SECTION 088853 - SECURITY GLAZING

1. GENERAL
   * + 1. RELATED WORK SPECIFIED ELSEWHERE
          1. Glazing: Section 088000.
          2. Plastic Glazing: Section 088400.
       2. REFERENCES
          1. American Society for Testing and Materials (ASTM), ASTM International, 100 Barr Harbor Dr., PO Box C700, West Conshohocken, PA, 19428-2959, www.astm.org
          2. H. P. White Laboratory, Inc., 3114 Scarboro Rd., Street, MD 21154-1822, www.hpwhite.com.

Retain paragraph below for sheet types S-3, S-5, or S-6 only (ballistics resistant).

* + - * 1. Underwriters Laboratories Inc., 333 Pfingsten Rd., Northbrook, IL 60062-2096, www.ul.com.
        2. Glass Association of North America, 2945 SW Wanamaker Dr., Suite A, Topeka, KS 66614-5321, www.glasswebsite.com.
        3. American Architectural Manufacturers Association, 1827 Walden Office Square, Suite 550, Schaumburg, IL 60173-4268, [www.aamanet.org](http://www.aamanet.org).
      1. DEFINITIONS

Edit paragraph below to include only types of security glazing selected.

* + - * 1. Sheet Materials: The term “Sheet Materials” as used in this Section refers to monolithic polycarbonate sheets, glass clad polycarbonate sheets, and laminated polycarbonate sheets specially fabricated for ballistics and/or forced-entry resistance.
      1. SUBMITTALS
         1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
         2. Manufacturer’s installation instructions shall be provided along with product data.
         3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
         4. Waiver of Submittals: The “Waiver of Certain Submittals Requirements” in Section 013300 does not apply to this Section.
         5. Product Data: Catalog sheets, specifications, glazing details, and installation instructions for each type of sheet materials, and glazing materials specified.

USE PARAGRAPH BELOW WITH EPD REQUIREMENT WHEN PROJECT ESTIMATE IS $1M OR MORE.

* + - * 1. Submit an Environmental Product Declaration (EPD) from the manufacturer for glass within this specification section, if available. A statement of the contractor’s good faith effort to obtain the EPD shall be provided if not available.

Manufacturer-provided EPDs must be Product Specific Type III (Third-Party Reviewed), in adherence with ISO 14025 *Environmental labels and declarations*, ISO 14044 *Environmental management – Life cycle assessment*, and ISO 21930 *Core rules for environmental product declarations of construction products and services.*

Retain paragraph below for large projects only.

* + - * 1. Samples:

Sheet Materials: 12 x 12 inch pieces for each type specified.

Setting blocks: Full size, not less than 4 inches long.

Glazing Tape: 4 inches long.

Color Samples for Glazing Materials: Manufacturer’s standard colors.

Spacer Shims: 4 inches long.

* + - * 1. Quality Control Submittals:

Certificate: Affidavit required under Quality Assurance Article.

Test Reports: Test data to substantiate sheet material assemblies compliance with the requirements of this Section. Retain subparagraph below for sheet types S-3, S-4, or S-10 only (glass clad polycarbonate).

Manufacturer’s Qualifications Data: Written certification that the manufacturer has been actively marketing security glazing materials for the past 3 years.

Installer’s Qualifications Data:

Name of each person who will be installing the Work of this Section and their employer’s name, business address and telephone number.

Names and addresses of 3 similar projects that each person has worked on during the past 5 years.

Compatibility: Written certification from sheet materials manufacturer that all proposed glazing materials are compatible with specified sheet material.

* + - * 1. Contract Closeout Submittals:

Maintenance Data: Deliver 2 copies, covering installed products, to the Director’s Representative.

Retain subparagraph below for sheet type S-1 only.

Warranty: Copy of specified Warranty.

* + - 1. QUALITY ASSURANCE
         1. Testing Laboratory: Independent testing laboratory with the test facilities, experience, and capability to demonstrate the proposed sheet material assemblies compliance with the requirements of this Section to the satisfaction of the Director.

Retain paragraph below for sheet types S-3, S-4, or S-10 only (glass clad polycarbonates).

* + - * 1. Certification: Affidavit by the sheet material manufacturer, certifying that chemically strengthened glass was cut to final size before treatment.
        2. Manufacturer’s Qualifications:

The manufacturer shall have been actively marketing security glazing materials in the United States for a minimum of 3 years.

The manufacturer shall have the technical expertise and qualified technical representatives to resolve questions or problems that may arise both during and after the Work is completed.

* + - * 1. Installer’s Qualifications: The persons installing the security glazing and their Supervisor shall be personally experienced in security glazing systems and shall have been regularly employed by a Company installing security glazing systems for a minimum of 5 years.
        2. Product Identification Labels:

Retain paragraph below for sheet types S-1, S-4, S-7, S-9 or S-10 only (forced entry resistant).

Identify each piece of forced entry resistant sheet material with a one inch high x 3 inches long self-adhesive transparent label, indicating the manufacturer and product name. Place the stencil on the glass, if applicable, readable from the secure side. Locate label in the upper right corner 2 inches from the top and side of the frame.

Retain paragraph below for sheet types S-3, S-5, or S-6 only (ballistics resistant).

Identify each piece of ballistics resistant sheet material with a permanent stencil indicating the manufacturer and applicable rating achieved when tested to UL 752. Place the stencil on the glass, if applicable, readable from the secure side. Locate label in the upper right corner 2 inches from the top and side of the frame.

Delete paragraph below if using sheet type S-1 only (no laminations).

* + - * 1. Laminated Glass Imperfections: Imperfections such as bubbles, blow-in, fuse, hair, lint, inside dirt (dirt spot), delamination, discoloration, short interlayer, unlaminated area chip, interlayer scuff, streak, scratches, will be cause for rejection of product. Comply with ASTM C-1349 for Glass Clad Polycarbonates

Delete paragraph below if using sheet type S-1 only (no laminations).

* + - * 1. Mismatch of Laminations:

Maximum Allowable Mismatch: 3/16 inches.

Length and Width Tolerances of Symmetrical Glass Clad Polycarbonate Laminates: Comply with ASTM C 1349, Table 2.

* + - 1. DELIVERY, STORAGE, AND HANDLING
         1. Deliver and store sheet material assemblies with manufacturer’s labels intact.
         2. Deliver exposed polycarbonate sheets with strippable water resistant protective masking intact. Do not capture protective masking in frame when installing sheet material. Protective masking to remain intact during installation. Where sheet material is in direct sunlight, remove protective masking.
         3. Protect sheet material assemblies from damage during handling, storage, and installation.
      2. PROJECT CONDITIONS
         1. Environmental Requirements: Comply with glazing materials manufacturer’s printed recommendations regarding environmental conditions under which glazing materials can be installed.

Retain article below for sheet type S-1 only.

* + - 1. WARRANTY
         1. Special Warranty: The one-year period required by Paragraph 9.8 of the General Conditions is extended to 2 years for Type S-1 Glass. Refer to Supplementary Conditions.
         2. Manufacturer’s Warranties: In addition to the 2-year period specified above, furnish Type S-1 glass manufacturer’s warranties as follows:

Ten-year warranty against breakage or coating failure.

Ten-year warranty against excessive yellowing (ASTM D 1925; less than 5.0 after 3 years and less than 10.0 after 10 years as measured with a Gardner Colorimeter).

Ten-year warranty against excessive light transmission loss. ASTM D 1003, not more than 3 percent decrease after 3 years, and not more than 7 percent decrease after 10 years.

Retain article below with sheet type S-4 only. Glass clad polycarbonates have long lead times for replacement units. Verify with client if extra material is required and storage space is available. Quantity of replacement material should be modified to reflect a reasonable percentage of the total project.

* + - 1. MAINTENANCE
         1. Extra Material: Furnish 5 percent (minimum of one piece) of each size of Type S-4 Sheet required for the Project. Deliver in the manufacturer’s original container labeled with the size and location to be used. Store at the Site where directed.

1. PRODUCTS

Edit article below to include only the companies that produce the type of security sheet you specified below. Products and company names are listed at the end of each sheet type.

* + - 1. COMPANIES
         1. SABIC Innovative Plastics, Structured Products Department, One Plastics Ave., Pittsfield, MA 01201-3662, (800) 451-3147, www.geplastics.com.
         2. Global Security Glazing, 616 Selfield Rd., Selma, AL 36703-8702, (800) 633-2513, www.security-glazing.com.
         3. Standard Bent Glass Corporation, P.O. Box 469, Butler, PA 16003-0469, (800) 634-9252, www.standardbent.com.
         4. Oldcastle Glass, 375 East Church Ave., Telford, PA 18969-1003, (800) 750-3497, [www.oldcastleglass.com](http://www.oldcastleglass.com).
         5. Sheffield Plastics, Inc., 119 Salisbury Rd., Sheffield, MA 01257-9706, (800) 628-5084, [www.sheffieldplastics.com](http://www.sheffieldplastics.com).
         6. North American Specialty Glass, LLC, 2175 Kumry Rd., PO Box 70, Trumbauersville, PA 18970-0070, (888) 785-5962, www.naspecialtyglass.com.
         7. Dlubak Corporation, 520 Chestnut Street, Blairsville, PA 15717, (800) 336-0562, www.dlubakglass.com

Use below only with type S-7 sheet.

* + - * 1. The Rector Seal Co., 2601 Spenwick Dr., Houston, TX 77055-1035, (800) 231-3345, www.rectorseal.com.
      1. MATERIALS

Retain paragraph below for sheet types S-3, S-4, or S-10 (glass clad polycarbonate).

* + - * 1. Chemically Strengthened Float Glass: ASTM C 1036, Type I (transparent glass, flat), Class 1 (clear), quality Q3 (glazing select), chemically tempered. Modulus of Rupture 30,000 psi. Cut chemically strengthened glass to final size and seam edges before treatment.
        2. Polycarbonate: Extruded polycarbonate, UV stabilized, mar-resistant surface coating, smoke density rating less than 75, ASTM D 2843; extent of burning characteristics less than one inch when tested in accordance with ASTM D 635.

Retain paragraph below for sheet type S-10 sheet only.

* + - * 1. Tempered Float Glass (Type S-10 only); ASTM C 1048, Kind FT, Condition A, Type I, Class 1, tempered by the manufacturer’s standard process after cutting to final size.

Edit 3 paragraphs below for type of sheet specified.

* + - * 1. Interlayer For Laminating Polycarbonate to Glass: Polyurethane, as recommended by the sheet manufacturer, specifically designed for lamination, with demonstrated long-term ability to maintain physical and visual properties under installed conditions.
        2. Interlayer for Laminating Polycarbonate to Polycarbonate: Polyurethane as recommended by the sheet manufacturer, or clear siloxan/polycarbonate copolymer resin, not to exceed 15 mils thick.

Laminated glass is generally available in 3’-0” x 8’-0”, 4’-0” x 8’-0”, or 5’-0”x 8’-0” sheets. To economize the use of this material, design your window sizes accordingly.

* + - * 1. Interlayer for Laminating Glass to Glass: Polyvinyl butyral interlayer specifically designed for lamination, with demonstrated long-term ability to maintain physical and visual properties under installed conditions.

Before selecting security sheet type, review with the client the potential threat (forced entry, or ballistics), what asset is being protected (property or lives), and the level of protection required.

* + - 1. FORCED ENTRY RESISTANT SECURITY GLAZING TYPES

Type S-1 sheet is primarily used in the Office of Mental Health’s security windows. The special 10-year warranty extension from the manufacturer is exclusively for OMH.

* + - * 1. Type S-1 Sheet:

Monolithic Polycarbonate.

Forced Entry Resistance: H.P. White TP-0500.01 Level l, or ASTM F 1233 Class II, (Step 5).

Overall Nominal Thickness: 1/2 inch.

Color: Clear.

Ripple Pattern: Horizontal.

Products:

Lexan MR 10 by SABIC Innovative Plastics.

Makrolon AR by Sheffield Plastics.

Type S-4 sheet is primarily used in Correctional Facilities for cell windows, and rear cell doors to recreation yards.

* + - * 1. Type S-4 Sheet:

Glass Clad Polycarbonate Laminate Sheet: Chemically strengthened clear glass laminated to each side of a polycarbonate core, fabricated to produce the required forced entry resistance listed below.

Forced Entry Resistance: H.P. White TP-0500.01 Level 1, or ASTM F1915 Grade 4.

Overall Nominal Thickness: 9/16 inch.

Color: Clear.

Products:

Secure-Tem + Poly 2117 by Global Security Glazing.

ICGCP 916 CS by Standard Bent Glass.

9/16” ArmorProtectPlus by Oldcastle Glass.

D-FenceGlas DFG 9/16 by North American Specialty Glass.

DGCP562 by Dlubak Corp.

Type S-9 sheet is primarily used in Correctional Facilities for control rooms in special housing units, inmate waiting areas, isolation rooms, infirmary bed rooms, and control rooms in regional medical units.

* + - * 1. Type S-9 Sheet:

Laminated Polycarbonate Sheet: Multiple layers of polycarbonate fabricated to produce the required forced entry resistance listed below.

Forced Entry Resistance: H.P. White TP-0500.01 Level II minimum Step 12, or ASTM F 1233 Class III minimum Step 15, or ASTM F1915 Grade 2.

Overall Nominal Thickness: 1/2 inch.

Color: Clear.

Products:

Lexgard MPC-500 by Standard Bent Glass.

ArmorProtectMax500 by Oldcastle Glass.

Makrolon Hygard CG500 by Sheffield Plastics.

DLP 500 by Dlubak Corp.

* + - 1. BALLISTIC RESISTANT SECURITY GLAZING TYPES

Type S-3 sheet is primarily used in Correctional Facilities for control towers. UL will not allow glazing under 12 x 12 inches to carry the UL label.

* + - * 1. Type S-3 Sheet:

Glass Clad Polycarbonate Laminate Sheet: Multiple layers of clear annealed glass laminated to polycarbonate, fabricated to produce the required ballistic resistance listed below.

No Spall: Assembly to have glass plies on the attack side of the unit and single or multiple plies of polycarbonate on the witness side.

Ballistic Resistance: UL 752 Level 4 - High Power Rifle (.30-06 Rifle).

Overall Nominal Thickness: 1-5/16 inch.

Products:

Secure-Tem + Poly SP 246 by Global Security Glazing.

Armor-Gard BALULN 31 by Standard Bent Glass.

DBP04 by Dlubak Corp.

* + - 1. BALLISTIC AND FORCED ENTRY RESISTANT SECURITY GLAZING TYPES

Type S-5 sheet is primarily used in Correctional Facilities for control rooms in administration buildings.

* + - * 1. Type S-5 Sheet:

Laminated Polycarbonate Sheet: Multiple layers of polycarbonate laminated together, fabricated to produce the required ballistic and forced entry resistance listed below.

Ballistic Resistance: UL 752 minimum Level 2, High Power Small Arms (.357 Magnum Handgun) or HP White TP-0500.03 Level B Ballistics (.357 Magnum modified) no spall.

Forced Entry Resistance: H.P. White TP-0500.01 Level V minimum Step 42, or H.P. White TP-0500.03 Level IV, or ASTM F 1233 Class V minimum Step.40.

Overall Nominal Thickness: 1 inch.

Color: Clear.

Products:

Lexgard MP 1000 by Standard Bent Glass.

ArmorProtectMax1000 by Oldcastle Glass.

Makrolon Hygard BR1000 (Level V minimum Step 42) by Sheffield Plastics.

DLP 1000 by Dlubak Corp.

Type S-6 sheet is primarily used in Correctional Facilities for control rooms in administration buildings.

* + - * 1. Type S-6 Sheet:

Laminated Polycarbonate Sheet: Multiple layers of polycarbonate laminated together, fabricated to produce the required ballistic and forced entry resistance listed below.

Ballistic Resistance: UL 752 Level 3- Super Power Small Arms (.44 Magnum).

Forced Entry Resistance: H.P. White TP-0500.01 Level V minimum Step 53, or H.P. White TP-0500.03 Level V Step 44, or ASTM F1233 Class V minimum Step 38 or ASTM F1915.

Overall Nominal Thickness: 1-1/4 inch.

Color: Clear.

Products:

Lexgard SP 1250 by Standard Bent Glass.

ArmorProtectMax1250 by Oldcastle Glass.

Makrolon Hygard BR1250 by Sheffield Plastics.

DLP 1250 by Dlubak Corp.

* + - 1. FIRE RESISTANT, FORCED ENTRY RESISTANT SECURITY GLAZING

Type S-7 sheet 45 minute is primarily used in vision panels of fire rated door assemblies. 1” stop height is required. Type S-7 has been tested to ul10b (negative pressure requirements), but not to ul10c (positive pressure requirements). Consult manufacturer’s literature for size limitations.

* + - * 1. Type S-7 Sheet:

Glass Clad Polycarbonate Laminate Sheet: Wire glass laminated to each side of a polycarbonate core, fabricated to produce the required fire and forced entry resistance listed below.

Wire Pattern: Square or Diamond. Wires to be aligned from one sheet to the other when viewed at 90 degrees perpendicular to the glass.

Fire Resistance: Passes UL - 9 with hose stream for a 45-minute fire resistance rating.

Forced Entry Resistance: H.P. White TP-0500.01 Level 1.

Overall Nominal Thickness: 7/8 inch.

Products:

Inferno-Lite FRP 4510 by Global Security Glazing.

Firegard ICGCP 916WW by Standard Bent Glass.

* + - 1. INSULATING FORCED ENTRY RESISTANT SECURITY GLAZING TYPES

Type S-10 sheet is primarily used in Correctional Facilities for exterior glazing.

* + - * 1. Type S-10 Sheet:

Organically Sealed Insulating Units: Manufacturer’s standard edge construction of spacers and sealant permanently bonded to glass surfaces and hermetically sealed with secondary sealant to provide a dehydrated air space 1/2 inch thick with -60 degrees F dew point.

Glass Clad Polycarbonate Laminate Sheet: Chemically strengthened clear glass laminated to each side of a polycarbonate core, fabricated to produce the required forced entry resistance listed below.

Forced Entry Resistance: H.P. White TP-0500.01 Level 1 or ASTM F1915 Grade 4.

Overall Nominal Thickness: 9/16 inch.

Products:

Secure-Tem + Poly 2117 by Global Security Glazing.

ICGCP 916 CS by Standard Bent Glass.

9/16” ArmorProtectPlus by Oldcastle Glass.

D-FenceGlas DFG 9/16 by North American Specialty Glass.

DGCP562 by Dlubak Corp.

Tempered Float Glass; ASTM C 1048, Kind FT, Condition A, Type I, Class 1, tempered by the manufacturer’s standard process.

Nominal Thickness: 1/4 inch.

Cut glass to final size before tempering.

Overall Nominal Thickness of Sealed Unit: 1-5/16 inches.

* + - 1. GLAZING MATERIALS

Setting blocks are required for setting glass clad polycarbonates. They are optional for setting laminated polycarbonates, however, some manufacturers recommend using them to prevent the laminate from sitting on the bottom of the channel with potential damage to the interlayer from moisture or cleaning agents that migrate through the sealant and accumulate in the channel.

* + - * 1. Setting Blocks: Comply with ASTM C 864, Shore A durometer hardness of 85 +/- 5 percent ASTM Test Method D 2240. Provide compatible setting blocks specifically recommended by the by the sheet material manufacturer for use with sheet materials and glazing materials used.
        2. Spacer Shims: Shore A durometer hardness of 50 to 60 ASTM Test Method D 2240. Provide compatible spacer shims of material, size, and shape specifically recommended by the sheet material manufacturer for the materials used.

Both glazing tape and glazing sealant below are required for proper installation of security sheet types, (except type S-7 sheet).

* + - * 1. Glazing Tape: Preformed, 100 percent solid, butyl-based elastomeric tape or ribbon (coiled on release paper), non-staining and non-migrating, with continuous built-in shim (pre-shimmed), if recommended in writing by the glazing manufacturer for the application indicated, comply with AAMA 800.
        2. Glazing Sealant: Silicone, ASTM C 920, Type S, Grade NS, Class 25, Use G. Verify compatibility of sealant with sheet material other glazing materials, and frame with sealant manufacturer.

Use below only with type S-7 sheet.

* + - * 1. Glazing Material for Type S-7 Sheet: Metacaulk 950 by The Rector Seal Co.

Use below only with type S-10 sheet in fixed windows that do not have removable stops at the sill and head. Silicone sealant specified above is required as a cap bead.

* + - * 1. Glazing for Type S-10 Sheet in Fixed Windows: Extruded, closed-cell neoprene sponge, shape and density as required to maintain seal, provide manufacturer’s recommended adhesive.
        2. Sealant Colors: For exposed materials provide color as indicated or, if not indicated, as selected by the Director from the manufacturer’s standard colors. For concealed materials, provide any of the manufacturer’s standard colors.

Delete last 3 words in paragraph below if polycarbonate is not specified.

* + - * 1. Cleaners, Primers, and Sealers: Types recommended by glazing material manufacturer, compatible with polycarbonate.

1. EXECUTION
   * + 1. EXAMINATION
          1. Examine glazing channels and stops for defects that will prevent satisfactory installation of sheet glazing system. Report unsatisfactory conditions to the Director in writing. Do not proceed with installation until unsatisfactory conditions have been corrected.
          2. Inspect each piece of sheet material immediately before installation. Remove from the Site pieces that have observable damage or face imperfections.
       2. PREPARATION
          1. Remove coatings that are not firmly bonded to the substrate.
          2. Clean the glazing channel, and other framing members to receive sheet material, immediately before glazing.

Delete paragraph below if polycarbonate is not specified.

* + - * 1. Immediately prior to installation, peel back factory applied protective masking only to a dimension sufficient for edge engagement. Do not totally remove masking from sheet.
      1. INSTALLATION
         1. Each installation shall withstand normal temperature changes without sheet material delamination, failure of glazing materials to remain watertight and airtight, deterioration of glazing materials and other defects in the work.
         2. Install sheet and glazing material in accordance with the recommend standards detailed in the “Glazing Manual” of the Glass Association of North America except as indicated and specified otherwise, and except as specifically recommended otherwise by the manufacturers of the sheet material and glazing materials.
         3. Primer: Apply primer to surfaces when recommended by glazing material manufacturer.
         4. Setting Blocks:

Install a minimum of 2 identical setting blocks sized to provide 0.1 inch long for each square foot of sheet material area but not less than 4 inches long.

Height of setting blocks to provide the recommended nominal bite and minimum edge clearance for the security glazing used.

Width as required providing proper support of sheet materials but allowing water passage to weep holes.

Install at quarter points in heal bead of sealant, do not block weeps.

* + - * 1. Glazing Tape:

Cut glazing tape to proper length prior to application. Install strips in 4 separate sections. Do not run continuously around corners.

Install tape continuously against permanent stop 3/16 to 1/4 inch below sightline. Do not permit gaps or joints in tape except at corners. Do not lap adjoining lengths of tape. Miter or butt ends of tape at corners and seal with compatible sealant.

Use below only with type S-10 sheet in fixed windows that do not have removable stops at the sill and head. Also, retain the installation procedures specified for setting blocks, sheet type, spacer shims, and glazing sealant.

* + - * 1. Glazing for Type S-10 Sheet in Fixed Windows: Install closed cell sponge in accordance with manufacturer’s printed recommendations.
        2. Sheet Glazing: Set sheet material on setting blocks and press against tape with sufficient pressure to ensure full contact and adhesion at perimeter. Install removable stop.
        3. Spacer Shims: Insert continuous spacer shims between sheet material and applied stop to keep sheet in compression against tape, do not displace glazing tape. Install shims in 4 separate sections. Do not run continuously around corners or come in contact with sheet material cut edges.
        4. Glazing Sealant:

Install continuous cap bead on both sides of sheet material.

Force sealant into channel to eliminate air pockets and voids and to ensure a complete bond of sealant to sheet material and framing.

Tool exposed surfaces of sealant eliminate air pockets and to provide a substantial “wash” away from sheet material.

Clean off excess sealant as work progresses using methods that will not damage sheet or glazing material.

Cure glazing materials in accordance with manufacturer’s instructions and recommendations, to obtain high early bond strength, internal cohesive strength, and surface durability.

Use below only with type S-7 sheet.

* + - * 1. Glazing for Type S-7 Sheet: Install Glazing Materials in accordance with manufacturer’s printed recommendations.
      1. PROTECTION AND CLEANING
         1. Remove factory installed protective masking from sheet that is in high humidity or direct sunlight immediately after installation. Prolonged exposure can make removal of masking difficult.
         2. Mark glazed openings immediately upon installation of sheet material by attaching crossed streamers to framing. Do not apply markers of any type to surfaces of sheet material.
         3. Protect exposed surfaces of polycarbonate from construction operations with temporary covering. Do not apply tape to sheet material.
         4. Replace sheet material included in the Work that is broken or otherwise damaged from the time Work is started at the site until the date of physical completion.
         5. Maintain sheet material in a reasonably clean condition until the date of physical completion.
         6. Clean and trim excess glazing material from the sheet material and stops or frames promptly after installation.
         7. When directed, or just before the project is turned over to the State, remove temporary covering, dirt and other foreign material from both surfaces of sheet material installed under this Contract, and clean sheet material on both sides.

END OF SECTION 088853