

## **PART ONE - GENERAL**

### **DESCRIPTION**

#### **SECTION INCLUDES:**

1. EXTERIOR WOOD DOORS, stile and rail design.
2. GLASS PANELS.

#### **RELATED WORK**

1. SECTION 06 200: Finish Carpentry
2. SECTION 09 900: Painting
3. SECTION 08 710: Door Hardware.

#### **REFERENCES**

1. AWI: Quality Standards of the Architectural Woodwork Institute. Section 1300
2. HPMA HP - Hardwood and decorative Plywood.
3. NWWDA STANDARD: 1.5.1 National Wood Window and Door Association.

### **SUBMITTALS FOR REVIEW**

**PRODUCT DATA:** Indicate stile and rail core materials and construction; veneer species, type and characteristics.

**SHOP DRAWINGS:** Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, identify cutout for glazing. Trim provide at glass and panels.

**SAMPLES:** Submit two samples of door veneer illustrating wood grain, stain color, and sheen.

### **QUALITY ASSURANCE**

**PERFORM WORK** in accordance with AWI Quality Standard Section 1400, Premium Grade.

### **DELIVERY, STORAGE, AND PROTECTION**

**PROTECT DOORS** with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer.

1. SEAL TOP and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

### **PROJECT CONDITIONS**

**COORDINATE THE WORK** with door opening construction, door frame and door hardware installation.

### **WARRANTY**

**PROVIDE WARRANTY** to the following term:

1. EXTERIOR DOORS: 5 years.

**INCLUDE COVERAGE** for delamination of veneer, warping beyond specified installation tolerances, defective materials.

## **PART TWO - PRODUCTS**

### **MANUFACTURERS**

**ACCEPTABLE MANUFACTURERS:** Include

1. AW Certified local door millwork shops. Minimum five (5) years experience in custom doors.
2. APPROVED SUBSTITUTE

### **DOORS**

**EXTERIOR DOORS:** 1-3/4" thick

1. CONSTRUCTION: Low density glued up lumber core using interrupted lengths, with 1/8" minimum hardwood veneer.
  - a. Provide matching hardwood lumber species at exposed edges.
2. JOINTS: Mortise and tenon
3. GLASS STOP: Match existing profile, as feasible.

4. THROUGH MUNTIN 12 LITE glass panel on both sides of glass. Match existing size-doweled to vision lite frame at perimeter.
5. SPECIES: White Oak
6. CUT: Plain sliced
7. FINISH: Transparent. Both sides

#### **DOOR TRIM**

TRIM: AWI Premium quality species wood, matched grain, for transparent finish on exterior.

1. SPECIES: White Oak
2. CUT: Plain sliced.

#### **ADHESIVE**

ADHESIVE: Type I – Waterproof for exterior doors.

#### **ACCESSORIES**

MOLDING: Wood, of same species as door facing, shape, mitered corners; prepared for countersink style screws.

GLASS PANELS: Minimum ¼” thick, safety, clear.

1. ASTM C1048, fully tempered, condition A, uncoated, Type 1, transparent flat, clear, quality q3.

METAL FLASHING: Aluminum, bronze tone anodized.

1. LOCATE at top and bottom of door per AW1 Standards.

SEALANT: 2 component, polyurethane. Color as selected.

1. TREMCO; Product – Dymeric 240FC
2. PECORA; Product – NR 100
3. SONEBORN – Contech: Product – Sonoplastic NPI

#### **FABRICATION**

FABRICATE DOORS in accordance with AWI Quality Standards requirements.

AT EXTERIOR DOORS provide aluminum flashing at the top and bottom rail for full thickness and width of door per AWI Standards.

FACTORY MACHINE DOORS for finish hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware.

1. CUT AND CONFIGURE EXTERIOR DOOR edge to receive recessed weather stripping devices. Provide edge clearances in accordance with AWI 1600.

FACTORY FIT DOORS for frame opening dimensions identified on shop drawings and based on field measurements.

#### **FINISH**

SHOP FINISH: Per AWI Quality Standard 1500. Finish #5.

1. DOORS: Transparent, catalyzed polyurethane, premium quality, gloss sheen. Per submitted sample.
2. COATS
  - a. Stain: One Coat
  - b. Seal: One Coat
  - c. Top Coats: Two Coats
3. SEAL DOOR TOP EDGE with matching color.

#### **PART 3 - EXECUTION**

##### **EXAMINATION**

VERIFY THAT OPENING SIZES and tolerances are acceptable.

1. MAKE FIELD MEASUREMENTS of existing frame to assure proper fit.

DO NOT INSTALL DOORS in frame openings that are not plumb or are out of tolerance for size or alignment.

### **INSTALLATION**

CONFORM to AWI Quality Standards.

INSTALL DOORS in accordance with AWI Quality Standards requirements and manufacturer's standards.

1. TRIM DOOR WIDTH by cutting equally on both jamb edges.
2. TRIM DOOR HEIGHT by cutting bottom edges to a maximum of 3/4" (19mm).

MACHINE CUT for hardware

COORDINATE INSTALLATION OF DOORS with existing frames and hardware.

COORDINATE INSTALLATION of glass and glazing.

### **INSTALLATION TOLERANCES**

MAXIMUM DIAGONAL DISTORTION (WARP): 1/8 inch measured with straight edge or taut string, corner to corner, over an imaginary 36 x 84 inch surface area.

MAXIMUM VERTICAL DISTORTION (BOW): 1/8 inch measured with straight edge to edge, over an imaginary 36 x 84 inch surface area.

MAXIMUM WIDTH DISTORTION (CUP): 1/8 inch measured with straight edge or taut string, edge to edge, over an imaginary 36 x 84 inch surface area.

EDGE CLEAR ANGLES: Per AWI 1600

### **ADJUSTING**

ADJUST DOOR for smooth and balanced door movement.

ADJUST CLOSER for full closure.

### **SCHEDULE**

REFER TO DOOR AND FRAME SCHEDULE.

END OF SECTION

## **PART ONE - GENERAL**

### **DESCRIPTION**

SECTION INCLUDES: Performing all work required to complete the Door Hardware work, including but not limited to:

1. HARDWARE for doors
2. THRESHOLDS, at exterior doors
3. WEATHERSTRIPPING, at exterior doors

### RELATED WORK:

1. GENERAL CONDITIONS and Division 1.
2. STILE and RAIL WOOD DOORS: Section 08 212.

### **QUALITY ASSURANCE**

HARDWARE SUPPLIER: Firm with not less than 5 years experience preparing hardware schedules and supplying and servicing finish hardware

HARDWARE SUPPLIER PERSONNEL: Employ a certified Architectural Hardware Consultant to prepare the Schedule, meet with Owner, and to supervise the delivery, adjustment and servicing of finish hardware.

REQUIREMENTS OF REGULATORY AGENCIES: At doors required to have a U.L. Label, hardware shall be listed by Underwriters' Laboratories, Inc. for use with the appropriate labeled assembly.

1. COMPLY WITH all laws, codes, ordinances, and regulations of governmental authorities having jurisdiction where such requirements exceed the requirements of the Specifications.

### **REFERENCES**

CONFORM to the following:

1. ANSI A117.1 Making buildings accessible to physically handicapped.
2. ADA
3. MICHIGAN BARRIER FREE CODE
4. NFPA 80 - Fire doors and windows.
5. NFPA 101 – Life Safety Code.
6. ANSI - A156

### **SUBMITTALS**

EXAMINE the Drawings and Specifications thoroughly to assure that all necessary hardware for a complete installation is included in the Bid. No claim for additional cost will be considered for items which could have been reasonable foreseen by the certified Hardware Consultant and included in its Bid.

HARDWARE SCHEDULES: Submit Hardware Schedules. Coordinate hardware with doors, frames, and related work to ensure proper size, thickness, hand, function and finish.

COORDINATE functions, keying, finishes etc with the Owner at a special meeting arranged for that purpose. Revise and resubmit Schedule if required.

1. APPROVAL OF THE SCHEDULE will not relieve the Contractor of its responsibility for furnishing all the hardware items required for a complete installation and suited to the specific conditions encountered.

PRODUCT DATA: Submit product data concurrently with Hardware Schedule.

### **PRODUCT DELIVERY, STORAGE AND HANDLING**

LABEL EACH ITEM OF HARDWARE with the appropriate door number and Hardware Schedule heading number.

DELIVER KEYS to Owner by security shipment direct from hardware supplier.

### **WARRANTY**

FIVE (5) YEAR WARRANTY, plus five (5) year on exit devices, 10 years on hinges, door closers.

## **PART TWO - PRODUCTS**

### **GENERAL**

ACCEPTABLE MANUFACTURERS are shown with each product category. Furnish each category with the products of only one manufacturer, except where noted otherwise.

### **HINGES**

BUTT HINGES: ANSI – A156.1 Commercial Quality. Mortise butt type with concealed ball bearings, oilite bushed. Provide heavy duty (HD) rated on high frequency use doors.

1. ACCEPTABLE MANUFACTURERS: Hager
2. PRODUCT: BB1199 5 x 5
3. FINISH: Match Lockset, US10B
4. BUTT HINGE SIZE for 1-3/4" to 2-1/4" door thickness.

<u>Door Width</u>	<u>Hinge Size (h x w)</u>	<u>Hinge Weight</u>
37" to 41"	5" x 5"	Heavy (.190)
5. BUTT HINGE QUANTITIES PER DOOR LEAF:

<u>Height of Door</u>	<u>No. of Hinges</u>
61" to 90"	3
6. HINGE PINS: Stainless Steel unless otherwise indicated provide;
  - a. Exterior Doors: Non-removable pins (NRP)
  - b. Tips: Ball tip, top and bottom. Finish to match leaves.
7. USE STEEL BASE METAL, except where otherwise noted.
  - a. Exterior Out-Swinging Doors: Use brass base metal or other non-ferrous material.

SCREWS: Philips flat head wood screw (wood doors).

1. FINISH: Match hinge.

### **DOOR CLOSERS**

MANUFACTURER: ANSI A156.4, Grade 1 Only LCN "Series 4000. Parallel Arm and to suit each application.

1. FINISH: #695-Dark Bronze color
2. SIZE as recommended by manufacturer, unless larger size scheduled.
3. MODEL: P4111-N x ST3447
4. EXTERIOR DOORS: Heavy duty rated.
5. DROP PLATE: #4010-18

### **EXTERIOR TRIM**

MANUFACTURERS: Baldwin

1. FINISH: US10B, oil rubbed bronze
2. MODEL: 2608
3. USE: Classroom side of door

### **OTHER COMPONENTS**

KICKPLATES: Bronze, 10" height by door width minus 1-1/2".

1. THICKNESS: 0.50" (16 ga)
2. MANUFACTURERS: Rockwood, K1050
3. INSTALLATION: Interior and exterior face of each door.

SMALL MORTISE AUXILIARY DEAD LOCK: Extra heavy duty single cylinder with key on classroom side.

1. MANUFACTURER: Schlage, Product # L464.
2. FINISH: Match Lockset

PUSH PLATES: .050" stainless steel; bevel edges, stainless steel fasteners.

1. MANUFACTURERS: Rockwood, Product: 70C; or approved substitute.
2. SIZE: 4" x 16"
3. FINISH: See Schedule

### **THRESHOLDS, WEATHERSTRIPPING**

THRESHOLDS: ANSI A 156.21, Grade 1, 6" x 1/2" saddle type, unless otherwise noted or required for each application.

1. ACCEPTABLE MANUFACTURERS: National Guard Products
2. MATERIAL: Aluminum with Bronze Tone Finish
3. PRODUCT: #426 DKB

WEATHERSTRIPPING Aluminum, with dark bronze finish.

1. ACCEPTABLE MANUFACTURERS: National Guard.
2. PRODUCTS: #1709NDKB

### **FASTENERS**

FURNISH FASTENERS of the proper type, size, quantity, and finish.

1. FASTENERS SHALL INCLUDE machine screws, through and sex bolts, expansion shields, etc., with finishes appropriate for use required to attach each item of hardware to its respective surface properly.
2. HINGES: Philips flat-head or machine screws. Wood screws at wood surfaces.
3. FINISH: to match hardware, including hinge screws (US10B).

### **FINISHES**

GENERAL: Provide matching finishes for hardware at each door.

<u>HARDWARE</u> :	US10B, Oil Rubbed Bronze
1. HINGES:	US10B, Oil Rubbed Bronze
2. EXIT DEVICES:	US10B, Oil Rubbed Bronze
3. CLOSERS:	AL, 695 (Powder coat), dark bronze
4. CYLINDERS:	Match surrounding hardware
5. KICK PLATES:	US10B, Oil Rubbed Bronze
6. THRESHOLDS:	US10B, Oil Rubbed Bronze

PROTECTIVE LACQUER: On exposed brass, bronze, aluminum.

BASE METAL: High quality carbon steel – brass, or bronze.

### **KEYING**

KEYING AND CYLINDERS: Key, masterkey and grand masterkey locksets and cylinders to owner's system. Verify specific keying requirements with Owner.

1. PROVIDE CONSTRUCTION masterkeying for cylinders.
2. 2 CHANGE KEYS for each cylinder, 3 masterkeys each group; 3 grand masterkeys each group.

## **PART THREE - EXECUTION**

### **EXAMINATION**

VERIFY THAT DOORS, FRAMES are ready to receive work and dimensions are as indicated on shop drawings or required.

### **INSTALLATION**

INSTALL HARDWARE according to manufacturer's instructions.

1. USE TEMPLATES provided by manufacturer.

WHEREVER CUTTING AND FITTING is required to install hardware onto or into surfaces which are later to be painted or finished in another way, install each item completely and then remove and store in a secure place during the finished application. After completion of the finishes, reinstall each item. Do not install surface-mounted items until finishes have been completed on the substrate.

SET UNITS LEVEL plumb and true to line. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

SET THRESHOLDS for exterior doors in full bed of butyl rubber or polyisobutylene mastic sealant.

### **TEMPLATES AND HARDWARE LOCATIONS**

FURNISH HARDWARE made to template. Furnish required templates and hardware locations to the door and frame manufacturers.

KICKPLATES: Mount flush with bottom of door.

### **MOUNTING HEIGHTS**

DIMENSIONS are from finish floor to center line of item. Locate per recommendations of Door and Hardware Institute ADA and manufacturer's recommendations.

### **ADJUST AND CLEAN**

ADJUST AND CHECK EACH OPERATING ITEM of hardware and each door to ensure proper operation or function of every unit. Lubricate moving parts with type lubrication recommended by manufacturer (graphite type if not other recommended). Replace units which cannot be adjusted and lubricated to operate freely and smoothly as intended for the application made.

### **HARDWARE SCHEDULE**

TYPICAL HARDWARE SETS are listed by number in the Door Schedule.

REVIEW DRAWINGS AND SPECIFICATIONS to determine extent of finish hardware required for completion of the work. Provide additional hardware as required whether or not listed under typical sets. Use finish hardware suitable for service required and of same quality as other hardware for similar service wherever additional hardware required.

IT IS THE RESPONSIBILITY OF THE SUPPLIER to provide the correct size, type, and function of hardware to establish adequacy and completeness of hardware to comply with all applicable laws, codes, and ordinances, and to develop complete, final and detailed hardware schedule.

THE FOLLOWING LIST OF COMPONENTS is designed to provide "key words" which will establish the hardware elements, described previously in this specification.

MISCELLANEOUS AND INFREQUENTLY USED items are shown by manufacturer's name and catalog number in Hardware Groups.

WEATHERSTRIPPING AND THRESHOLD: to be provided at all exterior doors.

#### GENERAL:

1. CYLINDER AND CORE: Provide at all doors where lockset, exit device, etc., is noted. Key to Owner's "Best" master key system.
2. KICKPLATES: Mount to each side of door leaf, as noted.

THE FOLLOWING HARDWARE GROUPS are listed by number in the door schedule:

#### EXTERIOR ENTRY DOOR – SET NO. 1

- Hinges
- Closer
- Deadlock (keyed side is classroom)
- Exterior Pull Trim (classroom side)
- Interior Push Plate (Greenhouse side)
- Kickplates
- Threshold
- Weatherstrip
- Cylinder
- Core

END OF SECTION

## **PART ONE - GENERAL**

CONFORM to General Conditions and provisions of Division 1.

### **DESCRIPTION**

WORK INCLUDES: Perform all work required to complete glazing of all openings to receive glass, including:

1. GREENHOUSE
2. EXTERIOR WOOD DOORS
3. ACCESSORIES
4. SEALANTS

RELATED WORK: Particularly Review

1. GREENHOUSE: Section 13 123
2. STILE AND RAIL WOOD DOORS: Section 08 212

### **QUALITY ASSURANCE**

INSTALLERS QUALIFICATIONS: The glazing work shall be performed by an established firm employing skilled, experienced workers under competent supervision.

SOURCE QUALITY CONTROL: In the Product List required under Section 01 630, name the types and sources of glass, glazing compound, tape and sealant.

REFERENCE STANDARDS Conform to:

1. "GLAZING Manual Specifications for Installation of Flat Glass" as published by Flat Glass Jobbers Association.
2. CONSUMER PRODUCT SAFETY COMM. - CPSC - CFR part 1201 Safety Standard for Architectural Glazing Materials.
3. ANSI 297.1 Performance Specifications and Methods of Test for Safety Glazing Materials used Buildings.
4. STATE OF MICHIGAN - Safety Glass Code.

SIZE GLASS: To withstand dead loads and live loads and positive and negative loads acting normal to the plane of the glass, per building code requirements, and ASTM E330.

1. WIND LOAD: 25 pounds per S.F.
2. DEFLECTION: Maximum of 1/200, flexure limit of glass, with full recovery of glazing materials, whichever is less.

### **SUBMITTALS**

PRODUCT DATA: Provide structural, physical, characteristics, size limitations. Submit manufacturer's product specifications, including documentation of compliance with requirements, and instructions for handling, storing, installing, cleaning and protecting each type of glass and glazing materials.

SAMPLES: Submit 2 samples of each glass and glazing material.

### **PRODUCT DELIVERY, STORAGE AND HANDLING**

DELIVER GLASS to site in special trucks designed for transporting glass. Install glass direct from truck to greenhouse without storing at site. Where necessary to temporarily store glass, protect from damage and breakage until installation. No scratched, cracked or warped glass will be accepted.

### **JOB CONDITIONS**

EXISTING CONDITIONS: Inspect preceding work for improper conditions which may prevent the proper installation of the work under this Section. Execution of the work of this Section over preceding work constitutes acceptance of such.

COORDINATION: Coordinate and schedule this work with the work of other Sections. Review the shop drawings of other related Sections.

CONSTRUCTION AIDS: Provide scaffolding, staging and work platforms as required for the work of this section as governed by Section 01 520.



## **WARRANTY**

ONE YEAR WRITTEN GUARANTEE: required in accordance with General Conditions.

WARRANTY ON INSULATING GLASS UNITS: TEN YEAR written warranty, agreeing to replace (at no cost) units with defective hermetic seal (not due to glass breakage); including intrusion of dirt or moisture, internal condensation or fogging at temperatures above - 20 degree F., deterioration of internal glass coatings.

WARRANTY ON LAMINATED GLASS: TEN YEAR written warranty, agreeing to replace (at no cost) units with defective lamination, changes in required strength, transmittance, color.

## **PART TWO - PRODUCT**

### **MATERIALS**

MANUFACTURER: Subject to compliance with requirements, provide products of one of the following:

1. CLEAR AND TINTED FLOAT, COATED AND HEAT-TREATED
  - a. AFG Industries, Inc.
  - b. Ford Glass Division or Sunglas Industries
  - c. Guardian Industries Corp.
  - d. LOF Glass, Inc.
  - e. PPG Industries, Inc.
  - f. Saint-Gobain/Euroglass
2. LAMINATED GLASS
  - a. Advanced Coating Technology
  - b. Falconer Glass Industries
  - c. Ford Glass Division or Sunglas Industries
  - d. Guardian Industries Corp.
  - e. Hordis Brothers, Inc.
  - f. PPG Industries, Inc.
  - g. Saint Gobain/Euroglass
  - h. Viracon, Inc.
3. LOW-MODULUS ONE-PART SILICONE GLAZING SEALANTS:
  - a. Dow Corning 790; Dow Corning Corp.
  - b. Silpruf; General Electric.

### **GLASS PRODUCTS, GENERAL**

PRIMARY GLASS STANDARD: Provide primary glass which complies with ASTM C1036 requirements, including those indicated by reference to type, class and quality.

HEAT-TREATED GLASS STANDARD: Provide heat-treated glass which complies with ASTM C 1048 requirements, including those indicated by reference to kind, condition, type, quality and class.

SIZES: Fabricate glass to sizes required for glazing openings indicated, with edge clearances and tolerances complying with recommendations of glass manufacturer. Provide thicknesses indicated, or if not otherwise indicated, as recommended by glass manufacturer for application indicated.

### **FLAT GLASS MATERIALS**

MANUFACTURERS: Subject to compliance with requirements:

1. PPG INDUSTRIES
2. GUARDIAN INDUSTRIES
3. LOF GLASS INDUSTRIES
4. FORD GLASS DIVISION

FLOAT GLASS: ASTM C1036, Type 1, transparent, flat, Class 1 clear, Quality q3 glazing select.

1. THICKNESS: Minimum 1/4", unless noted thicker elsewhere.

SAFETY GLASS: ASTM C1048, Fully tempered, Condition A uncoated, Type 1 transparent flat, Class 1 clear, Quality q3, glazing select.

1. THICKNESS: Minimum 3/16".
2. TEMPERED SAFETY: Where required by code.
3. LOW E: Where noted

**LAMINATED SAFETY GLASS:** Two panes of glass of equal thickness, laminated together with not less than 0.060" thick plastic interlayer and complying with requirements indicated below:

1. **GLASS CHARACTERISTICS:** Float glass, complying with requirements for class and thickness of each pane (ply) indicated below:
  - a. **Type:** clear both panes.
  - b. **Thickness:** 3/16", or as required for glazing condition and structural requirements.
  - c. **Under 9 sf in area:** Class I (150 ft lbs impact)
  - d. **Larger lights:** Class II; 400 ft - lbs impact.

### **SEALED INSULATING GLASS MATERIALS**

**GENERAL:** Provide preassembled units consisting of organically sealed panels of glass enclosing a hermetically sealed dehydrated air space; comply with requirements indicated for glass characteristics, air space, sealing system, sealant, spacer material, corner design, and desiccant. Conform to ASTM E774 requirements for Class.

**SIZES:** Fabricate insulating glass to sizes required for glazing openings indicated, with edge clearances and tolerances complying with recommendations of glass manufacturer. Provide minimum thicknesses indicated or thicken if required to suit application or if not otherwise indicated, as recommended by glass manufacturer for application indicated.

**MANUFACTURERS:** Same as noted above.

**INSULATED GLASS UNITS:** ASTM E 774 and E 773 double pane, glass to mastic edge seal, outer pane of clear glass, inner pane of clear glass, interplane space purged dry hermetic air.

1. **THICKNESS:** 1" total thickness. Two lights at 3/16" each (except where laminated glass is used).
2. **LOW "E"** at insulated units, on #3 surface.
  - a. Solutia Saflex (or similar) by PPG

### **GLASS THICKNESS** (Unless noted otherwise)

#### AREA TO BE GLAZED

Under 80 united inches  
Over 80 to 120  
Over 120 to 150 united inches  
Over 150 united inches, or as specified

#### THICKNESS OF GLASS TO BE USED

Double Strength  
3/16" glass (40 oz.)  
7/32" glass (45 oz.)  
Plate Glass

### **GLAZING ACCESSORIES**

**SETTING BLOCKS:** Neoprene. Length of 0.1 inch for each square foot of glazing.

**SPACER SHIMS:** Neoprene. Size to suit application.

**GLAZING TAPE:** Preformed butyl compound, 10-15 Shore hardness; corted on release paper, black color, non-skinning.

1. **THICKNESS:** As required to suit application.
2. **MANUFACTURER:** Polyshim Tape, Tremco Inc.
3. **LOCATION:** Exterior glazing in greenhouse window wall and roof.

### **HEAT-TREATED GLASS PRODUCTS**

**MANUFACTURING PROCESS:** Manufacturer heat-treated glass by horizontal (roller hearth) process with roll wave distortion parallel with bottom edge of glass as installed.

**CLEAR HEAT-TREATED FLOAT GLASS:** Condition A (uncoated surfaces) Type I (transparent glass, flat), Class I (clear), quality q3 (glazing select), Kind FT (fully tempered).

### **LAMINATED GLASS PRODUCTS**

**GENERAL:** Refer to primary, heat-treated and coated glass requirements relating to properties of glasses making up laminated glass products.

PLASTIC INTERLAYER: Provide glass fabricator's standard polyvinyl butyral interlayer for laminating panes of glass, with a proven record of showing no tendency to bubble, discolor or lose physical or mechanical properties after laminating and installation, in clear or colors and of thickness indicated.

1. PRODUCTS: Subject to compliance with requirements, provide one of the following:
  - a. "Saflex"; Monsanto Co.
  - b. "Butacite"; E.I. DuPont De Nemours & Co., Inc.

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

### **GENERAL FABRICATION**

POLISH ALL EDGES wherever exposed to view.

VERIFY ALL GLASS THICKNESSES will comply with performance requirements specified in other Sections. Adjust thickness as required to comply as necessary.

TEMPER GLASS WHERE INDICATED OR REQUIRED for compliance with safety glass regulations or recommended by manufacturer/fabricator for size or thermal stress.

### **INSULATING GLASS FABRICATION**

1. FABRICATE AND LABEL UNITS to match units which have been tested and certified by the Insulating Glass Certification Council in accordance with proposed standard ASTM E6-P3, Test Methods, P1 and P2 (as sponsored by the Sealed Insulating Glass Manufacturers Association); and passed tests for glass seal classification "A".
2. FABRICATE UNITS WITH A PERMANENT, hermetically sealed dry air or glass filled space of the width indicated between sheets of glass as indicated. Provide an edge seal consisting of twin primary sealant beads of silicone positioned and retained by a tubular aluminum or galvanized steel spacer-bar frame with soldered/welded sealed corners, and filled with desiccant with breather ports into sealed space: with secondary edge sealant completely encapsulating outer face of spacer bar and sealed to the opposing sheets of glass. Provide silicone elastomeric sealant as secondary edge seal.
  - a. Extend secondary sealant to provide minimum of 1/16" thick elastomeric coating on edges of glass sheets in each insulating glass unit (to form a protective edge cushion).
  - b. Width: Except as otherwise indicated, fabricate units with 1/2" wide air spaces.
  - c. Fill air spaces by fabricator's standard process, using either gas or dry air with a maximum dew point of -20 degrees F. Exercise extreme care to exclude dirt and other foreign substances.
3. LABEL EACH UNIT, to show compliance with required standards and regulations, and to list generically each component including elements of edge seal. Indicate which face of unit is for exposed to exterior of weather. Provide removable label except where regulations require a permanent label.
  - a. Label interior-exposed edge of spacer bar with fabricator's name and date of completing hermetic seal.
4. TYPE REQUIRED: Refer to Section 13 123

### **GLAZING SEALANTS, COMPOUNDS AND GASKETS**

GENERAL: Hardness shown and specified are intended to indicate general range necessary for overall performance. Consult manufacturer's technical representative to determine actual hardness recommended for conditions of installation and use. Architect will furnish information concerning anticipated glass movement related to actual glazing channel width and installation temperature upon request. Except as otherwise indicated or recommended, provide glazing materials within the following ranges of hardness (Shore A, fully cured, at 75 degrees F.):

1. 15 TO 35 FOR ELASTOMERIC COMPOUNDS and tapes used with rigid stops and frames for large glass sizes (in excess of 100 unites inches.) Provide materials sufficiently hard to withstand exposed (if any) to abrasion and vandalism.
2. 25 TO 50 FOR RUBBER-LIKE CURING COMPOUNDS used with rigid stops frames for medium and small glass sizes (less than 100 unites inches.) Provide materials sufficiently hard to withstand impact where used on moving sash and doors.

3. 35 TO 60 FOR MOLDED GASKETS used with rigid stops and frames, depending upon strength needed for application or insertion of units and open profile of gasket.
4. 70 TO 80 FOR STRUCTURAL GASKETS (not supported by stops).
5. NON-ELASTOMERIC COMPOUNDS: (Shore A not applicable) 2 to 20mm penetration for 5.0 seconds of penetrometer needle or nominally cured compound (ASTM D2451).

COMPATIBILITY: Before purchase of specified glazing materials, investigate compatibility with channel surfaces, joint fillers, and other materials in glazing channel. Provide only materials (manufacturer's recommended variation of specified materials) which are known to be fully compatible with actual installation condition, as shown by manufacturer's published data or certification.

PROVIDE SIZE AND SHAPE of gaskets and preformed glazing units as shown, or if not shown, as recommended by manufacturer, either in published data or upon consultation with technical representative.

COLORS: Provide black or other natural color where no other color is available. Where material is not exposed to view, provide manufacturer's standard color which has the best overall performance characteristics for application shown.

**TWO-COMPONENT POLYSULFIDE GLAZING SEALANT:**

1. POLYSULFIDE-BASED, 2-PART ELASTOMERIC SEALANT, comply with FS TT-S-00227, Class A, Type 2 (non-sag); certified by manufacturer to be specifically compounded for glazing application, with sufficient resistance to UV deterioration to show no significant change for 20 years of normal glazing exposure to the sun.
2. ACCEPTABLE MANUFACTURER: Lasto-Meric; Tremco, Inc.
3. LOCATION: Use for cap bead on all sloped glazing.

**NONPOROUS BOND SILICONE RUBBER GLAZING SEALANT:**

1. ONE-PART ACID-TYPE SILICONE RUBBER ELASTOMERIC SEALANT, complying with FS TT-S-001543, Class A, non-sag, recommended by manufacturer for nonporous exterior joint surfaces and for glazing.
2. ACCEPTABLE MANUFACTURERS:
  - a. 781 Building Sealant; Dow Corning Corp.
  - b. Silicone Construction 1200 Sealant; General Electric Co.
  - c. Rhodorsil Sealant 3B; Rhodia Inc. Chemicals Div.
3. LOCATION: Use for all butt joints.

**PREFORMED BUTYL RUBBER GLAZING TAPE:**

1. PERFORMED RIBBON OR TAPE (coiled with release paper) of polymerized butyl (or mixture of butyl and polyisobutylene) with inert fillers (pigments), solvent-based with minimum 95% solids, non-sag consistency, tack-free time of 24 hours or less, paintable, non-staining, pre-shimming to prevent stretch (as required by Glazier to facilitate proper application and glass installation).
2. ACCEPTABLE MANUFACTURER: Polyshim Tape; Tremco, Inc.
3. LOCATION: Use for exterior glazing of glass in aluminum window wall and all interior glazing except wire glass.

**OLEO-RESINOUS GLAZING COMPOUND:**

1. OIL-BASED RESINOUS GLAZING COMPOUND recommended by the manufacturers specifically for glazing in the configuration indicated (either channel/stop or face glazing), non-staining, nonbleeding; and where used for face glazing, comply with FS TT-G-410.
2. LOCATION: Use for wire glass.

**GASKETS:**

1. REFER to Section 08 for gaskets part of aluminum window wall.

**MISCELLANEOUS GLAZING MATERIALS**

CHANNEL CLEANER: Use type compound recommended by sealant manufacturer for channel surfaces to be cleaned.

CHANNEL PRIMER/SEALER: Provide type of primer or sealer recommended by sealant manufacturer for application of sealant to channel surfaces.

SETTING BLOCKS: Neoprene or other resilient blocks of 70 to 90 Shore A durometer hardness, tested for compatibility with specified glazing sealants.

SPACERS: Neoprene or other resilient blocks of 40 to 50 Shore A durometer hardness, adhesively backed on one face only, tested for compatibility with specified glazing sealants.

COMPRESSIBLE FILLER ROD: Closed-cell or waterproof-jacketed foam of polyethylene, butyl rubber, neoprene, polyurethane, or vinyl tested for compatibility with specified glazing sealants of 5 to 10 psi compression strength (25% deflection) as recommended by sealant manufacturers for use in glazing channel to prevent sealant exudation from channel.

### **PART THREE - EXECUTION**

#### **INSPECTION**

EXISTING CONDITIONS: Examine framing and substrate work to receive glass and glazing materials and conditions under which glass is to be installed for conditions detrimental to proper completion of the work. Do not proceed with glazing until unsatisfactory conditions have been satisfactorily corrected. Installation of the glass work constitutes acceptance of existing conditions and preceding work.

#### **EXAMINATION**

VERIFY THAT OPENINGS for glazing are correctly sized and within tolerance and that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

1. REQUIRE GLAZIER TO INSPECT WORK of glass framing erector 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 joiners. 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.

#### **PERFORMANCE REQUIREMENTS**

WATERTIGHT AND AIRTIGHT INSTALLATION of each piece of glass is required, except as otherwise shown. Each installation must withstand normal temperature changes, wind loading, and impact loading (for operating sash and doors) without failure, including loss or breakage of glass, failure of sealants or gaskets to remain watertight and airtight, deterioration of glazing materials and other defects in the work.

PROTECT GLASS FROM EDGE DAMAGE during handling, installation and operation of building systems/equipment. Glass breakage during warranty period is a form of faulty materials or workmanship (resulting from edge damage) unless known to result from vandalism or other causes not related to materials and workmanship.

GLAZING CHANNEL DIMENSIONS as shown are intended to provide for necessary minimum fit on glass, minimum edge clearance, and adequate sealant thicknesses with reasonable tolerance. Glazier is responsible for correct glass size for each opening within tolerances and necessary dimensions established.

#### **PREPARATION**

CLEAN CONTACT surfaces with solvent and wipe dry.

#### **INSTALLATION**

COMPLY WITH combined installation recommendations of glass unit manufacturer, framing system manufacturers and sealant manufacturer.

##### GENERAL AND STANDARDS:

1. COMPLY WITH COMBINED RECOMMENDATIONS of glass manufacturer and manufacturer of sealants and other materials used in glazing, except where more stringent requirements are shown or specified.
2. UNIFY APPEARANCE of each series of lights by setting each piece to match others as nearly as possible. Inspect each piece and set with pattern, draw, and bow oriented in the same direction as other pieces.
3. INSPECT EACH PIECE of glass immediately before installation and eliminate pieces which have observable edge damage or face imperfections.

4. DO NOT ATTEMPT TO CUT, seam, nip or abrade glass which is tempered, heat strengthened, or coated.
5. CUT AND INSTALL COLORED (tinted) and heat absorbing glass as recommended in "Technical Services Report No. 104" (latest edition) by PPG Industries, or similar report by other glass manufacturer.
6. COMPLY WITH APPLICABLE PUBLICATIONS by Flat Glass Marketing Association, except as shown and specified otherwise, and except as specifically recommended otherwise by the manufacturers of the glass and glazing materials.

PREPARATION OF SUBSTRATE: Clean the glazing channel or other framing members to receive glass, immediately before glazing. Remove coatings which are not firmly bonded to the substrate. Remove lacquer from metal surfaces where elastomeric sealants are used.

1. APPLY PRIMER or sealant to joint surfaces where recommended by sealant manufacturer.

SEALANT/COMPOUND GLAZING:

1. INSTALL SETTING BLOCKS of proper size in sill rabbet, locate at one-fourth of glass width measured from each jamb. Set blocks in thin course of the heel-based compound if heel bead is to be installed.
2. PROVIDE SPACERS inside and out, and of proper size and spacing for glass sizes larger than 50 united inches, except where preshimmed tape or gaskets are used for glazing. Provide 1/8" minimum bite of spacers on glass and use thickness equal to sealant width, except with butyl rubber sealant tape use thickness 1/32" less than final compressed thickness of tape.
3. VOIDS AND FILLER RODS: Prevent exudation of sealant or compound by forming voids or installing filler rods in channels at heel of jambs and heads (do not leave voids in sill channels), except as otherwise indicated. In general, voids or filler rods are required for insulating glass and for laminated or colored glass (tinted, heat-absorbing and coated) larger than 75 united inches and for other glass more than 9/32" thick or larger than 120 united inches.
4. FORCE SEALANTS INTO CHANNEL to eliminate air pockets and voids (other than expansion voids), and to ensure complete "wetting" and bond of sealant to glass and channel surfaces.
5. TOOL EXPOSED SURFACES of glazing sealants and compounds to provide a substantial "wash" away from glass.
6. WHEN INSTALLING PROCESSED GLASS, exercise extraordinary care to avoid contact of glazing materials with processed surfaces, except where concealed in glazing channel. Use masking tape to ensure limitation of compounds to channel area.
7. CLEAN AND TRIM EXCESS glazing materials from glass and stops or frames promptly after installation, and eliminate stains and discolorations.

GASKETS AND TAPES: Miter cut and bond ends together at corners where gaskets are used for channel glazing so that gaskets will not pull away from corners and result in voids or leaks in glazing system.

1. INSTALL PRESSURIZED TAPES and gaskets to protrude slightly out of channel so as to eliminate dirt and moisture pockets. Trim to straight line as required.

## **CURE AND PROTECTION**

CURE GLAZING SEALANTS AND COMPOUNDS in compliance with manufacturer's instructions and recommendations to obtain high early bond strength, internal cohesive strength, and surface durability.

## **GLAZING - DRY METHOD (PREFORMED)**

CONFORM with framing manufacturer's recommendations.

CUT GLAZING TAPE to length; install on glazing pane. Seal corners by butting and sealing junctions with butyl sealant.

PLACE SETTING BLOCKS at 1/4 points with edge block no more than 6 inches from corners.

1. REST GLAZING on setting blocks and push against fixed stop with sufficient pressure to attain full contact.

INSTALL REMOVABLE STOPS without displacing glazing tape. Exert pressure for full continuous contact.

### **CLEANING**

REMOVE GLAZING materials from finish surfaces.

REMOVE LABELS after work is complete.

CLEAN GLASS and mirrors.

MAINTAIN GLASS in a reasonably clean condition during construction so that it will not be damaged by corrosive or erosive action and will not contribute (by wash-off) to deterioration of glazing materials and other work.

1. CLEAN GLASS in accordance with manufacturer's recommendations. Do not use abrasive materials. On glass, do not use broken razor blades for cleaning.

WASH AND POLISH GLASS on both faces not more than 4 days prior to Owner's acceptance of the work in each area. Comply with glass manufacturer's recommendations.

### **PROTECTION OF FINISHED WORK**

PROTECT FINISHED WORK

AFTER INSTALLATION, mark pane with an 'X' by using removable plastic tape or paste. Do not mark heat absorbing or reflective glass units.

PROVIDE PROTECTION OF GLASS and glazing sealants and compounds during construction period so that they will be without deterioration or damage (other than normal weathering) at time of Owner's acceptance.

1. FURNISH SPECIFIC INSTRUCTIONS to Contractor on precautions and provisions required to prevent glass damage resulting from the alkaline wash from green concrete surfaces and similar sources possible damage.
2. PROTECT EXTERIOR GLASS FROM BREAKAGE immediately upon installation by attachment of crossed streamers to framing held away from glass. Do not apply markers directly on surfaces of glass. Except as otherwise indicated, remove applied labels from glass surfaces immediately after glass installation.
3. REMOVE AND REPLACE GLASS WHICH IS BROKEN, chipped, cracked, abraded or damaged in other ways during the construction period, including pieces damaged through natural causes, accidents and vandalism.

### **SCHEDULE**

EXTERIOR GREENHOUSE

- |               |   |
|---------------|---|
| 1. WALL GLASS | Insulated, tempered (clear)               |
| 2. ROOF GLASS | Insulated, tempered and laminated (clear) |
| 3. DOOR GLASS | Single, safety (clear)                    |

END OF SECTION