IN THE ACCOMPANYING ALUMINUM FRAMING SECTION (STOREFRONT, WINDOWS OR CURTAIN WALL).

d. U-value and Solar Heat Gain Coefficient: As required to achieve specified performance in [“Aluminum Entrances and Storefront”] [“Aluminum Windows”] [“Glazed Aluminum Curtain Wall”] Section[s].

USUALLY DELETE PARAGRAPH AND SUBPARAGRAPHS BELOW. RETAIN ONLY FOR PROJECTS MATCHING EXISTING TINTED GLASS.

B. Tinted Low-E Insulating Glass Units for Vertical Applications: Manufacturer's standard units complying with the following requirements:

REVISE BELOW AS REQUIRED TO MATCH COLOR OF EXISTING GLAZING.

1. Thickness of Each Pane: 1/4-inch.

SELECT TYPE OF GLASS FOR EACH PANE. TYPICALLY USE HEAT STRENGTHENED GLASS WHEN GLASS IS TINTED, ESPECIALLY ON SOUTH AND WEST ELEVATIONS.

2. Exterior Pane: [Clear float glass] [Heat strengthened float glass] [Fully tempered float glass], low-emissivity coating applied to the second surface.
   a. Tint: Bronze.
3. Interior Pane: [Clear float glass] [Heat strengthened float glass] [Fully tempered float glass], uncoated.
4. Air Space Thickness: 1/2-inch.
   a. Fill air space with argon gas.
5. Composite Thickness: 1-inch.
6. Performance Characteristics: Provide insulating glass units complying with ASTM E 774 for Class A, and the following:

MODIFY AS REQUIRED TO MEET PROJECT REQUIREMENTS.

   a. Visible light transmittance: []
   b. UV Transmittance: Not more than 5 percent.
   c. Outdoor reflectance: []

NORMALLY, SPECIFY U-VALUE AND SHGC IN THE ACCOMPANYING ALUMINUM FRAMING SECTION (STOREFRONT, WINDOWS OR CURTAIN WALL).

   d. U-value and Solar Heat Gain Coefficient: As required to achieve specified performance in [“Aluminum-Framed Entrances and Storefronts”] [“Aluminum Windows”] [“Glazed Aluminum Curtain Wall”] Section[s].

BELOW DESCRIBES SEMI-OPAQUE "TRANSOM PANEL" USED TO CONCEAL CEILING SPACES. IT IS A REASONABLY CLOSE MATCH TO VISION PANELS. DELETE IF STANDARD OPAQUE SPANDREL COATED GLASS IS SELECTED, OR IF NO SPANDREL COATED GLASS IS REQUIRED.

C. Non-Vision Low-E Insulating Glass Units for Vertical Applications: Manufacturer's standard units complying with the following requirements:

1. Thickness of Each Pane: 1/4-inch.

SELECT TINTED OR CLEAR GLAZING TO MATCH VISION UNITS. IF USING CLEAR GLASS DELETE THE FOLLOWING PARAGRAPH AND ASSOCIATED SUB-PARAGRAPHS.

TYPICALLY USE HEAT STRENGTHENED GLASS WHEN GLASS IS TINTED, ESPECIALLY ON SOUTH AND WEST ELEVATIONS.

a. Exterior Pane: [Tinted] [Clear] [float glass] [heat strengthened float glass] [fully tempered float glass], low-emissivity coating applied to the second surface.

REVISE TO MATCH EXISTING TINT COLOR OR ELIMINATE FOR CLEAR GLASS.

1) Tint: Bronze.

b. Interior Pane: Spandrel coated glass.

1) Kind HS (heat strengthened), unless otherwise indicated.

c. Air Space Thickness: 1/2-inch.

1) Fill air space with argon gas.

d. Composite Thickness: 1-inch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspection: Inspect work of glass framing erector in presence of Glazier for compliance with manufacturing and installation tolerances, including those for size, squareness, offsets at corners; for presence and functioning of weep system; for existence of minimum required face or edge clearances; and for effective sealing of joinery.

1. Obtain Glazier's written report listing conditions detrimental to performance of glazing work. Do not allow glazing work to proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members to receive glass, immediately before glazing. Remove coatings which are not firmly bonded to substrates. Remove lacquer from metal surface where elastomeric sealants are indicated for use.

3.3 GLAZING GENERAL

IF IT IS ASSUMED THAT SHOP GLAZING WILL BE IMPOSSIBLE IN SOME LOCATIONS, INDICATE ACCEPTABLE FIELD GLAZED LOCATIONS ON DRAWING.

A. Unless indicated otherwise, shop glaze aluminum framing specified in “Aluminum-Framed Entrances and Storefronts”, “Aluminum Windows" and “Glazed Aluminum Curtain Wall” Sections.

B. Comply with combined written instructions of manufacturers of aluminum framing, glass, sealants, tapes, and other glazing materials, except where more stringent requirements are indicated, including those of referenced glazing publications.

C. Protect glass from edge damage during handling and installation. Remove from Project and legally dispose of damaged glass. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.

G. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of sealant which is acceptable for heel bead use.

H. Provide spacers for glass sizes larger than 50 united inches (length plus height).

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

I. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass unit manufacturer and according to requirements in referenced glazing publications.

J. Set units of glass in each series with uniformity of pattern, draw, bow and similar characteristics.

K. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

L. Install sealants in compliance with ASTM C1193.

COORDINATE GLAZING METHODS BELOW WITH SELECTIONS IN PART 2.

3.4 WET/DRY GLAZING

A. Follow manufacturer's recommendations and reference standards.

B. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

C. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

RETAIN BELOW FOR WINDOWS AND STOREFRONT SYSTEMS.

D. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer. Apply cap bead of sealant on exterior per manufacturer's instructions.

RETAIN BELOW FOR CURTAIN WALL

E. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer. Apply cap bead of sealant on exterior per manufacturer's instructions.

3.5 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until right before each glazing unit is installed.

DELETE PARAGRAPH BELOW IF NOT REQUIRED, OR QUALIFY BY ADDING "WHERE INDICATED" AND SHOW LOCATIONS ON DRAWINGS.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

DELETE PARAGRAPH BELOW IF NOT APPLICABLE OR REVISE; IT ASSUMES FIXED STOP IS LOCATED ON EXTERIOR.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

RETAIN BELOW FOR DRY GLAZING WITH GASKETS.

3.6 GASKET GLAZING (DRY):

A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Miter cut wedge-shaped gaskets at corners, and install gaskets in manner recommended by gasket manufacturer to prevent pull away at corners. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Install gaskets so they protrude past face of glazing stops.

3.7 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

1. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.8 ADJUSTING, CLEANING, PROTECTION

A. Protect exterior glass from breakage immediately upon installation by use of crossed streamers attached to framing and held away from glass. Do not apply markers to surface of glass. Remove nonpermanent label and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, containment substances do come into contact with glass, remove immediately by method recommended by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkali deposits or staining. When examination reveals presence of these forms of residue, remove by method recommended by glass manufacturer.

D. Remove and replace glass which is broken, chipped, cracked, abraded or damaged in other ways during construction period, including natural causes, accidents and vandalism.

E. Wash glass on both faces not more than 4 days prior to date scheduled for inspections intended to establish date of substantial completion in each are of project. Wash glass by method recommended by glass manufacturer.

END OF SECTION 088000