SECTION 08 80 00
GLAZING

SPEC WRITER NOTES:
1. Delete between // ---- // if not applicable to project.
2. Also delete any other item or paragraph not applicable in section and renumber paragraph.
3. Coordinate with other sections to specify type of glazing required.
5. See VA Architectural Design Guides for VA criteria on windows.
6. Determine design loads on glazing required by building code. Specify glazing to meet design loads.

PART 1 - GENERAL

1.1 DESCRIPTION
This section specifies glass, plastic, related glazing materials and accessories. Glazing products specified apply to factory or field glazed items.

1.2 RELATED WORK

A. Factory glazed by manufacturer in following units:
   1. Sound resistant doors: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES, and Section 08 14 00, WOOD DOORS.
   2. Revolving doors: Section 08 42 33, REVOLVING DOOR ENTRNCES.
   3. Forced Entry (FE) resistant and Ballistic Resistance (BR) rated glazing and frames: 08 56 53 SECURITY WINDOWS
   4. Mirrors: Section 10 28 00, TOILET, BATH, AND LAUNDRY ACCESSORIES.
   5. Bullet resisting glass: Section 08 56 59, SERVICE AND TELLER WINDOW UNITS.
   6. Lead glass: Section 13 49 00, RADIATION PROTECTION.
   7. Section 08 51 13, ALUMINUM WINDOWS (Single // Double // Triple // Hung).
   8. Section 08 51 13.11, SIDE HINGED ALUMINUM WINDOWS (Double Glazed).
   9. Section 08 44 13, GLAZED ALUMINUM CURTAIN WALLS.
  10. Section 08 56 53 SECURITY WINDOWS.
11. Color of spandrel glass, tinted (heat absorbing or light reducing) glass, and reflective (metallic coated) glass: Section 09 06 00, SCHEDULE FOR FINISHES.
12. Forced Entry (FE) resistant and Ballistic Resistance (BR) rated doors and frames: Section 08 34 53, SECURITY DOORS AND FRAMES.
13. Section 28 13 11, PHYSICAL ACCESS CONTROL SYSTEMS.
14. Section 28 16 11, INTRUSION DETECTION SYSTEM.

1.3 LABELS

A. Temporary labels:

1. Provide temporary label on each light of glass // and plastic material // identifying manufacturer or brand and glass type, quality and nominal thickness.
2. Label in accordance with NFRC (National Fenestration Rating Council) label requirements.
3. Temporary labels shall remain intact until glass // and plastic material // is approved by Resident Engineer.

B. Permanent labels:

1. Locate in corner for each pane.
2. Label in accordance with ANSI Z97.1 and SGCC (Safety Glass Certification Council) label requirements.
   a. Tempered glass.
   b. Laminated glass or have certificate for panes without permanent label.
   c. Organic coated glass.
3. Bullet resistance glass or plastic assemblies:
   a. Bullet resistance glass or plastic assemblies in accordance with UL 752 requirements for power rating specified.
   b. Identify each security glazing permanently with glazing manufacturer's name, date of manufacture, product number, and DOS Code number inconspicuously located in lower corner on protective side and visible after glazing is framed.
   c. The "attack (threat) side" shall be identified in bold lettering on each side of glazing with removable label.

1.4 PERFORMANCE REQUIREMENTS

A. Building Enclosure Vapor Retarder and Air Barrier:

1. Utilize the inner pane of multiple pane sealed units for the continuity of the air barrier and vapor retarder seal.
2. Maintain a continuous air barrier and vapor retarder throughout the glazed assembly from glass pane to heel bead of glazing sealant.

   SPEC WRITER NOTE: Verify that local authorities have adopted (and that their own requirements do not exceed) ASCE 7 (American Society of Civil Engineers). List local requirements where more stringent.

B. Glass Thickness:

1. Select thickness of exterior glass to withstand dead loads and wind loads acting normal to plane of glass at design pressures calculated in accordance with // ASCE 7 // applicable // code.
2. Test in accordance with ASTM E 1300.
3. Thicknesses listed are minimum. Coordinate thicknesses with framing system manufacturers.

C. Bullet resistance glass or plastic assemblies:

1. For blast resistant windows follow Unified Facilities Criteria, DOD Minimum Antiterrorism Standards for Buildings UFC4-010-01.
2. Spall Resistance: Laminated glazing shall not produce spall to interior (protected side) when impacted with scheduled ballistics.
3. Tolerances: Outside dimensions: Overall outside dimensions (height and width) of laminated security glazing shall maintain tolerance of ± 3 mm.
4. Warpage: Out-of-flat (warpage or bowing) condition of laminates shall not exceed 2.5 mm per lineal meter. The condition, if present, shall be localized to extent not greater than 0.75 mm for any 0.3 meter section.

1.5 SUBMITTALS

   SPEC WRITER NOTE: List below items intended for use in project, necessary for review prior to manufacture. Refer to Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES for submittal requirements. Include additional submittal requirements for items specified.

A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
B. Manufacturer's Certificates:
1. Certificates stating that wire glass, meets requirements for safety glazing material as specified in ANSI Z97.1.
2. Certificate on shading coefficient.
3. Certificate on "R" value when value is specified.
4. Certificate test reports confirming compliance’s with specified bullet resistant rating.
5. Certificate that blast resistant glass meets the requirements of UFC4-010-01.

C. Warranty: Submit written guaranty, conforming to General Condition requirements, and to “Warranty of Construction” Article in this Section.

D. Manufacturer's Literature and Data:
   1. Glass, each kind required.
   2. Insulating glass units.
   3. Transparent (one-way vision glass) mirrors.
   4. Elastic compound for metal sash glazing.
   5. Putty, for wood sash glazing.
   7. Sealing compound.
   8. Bullet resistant material.
   9. Plastic glazing material, each type required.

E. Samples:
   1. Size: 150 mm by 150 mm (6 inches by 6 inches).
   2. Tinted glass.
   3. Reflective glass.
   4. Transparent (one-way vision glass) mirrors.

F. Preconstruction Adhesion and Compatibility Test Report: Submit glazing sealant manufacturer’s test report indicating glazing sealants were tested for adhesion to glass and glazing channel substrates and for compatibility with glass and other glazing materials.

1.6 DELIVERY, STORAGE AND HANDLING

A. Delivery: Schedule delivery to coincide with glazing schedules so minimum handling of crates is required. Do not open crates except as required for inspection for shipping damage.

B. Storage: Store cases according to printed instructions on case, in areas least subject to traffic or falling objects. Keep storage area clean and dry.
C. Handling: Unpack cases following printed instructions on case. Stack individual windows on edge leaned slightly against upright supports with separators between each.

D. Protect laminated security glazing units against face and edge damage during entire sequence of fabrication, handling, and delivery to installation location. Provide protective covering on exposed faces of glazing plastics, and mark inside as "INTERIOR FACE" or "PROTECTED FACE":

1. Treat security glazing as fragile merchandise, and packaged and shipped in export wood cases with width end in upright position and blocked together in a mass. Storage and handling shall comply with Manufacturer's directions and as required to prevent edge damage or other damage to glazing resulting from effects of moisture, condensation, temperature changes, direct exposure to sun, other environmental conditions, and contact with chemical solvents.

2. Protect sealed-air-space insulating glazing units from exposure to abnormal pressure changes, as could result from substantial changes in altitude during delivery by air freight. Provide temporary breather tubes which do not nullify applicable warranties on hermetic seals.

3. Temporary protections: The glass front and polycarbonate back of glazing shall be temporarily protected with compatible, peelable, heat-resistant film which will be peeled for inspections and reapplied and finally removed after doors and windows are installed at destination. Since many adhesives will attack polycarbonate, the film used on exposed polycarbonate surfaces shall be approved and applied by manufacturer.

4. Edge protection: To cushion and protect glass clad, polycarbonate, and Noviflex edges from contamination or foreign matter, the four edges shall be sealed the depth of glazing with continuous standard-thickness Santoprene tape. Alternatively, continuous channel shaped extrusion of Santoprene shall be used, with flanges extending into face sides of glazing.

5. Protect "Constant Temperature" units including every unit where glass sheet is directly laminated to or directly sealed with metal-tube type spacer bar to polycarbonate sheet, from exposures to ambient temperatures outside the range of 16 to 24 C, during the
fabricating, handling, shipping, storing, installation, and subsequent protection of glazing.

1.7 PROJECT CONDITIONS

Field Measurements: Field measure openings before ordering tempered glass products. Be responsible for proper fit of field measured products.

1.8 WARRANTY

A. Warranty: Conform to terms of "Warranty of Construction", FAR clause 52.246-21, except extend warranty period for the following:
1. Bullet resistive plastic material to remain visibly clear without discoloration for 10 years.
2. Insulating glass units to remain sealed for 10 years.
3. Laminated glass units to remain laminated for 5 years.
4. Polycarbonate to remain clear and ultraviolet light stabilized for 5 years.
5. Insulating plastic to not have more than 6 percent decrease in light transmission and be ultraviolet light stabilized for 10 years.

1.9 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
B. American National Standards Institute (ANSI):
   Z97.1-09 ............... Safety Glazing Material Used in Building - Safety Performance Specifications and Methods of Test.
C. American Society for Testing and Materials (ASTM):
   C542-05 ............... Lock-Strip Gaskets
   C716-06 ............... Installing Lock-Strip Gaskets and Infill Glazing Materials.
   C794-10 ............... Adhesion-in-Peel of Elastomeric Joint Sealants
   C864-05 ............... Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers
   C920-11 ............... Elastomeric Joint Sealants
   C964-07 ............... Standard Guide for Lock-Strip Gasket Glazing
   C1036-06 ............... Flat Glass
   C1048-12 ............... Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass.
C1376-10 .............. Pyrolytic and Vacuum Deposition Coatings on Flat Glass
D635-10 .............. Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastic in a Horizontal Position
D4802-10 .............. Poly (Methyl Methacrylate) Acrylic Plastic Sheet
E84-10 .............. Surface Burning Characteristics of Building Materials
E119-10 .............. Standard Test Methods for Fire Test of Building Construction and Material
E2190-10 .............. Insulating Glass Unit

D. Commercial Item Description (CID):
   A-A-59502 .............. Plastic Sheet, Polycarbonate


F. National Fire Protection Association (NFPA):
   80-13 .............. Fire Doors and Windows.
   252-12 .............. Standard Method of Fire Test of Door Assemblies
   257-12 .............. Standard on Fire Test for Window and Glass Block Assemblies

G. National Fenestration Rating Council (NFRC)

H. Safety Glazing Certification Council (SGCC) 2012:
   Certified Products Directory (Issued Semi-Annually).

I. Underwriters Laboratories, Inc. (UL):
   752-11 .............. Bullet-Resisting Equipment.

J. Unified Facilities Criteria (UFC):
   4-010-01-2012 .......... DOD Minimum Antiterrorism Standards for Buildings

K. Glass Association of North America (GANA):
   Glazing Manual (Latest Edition)
   Sealant Manual (2009)

L. American Society of Civil Engineers (ASCE):
   ASCE 7-10 .............. Wind Load Provisions

PART 2 – PRODUCT

SPEC WRITER NOTES:
1. Refer to glass manufacturers’ literature for structural properties.
2. Specify glass by thickness and ASTM designations and supplement standard for additional properties. Refer to information following end of section for guides to ASTM C 1036 and C 1048 designations.
3. Establish and coordinate glass types to identify glass or glazing assemblies on drawings, preferably on exterior elevations for exterior windows.
4. Coordinate to retain glass types required with glazing assemblies.

2.1 GLASS

A. Use thickness stated unless specified otherwise in assemblies.

SPEC WRITER NOTE: Usually specify quality q3; use q4 for general glazing applications.

B. Clear Glass:

1. ASTM C1036, Type I, Class 1, Quality // q3 // // q4 //.
2. Thickness, // 6 mm (1/4 inch) // // as indicated //.

SPEC WRITER NOTES:
1. Select tint color from manufacturers’ data and samples.
2. Note that varying thicknesses of tinted or heat absorbing glass exhibit different color shades of the same tint.

C. Tinted Heat reflective and low emissivity coated glass:

1. ASTM C1036, Type I, Class 2, Quality q3.
2. Color:
3. Thickness, // 6 mm (1/4 inch) // // as indicated //.

SPEC WRITER NOTE: Specify m1 where fire-protection rating is required.

D. Patterned and Wired Flat Glass:

1. ASTM C1036, Type II, Class 1, Form 1, Pattern P1, Finish F1, Quality // Q5 // // Q6 //, Mesh // m1 // // m2 //.
2. Thickness, // 6 mm (1/4 inch) // // as indicated //.

2.2 HEAT-TREATED GLASS

SPEC WRITER NOTES:
1. Specify heat strengthened and fully tempered glass by thickness and ASTM C 1048 designations, and supplement standard for additional properties. Refer to information following end of
section for guides to ASTM C 1036 and C 1048 designations.
2. Do not use heat strengthened glass where compliance with ANSI Z97.1 or CFR 16CFR1201 is required except with manufacturer’s written documentation of compliance.
3. Coordinate color/tint/coating to accommodate required security monitoring.

A. Clear Heat Strengthened Glass:
   1. ASTM C1048, Kind HS, Condition A, Type I, Class 1, Quality q3.
   2. Thickness, // 3 mm (1/8 inch) // // 6 mm (1/4 inch) // // as indicated //.

SPEC WRITER NOTES:
   1. Use heat strengthened below for tinted glass on exterior panes when fully tempered tinted glass is not used.
   2. Specify tint color as selected from manufacturers’ data and samples.

B. Tinted Heat Strengthened Glass:
   1. ASTM C1048, Kind HS, Condition A, Type I, Class 2, Quality q3.
   2. Color: ___.
   3. Thickness, // 6 mm (1/4 inch) // // as indicated //.

C. Clear Tempered Glass:
   1. ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality q3.
   2. Thickness, // 6 mm (1/4 inch) // // as indicated //.

D. Tinted Tempered Glass:
   1. ASTM C1048, Kind FT, Condition A, Type I, Class 2, Quality q3.
   2. Color: ___
   3. Thickness, // 6 mm (1/4 inch) // // as indicated //.

SPEC WRITER NOTES:
   1. Use either pattern p1 (linear), p2 (Geometric), p3 (Random) or p4 (Special). Define special pattern.
   2. Use ASTM C1048, Kind FT for tempered.
   3. Laminate pattern glass if additional strength is needed for size of opening.
   4. See laminated glass article for other obscure options.

E. Tempered Patterned Glass (obscure):
   1. ASTM C1048, Kind FT, Type II, Class 1, Form 3, Quality q8, Finish f1, Pattern p3.
   2. Thickness // 10.7 mm (0.422 inch) // // as indicated //.
2.3 COATED GLASS

SPEC WRITER NOTE:
1. Glass may be coated by pyrolytic or sputtering (vacuum) process per ASTM C1376
2. Solar-reflective metallic-oxide pyrolytic coatings are applied to hot glass during manufacture. This results in a more scratch-resistant coating. Pyrolytic coatings may be applied on the first (exterior) surface, where they can reflect heat before it is absorbed by glass; such applications may avoid need for heat-treatment, but mirror-like appearance may not be acceptable. Colors are generally limited to silver, pewter, and gold. Pyrolytic coated glass may be heat treated after coating.
3. Metallic-oxide or metallic-nitride sputter coatings are applied after manufacture and heat-treatment. It is normally applied to second and third surfaces of laminated and insulating glass, where it is protected from scratching. Some manufacturers will allow use of stainless steel, chrome, and titanium-based coatings on the second surface of monolithic glass. Sputter coating offers a broader color range.
4. See laminated and insulating glass articles for location of coated surfaces in these assemblies.
5. See information following end of Section for Conditions applying to C1048.
6. See ceramic-coated spandrel glass and laminated glass article for other spandrel options.
7. Coordinate color/tint/coating to accommodate required security monitoring.

A. Spandrel Glass:
   1. ASTM C1048, Kind HS, Condition B, Type I.
   2. Thickness, // 6 mm (1/4 inch) // // as indicated //.

B. Reflective Tempered Glass:
   1. ASTM C1048, Kind FT, Condition C, Type I, Class 1, Quality q3 with reflective metallic coating, having nominal values of 25 percent day
light, 30 percent solar, and 7.9 percent ultraviolet transmittance within three percent plus or minus.

2. Thickness, // 6 mm (1/4 inch) // // as indicated //.

SPEC WRITER NOTES:
Low E Glass:
1. Standard thicknesses available are 3, 4, and 4.8 mm (1/8, 5/32 and 3/16 inch) nominal thickness.
2. Use 4.8 mm (3/16 inch) thick for most lights. This will restrict size of panes allowable for wind load.
3. Specifying greater thickness will be excessively costly and not justifiable.
4. Coordinate with paragraph on glazing assemblies for thickness.
5. Usually locate coating on second surface where intent is to reduce cooling load.
6. Usually locate coating on third surface where intent is to reduce heating load.

C. Low-E Tempered Glass:
1. ASTM C1048, Kind FT, Condition C, Type I, Class 1, Quality q3 with low emissivity pyrolytic coating having an E of 0.15.
2. Apply coating to // second // third // surface of insulating glass units.
3. Thickness, // 4.8 mm (3/16 inch) // // as indicated //.

SPEC WRITER NOTE: Indicate pattern of silk-screened ceramic frit coating on Drawings or describe below.

D. Ceramic Coated Vision Glass:
1. ASTM C1048, Kind // HS // // FT //, Condition C, Type I, Class // 1 // // 2 // // 3 //, Quality q3 with ceramic coating applied by silk-screen process.
2. Pattern as indicated in Drawings.
4. Thickness, // 6 mm (1/4 inch) // // as indicated //.

SPEC WRITER NOTE: Coating below may be applied to second surface of lites with pyrolytic solar coating on first surface.

E. Ceramic Coated Spandrel Glass:
1. ASTM C1048, Kind // HS // // FT //, Condition B, Type I, Class // 1 // // 2 // // 3 //, Quality q3 with ceramic coating applied over and fused into glass surface.
2. Pattern as indicated in drawings.
3. Apply coating to second surface.
4. Thickness, // 6 mm (1/4 inch) // // as indicated //.

SPEC WRITER NOTES:
1. Organic coated glass satisfies the requirements for safety glazing and may be used as an option to tempered or laminated glass.
2. This is a sole source item; do not specify except as an option.
3. Thicknesses available are 3, 4.8, and 6 mm (1/8, 3/16 and 1/4 inch).
4. Generally use in insulating glass with coating facing air space as some coatings may scratch or abrade.
5. Coordinate color/tint/coating to accommodate required security monitoring.

F. Organic Coated Glass:
1. Optional for tempered, heat strengthened, or laminated glass.
2. Polyester coated to obtain safety glazing ANSI Z97.1 and SGCC label.
3. Applied to // clear // // tinted // // or patterned // glass.

G. Transparent Mirror (One-Way-Vision Glass):
1. ASTM C1036, Type I, Class 1, Quality q2 or Class 3, Quality q3; Grey Glass.
2. Thickness, // 6 mm (1/4 inch) // // as indicated //.
3. Coated one face with a hard adherent reflective film of chromium or other coating of proven equivalent durability.
4. Visible light transmittance; eight percent, plus or minus two percent.
5. Visible reflectance; sixty percent, plus or minus five percent.
6. Light ratio; mirror side 10 or more; observer side one or less.
7. Assemble with coating covered and protected with a layer of clear glass not less than 3 mm (1/8 inch) thick.
8. Clean interface glass prior to assembly.
9. Tape edge to seal interface and hold panes together.

2.4 PLASTIC

SPEC WRITER NOTES:
1. Use abrasive resistant coated plastic when plastic is not in assembly protected by glass covering.
2. Coordinate with drawings to show thickness with glazing designation.
3. For acrylic use not less than the following minimum thickness:

<table>
<thead>
<tr>
<th>Thickness</th>
<th>Long Dimension of Sheet</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 mm (0.125 inch)</td>
<td>600 mm (24 inches or less)</td>
</tr>
<tr>
<td>5 mm (0.187 inch)</td>
<td>600 - 900 mm (24 through 36 inches)</td>
</tr>
<tr>
<td>6.5 mm (0.250 inch)</td>
<td>900 - 1500 mm (36 through 60 inches)</td>
</tr>
</tbody>
</table>

4. For polycarbonate use not less than the following minimum thickness:

<table>
<thead>
<tr>
<th>Thickness</th>
<th>Long Dimension of Sheet</th>
<th>Edge Lap</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 mm (0.125 inch)</td>
<td>600 - 1200 mm (24 through 48 inches)</td>
<td>19 mm (3/4 inch)</td>
</tr>
<tr>
<td>9.5 mm (0.375 inch)</td>
<td>1200 - 1500 mm (48 through 60 inches)</td>
<td>25 mm (3/4 inch)</td>
</tr>
<tr>
<td>13 mm (0.50 inch)</td>
<td>1500 mm (Over 60 inches)</td>
<td>25 mm (1 inch)</td>
</tr>
</tbody>
</table>

5. Check: Window, door, and plastic manufacturer for glazing rabbet depth allowing for expansion and edge lap required for plastic.
6. Acrylic plastics have flame spreads that limit use on interior spaces.

A. Clear Acrylic Sheet:
   1. ASTM D4802. Type UVF, Category A-1, clear, smooth both sides, and formulated with ultraviolet absorber.
   2. Thickness, as indicated.

B. Clear Acrylic Sheet, Abrasion Resistant:
   1. ASTM D4802. Type UVF, Category A-1, Finish 3, clear, smooth, formulated with ultraviolet absorber, and having an abrasive resistant coating on both sides.
   2. Thickness, as indicated.
C. Clear Polycarbonate Sheet:
2. Thickness, as indicated.

D. Clear Polycarbonate Sheet, Abrasion Resistant:
1. Fed. Spec. A-A-59502, Type III, coated mar resistant, Class 1, ultraviolet light stabilized, Grade A, High abrasion resistance. Flame spread of 10 or less when tested per ASTM E84.
2. Thickness, as indicated.

2.5 LAMINATED GLASS

SPEC WRITER NOTE:
1. Specify laminated flat glass using the “Kind” designation in ASTM C 1172, the C 1036 designations for each lite of glass, and indicate the thickness and type of interlayer.
2. Coordinate color/tint/coating to accommodate required security monitoring.

A. Two or more lites of glass bonded with an interlayer material for use in building glazing

B. Colored Interlayer:
1. Use color interlayer ultraviolet light color stabilization.
2. Option: Use colored interlayer with clear glass in lieu of tinted glass and clear interlayer.
3. Option: Use white interlayer with clear glass in lieu of obscure glass and clear interlayer.
4. The interlayer assembly shall have uniform color presenting same appearance as tinted glass assembly.

C. Use 1.5 mm (0.060 inch) thick interlayer for:
1. Horizontal or Sloped glazing.
2. Acoustical glazing.
3. Heat strengthened or fully tempered glass assembles.

D. Use min. 0.75 mm (0.030 inch) thick interlayer for vertical glazing where 1.5 mm (0.060 inch) interlayer is not otherwise shown or required.

2.6 LAMINATED GLAZING ASSEMBLIES

SPEC WRITER NOTES:
1. Follow Physical Security Design Manual for the use of laminated glazing in
blast resistant windows. These windows shall use glazing that meets requirements of UFC 4-010-01.DOD Minimum Antiterrorism Standards for Buildings.

2. Where a single pane occurs on horizontal or sloped glazing use inboard lite of tempered glass. Exception: plastic glazing may be used on canopies or unenclosed areas.

3. Verify the type of glazing that will qualify as safety glazing under applicable regulations.

4. Size of pane and live loads will determine whether heat strengthened or fully tempered glass is required to meet design loads. Coordinate to specify greater thickness where required by design load.

5. Horizontal tempering eliminates tong marks but induces wave pattern. Install temper direction parallel to floor to minimize effect.

6. Exposed edges maybe susceptible to degradation by organic solvents and some glazing compounds. Confirm compatibility between these products and laminate interlayer.

7. Specify laminated glazing assemblies by listing glass types, and thickness of each pane and type, thickness and color of interlayer.

8. Where coated glass is used in laminated assembly, indicate location of coated surface.

9. Examples listed below are intended only as a guide.

10. Coordinate color/tint/coating to accommodate required security monitoring.

A. Clear Glazing:
   1. Both panes clear glass ASTM C1036, Type I, Class 1, Quality q3.
   2. Thickness: Each pane, // 3 mm (1/8 inch) thick // // as indicated // // ____ //.

B. Clear Tempered Glazing:
   1. Both panes ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality q3.
   2. Thickness: Each pane // 4.8 mm (3/16 inch) thick // // as indicated // // ____ //.

C. Tinted Tempered Glazing:
1. Exterior pane ASTM C1036, Type I, Class 3, Quality q3, // 3 mm (1/8 inch) // // ___ // thick.
2. Interior pane ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality q3, // 3 mm (1/8 inch) // // ___ // thick.

D. Clear Heat Strengthened Glazing:
1. Both panes, ASTM C1048, Kind HS, Condition A, Type I, Class 1, Quality q3.
2. Thickness: Each pane, // 3 mm (1/8 inch) thick // // as indicated // // ___ //.

E. Tinted Heat Strengthened Glazing:
1. Both panes, ASTM C1048, Kind HS, Condition A, Type I, Class 2, Quality q3.
2. Thickness: Each pane, // 3 mm (1/8 inch) thick // // as indicated // // ___ //.

F. Tempered Obscure Glazing:
1. One pane ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality q3, // 3 mm (1/8 inch) // // ___ // thick.
2. One pane ASTM C1048, Kind FT, Type II, Class 1, Form 3, Quality q8, Finish f1, Pattern p__, // 3 mm (1/8 inch) // // ___ // thick.

2.7 BULLET RESISTIVE ASSEMBLY

SPEC WRITER NOTES:
1. See Section 08 56 59, SERVICE AND TELLER WINDOW UNITS. Specify assemblies below to meet actual project requirements.
2. Bullet-resisting glazing material is available in four power ratings to resist scattered shots from (1) medium-power small arms (MSA); (2) high-power small arms (HSA); (3) super-power small arms (SSA); and (4) high-power rifles (HR).
3. Bullet-resisting glass is available in thicknesses of 30.2 mm (1-3/16 inch), 38.1 mm (1-1/2 inch), 44.5 mm (1-3/4 inch), and 50.8 mm (2 inches), to meet those power ratings.
4. Bullet-resisting acrylic sheet is listed by UL for MSA rating only and is 25.4 mm (one inch) thick.
5. Bullet-resisting polycarbonate sheet is listed for MSA 25.4 mm (one inch) thick and for HSA and SSA ratings 31.8 mm (1-1/4 inch) thick.
6. Consult manufacturers for exact thicknesses and availability.
A. Provide protection listed by UL ABPMED as bullet resisting, with a power rating of // Medium Power-Small Arms (MSA) // // High Power-Small Arms (HSA) // // Super-Power Small Arms // // High-Power Rifles (HR) // ballistic level in accordance with UL 752.

SPEC WRITER NOTES:
1. Example below is for guideline only. Specify combination glass and polycarbonate layers where appropriate.
2. Consider glass clad polycarbonate assemblies where the potential for injury by loose shards of glass from the side opposite impact is understood and accepted.

B. Fabricate from Type I, Class 1, Quality q3 glass with polyvinyl butyral plastic interlayers between the layers of glass. Provide // _____ // //where indicated //.
1. Exterior pane // ____ // thick.
2. Interior pane // ____ // thick.

SPEC WRITER NOTES:
1. Mental health and behavioral science service for psychiatric, alcohol, and drug dependency treatment areas require "SECURITY GLAZING" assemblies, resistant to breakage and use as weapons.
2. Security (seclusion) rooms, including room doors, use 11 mm (7/16 inch) laminated clear glass, clear heat strengthened glass clad polycarbonate, or clear tempered glass clad polycarbonate.
3. For patient ward glazing use laminated assemblies of tinted, heat strengthened, clear, clear tempered, or clear heat strengthened glass.
4. Specify optional glazing of clear heat strengthened glass clad polycarbonate, or clear tempered glass clad polycarbonate for 11 mm inch (7/16) thick laminated glass.
5. Refer to VA Physical Security Design Guidelines for glazing requirements of blast-resistant windows.

2.8 GLASS CLAD POLYCARBONATE SECURITY GLAZING ASSEMBLY
A. Use 1.3 mm (0.050 inch) polyurethane sheeting for interlayer between glass and polycarbonate.
B. Clear Heat Strengthened Glass Clad Polycarbonate.
1. Use ASTM C1048, Kind HS, Condition A, Type I, Class 1, Quality q3, outer glass panes.
2. Use clear polycarbonate sheet, 3 mm (1/8 inch) thick core.
3. Thickness, 11 mm (7/16 inch).

C. Clear Tempered Glass Clad Polycarbonate:
1. Use ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality q3, 3 mm (1/8 inch) thick outer glass panes.
2. Use clear polycarbonate sheet, 3 mm (1/8 inch) thick core.
3. Thickness, 11 mm (7/16 inch).

D. Maximum Allowable Area: Laminated glazing shall not exceed 1.32 meter E. square unless glazing has been certified.

2.9 INSULATING GLASS UNITS
A. Provide factory fabricated, hermetically sealed glass unit consisting of two panes of glass separated by a dehydrated air space and comply with ASTM E2190.

B. Assemble units using glass types specified:

SPEC WRITER NOTES:
1. Follow UFC4-010-01 for thickness of insulating glass units for windows within the stand-off distance of Life Safety or Mission Critical Buildings.
2. Specify sealed insulating glass units by C 1036 designation and thickness for each pane of glass.
3. Use of argon gas filled units is not cost effective. Do not use. Use air filled only.
4. Use minimum of 13 mm (¼ inch) wide space for sealed edge units between panes.
5. Use minimum of 4.8 mm (3/16 inch) wide space for fused glass edge units between panes.
6. For horizontal or sloped glazing such as skylight or overhead glazing over controlled environment spaces use SEU (Sealed Edge Unit) clear tempered and laminated units or SEU tinted tempered and laminated units or change for size of glazing.
7. Plastic glazing may be used for unit skylights and canopies.
8. Determine design loads required by building code.
9. Specify laminated glazing assemblies by listing glass types, and thickness of each pane.
10. Where coated glass is used in laminated assembly, indicate location of coated surface.

11. Indicate thickness of each pane as required by size and loading.

12. Examples listed below are intended only as a guide.

C. Sealed Edge Units (SEU):
   1. Insulating Glass Unit Makeup
      a. Outboard Lite
         1. Glass type:
         2. Glass Tint:
         3. Nominal Thickness:
         4. Glass Strength: (Annealed, Heat-Strengthened, Tempered)
         5. Coating Orientation: (N/A, Surface #__)
      b. Spacer
         1. Nominal Thickness:
         2. Gas Fill: (Air or 90% Argon)
      c. Inboard Lite
         1. Glass Type:
         2. Glass Tint:
         3. Nominal Thickness:
         4. Glass Strength: (Annealed, Heat-Strengthened, Tempered)
         5. Coating Orientation: (N/A, Surface #__)
   2. Performance Characteristics (Center of Glass)
      a. Visible Transmittance: ___% 
      b. Visible Reflectance: ___% 
      c. Winter U-factor (U-value): ___
      d. Shading Coefficient (SC): ___
      e. Solar heat Gain Coefficient (SHGC): ___
   3. Glass shall be annealed, heat strengthened or tempered as required by codes, or as required to meet thermal stress and wind loads.
   4. Glass heat-treated by horizontal (roller hearth) process with inherent roller wave distortion parallel to the bottom edge of the glass as installed when specified.

D. Fused Edge Units, (FEU):
   1. Glass to glass sealed edges electrically fused.
   2. Air space not less than 4.8 mm (3/16 inch) wide up to 6 mm (1/4 inch) wide.
3. R value not less than 1.5.

E. FEU Clear Glass.

1. Interior and exterior panes, ASTM C1036, Type I, Class 1, Quality q3, 3 mm (1/8 inch) thick.
2. Thickness, 11 mm (7/16 inch) minimum.

2.10 FIRE RESISTANT GLASS WITHOUT WIRE MESH

A. Type 1 (Transparent float glass), Class 1 (Clear).

B. Fire-protective glass products used to protect against smoke and flames only shall be rated for [20] [45] minutes as required by local building code and shall be tested in accordance with NFPA 252 (Standard Methods of Fire Tests of Door Assemblies) and NFPA 257 (Standard on Fire Test for Window and Glass Block Assemblies).

C. Fire-resistive products used to protect against smoke, flame, and the transmission of radiant heat shall be rated for [60] [90] [120] minutes and shall be tested in accordance with NFPA 252, NFPA 257, and ASTM E119 (Standard Test Methods for Fire Tests of Building Construction and Materials).

D. Fire-rated glass or glass assembly shall be classified by Underwriters Laboratory (UL), Intertek Testing Services- Warnock Hersey (ITS-WHI) or any other OSHA certified testing laboratory. All glass shall bear a permanent mark of classification in accordance with local building code.

E. Maximum size is per the manufacturer’s test agency listing for doors, transoms, side lights, borrowed lights, and windows.

F. Where safety glazing is required by local building code, fire-rated glass shall be tested in accordance with CPSC 16 CFR 1201 Category I or II and bear a permanent mark of classification.

1. Category I products are limited to 0.84 m² – 9 ft² and tested to no less than 203 Nm-150 ft-lbs impact loading.
2. Category II products are greater than 0.84 m² – 9 ft² and tested to no less than 542 Nm-400 ft-lbs impact loading. Category II products can be used in lieu of Category I products.

2.11 INSULATING PLASTIC SHEETS

SPEC WRITER NOTES:

1. Plastic sheets of either acrylic or polycarbonate formed into panels with face sheets separated by plastic ribs forming cells; providing translucent glazing.
2. When code limits flammability use polycarbonate with a CCI rating.
3. Coordinate with Section 08 63 00, METAL FRAMED SKYLIGHTS, for specifying glazing and Division 8 for doors and windows.
4. Only polycarbonate glazing is specified, add other sheets as required for project.
5. Coordinate with manufacturers to specify tinted and curved shapes or special configurations and rabbet depths.
6. Specify whether clear or tinted, and indicate minimum light transmission and shading coefficients.

A. Homogenous polycarbonate assembly integrally joined face sheets separated by either vertical or angled ribs forming airspace cells between face sheets:
   1. Treated to prevent ultraviolet light discoloration.
   2. Flammability Rating: CCI classification by BOCA, ICBO, and SBCC Building Code Organizations when tested in accordance with ASTM D635 showing a burn rating of 25.4 mm (one inch) or less.
   3. Nominal Thickness: 9.5 mm (3/8 inch) minimum, 17.4 mm (11/16 inch) maximum.
   4. Thermal: U factors 0.55 when tested in accordance with ASTM C236.
   5. Impact Resistance: No rupture when subjected to a falling dart with 13 mm (½ inch) radius tip at 298 J (220 ft. lbs).

B. // Clear // // Tinted // Insulating Plastic Sheet:
   1. Light Transmission: Not less than ___ percent.
   2. Shading Coefficient: Not less than ___ percent.

2.12 GLAZING ACCESSORIES

A. As required to supplement the accessories provided with the items to be glazed and to provide a complete installation. Ferrous metal accessories exposed in the finished work shall have a finish that will not corrode or stain while in service.

B. Setting Blocks: ASTM C864:
   1. Channel shape; having 6 mm (1/4 inch) internal depth.
   2. Shore a hardness of 80 to 90 Durometer.
   3. Block lengths: 50 mm (two inches) except 100 to 150 mm (four to six inches) for insulating glass.
   4. Block width: Approximately 1.6 mm (1/16 inch) less than the full width of the rabbet.
5. Block thickness: Minimum 4.8 mm (3/16 inch). Thickness sized for rabbet depth as required.

C. Spacers: ASTM C864:
1. Channel shape having a 6 mm (1/4 inch) internal depth.
2. Flanges not less 2.4 mm (3/32 inch) thick and web 3 mm (1/8 inch) thick.
3. Lengths: One to 25 to 76 mm (one to three inches).
4. Shore a hardness of 40 to 50 Durometer.

SPEC WRITER NOTE: Coiled glazing tape will assure continuous seal without joints as compared to cut-to-length tape.

D. Sealing Tapes:
1. Semi-solid polymeric based material exhibiting pressure-sensitive adhesion and withstanding exposure to sunlight, moisture, heat, cold, and aging.
2. Shape, size and degree of softness and strength suitable for use in glazing application to prevent water infiltration.

SPEC WRITER NOTE: Spring steel spacers may be used in rabbets of steel windows such as hollow metal frames with stops.

E. Spring Steel Spacer: Galvanized steel wire or strip designed to position glazing in channel or rabbeted sash with stops.

SPEC WRITER NOTE: Glazing clips are only used when glazing in wood frames or in rolled section steel sash with face glazing. (No stops).

F. Glazing Clips: Galvanized steel spring wire designed to hold glass in position in rabbeted sash without stops.

SPEC WRITER NOTE: Points are for wood sash.

G. Glazing Points (Sprigs): Pure zinc stock, thin, flat, triangular or diamond shaped pieces, 6 mm (1/4 inch) minimum size.

SPEC WRITER NOTE: Dense wedge gaskets with soft, closed cell gaskets used for dry glazing and wet/dry (sealant or sealing tape) glazing systems may be required by the window manufacturer. Gaskets may be furnished by the window manufacturer with the sash, especially for factory glazing and residential units. Coordinate with Division 8.
H. Glazing Gaskets: ASTM C864:
1. Firm dense wedge shape for locking in sash.
2. Soft, closed cell with locking key for sash key.
3. Flanges may terminate above the glazing-beads or terminate flush with top of beads.

SPEC WRITER NOTE: For design of Glazing Gaskets, see ASTM C542 and C964, Standard Guide for Lock-Strip Gasket Glazing, and GANA Manuals. Use black only.

I. Lock-Strip Glazing Gaskets: ASTM C542, shape, size, and mounting as indicated.

SPEC WRITER NOTE: Do not use non-skinning sealants.

J. Glazing Sealants: ASTM C920, silicone neutral cure:
1. Type S.
2. Class 25
3. Grade NS.
4. Shore A hardness of 25 to 30 Durometer.

SPEC WRITER NOTE: Delete the following if structural glazing does not occur on the project. Glass not retained by a frame having a rabbet and applied stop as per GANA Glazing Manual, Exterior Flush Glazing.

K. Structural Sealant: ASTM C920, silicone acetoxy cure:
1. Type S.
2. Class 25.
3. Grade NS.
4. Shore a hardness of 25 to 30 Durometer.

SPEC WRITER NOTE: Vinyl glazing channels may be used in residential level windows, storm windows and some sliding glass doors. Vinyl channels may be furnished by the sash manufacture and in factory glazing units. Verify if window manufacturer requires. Do not use with plastic glazing.

L. Neoprene, EPDM, or Vinyl Glazing Gasket: ASTM C864.
1. Channel shape; flanges may terminate above the glazing channel or flush with the top of the channel.
2. Designed for dry glazing.
M. Color:

1. Color of glazing compounds, gaskets, and sealants used for aluminum color frames shall match color of the finished aluminum and be nonstaining.

2. Color of other glazing compounds, gaskets, and sealants which will be exposed in the finished work and unpainted shall be black, gray, or neutral color.

N. Smoke Removal Unit Targets: Adhesive targets affixed to glass to identify glass units intended for removal for smoke control. Comply with requirements of local Fire Department.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:

1. Examine openings for glass and glazing units; determine they are proper size; plumb; square; and level before installation is started.

2. Verify that glazing openings conform with details, dimensions and tolerances indicated on manufacturer’s approved shop drawings.

B. Advise Contractor of conditions which may adversely affect glass and glazing unit installation, prior to commencement of installation: Do not proceed with installation until unsatisfactory conditions have been corrected.

C. Verify that wash down of adjacent masonry is completed prior to erection of glass and glazing units to prevent damage to glass and glazing units by cleaning materials.

3.2 PREPARATION

A. For sealant glazing, prepare glazing surfaces in accordance with GANA-02 Sealant Manual.

B. Determine glazing unit size and edge clearances by measuring the actual unit to receive the glazing.

C. Shop fabricate and cut glass with smooth, straight edges of full size required by openings to provide GANA recommended edge clearances.

D. Verify that components used are compatible.

E. Clean and dry glazing surfaces.

F. Prime surfaces scheduled to receive sealants, as determined by preconstruction sealant-substrate testing.
3.3 INSTALLATION – GENERAL

A. Install in accordance with GANA-01 Glazing Manual and GANA-02 Sealant Manual unless specified otherwise.

B. Glaze in accordance with recommendations of glazing and framing manufacturers, and as required to meet the Performance Test Requirements specified in other applicable sections of specifications.

C. Set glazing without bending, twisting, or forcing of units.

D. Do not allow glass to rest on or contact any framing member.

E. Glaze doors and operable sash, in a securely fixed or closed and locked position, until sealant, glazing compound, or putty has thoroughly set.

SPEC WRITER NOTE: Select the following paragraphs in coordination with glass types specified in Part 2.

F. Patterned Glass:
   1. Install units with one patterned surface with smooth surface on the weather side.
   2. Install units in interior partitions with pattern in same direction in all openings.

G. Tempered Glass: Install with roller distortions in horizontal position unless otherwise directed.

H. Transparent (One-Way Vision Glass) Mirror: Use continuous channel glazing gasket.

I. Plastic:
   1. Use dry glazing method.
   2. Use only neoprene or EPDM gaskets.

J. Laminated Glass:
   1. Tape edges to seal interlayer and protect from glazing sealants.
   2. Do not use putty or glazing compounds.

K. Insulating Glass Units:
   1. Glaze in compliance with glass manufacturer's written instructions.
   2. When glazing gaskets are used, they shall be of sufficient size and depth to cover glass seal or metal channel frame completely.
   3. Do not use putty or glazing compounds.
   4. Do not grind, nip, cut, or otherwise alter edges and corners of fused glass units after shipping from factory.
   5. Install with tape or gunnable sealant in wood sash.

L. Fire Resistant Glass:
   1. Wire glass: Glaze in accordance with NFPA 80.
2. Other fire resistant glass: Glaze in accordance with UL design requirements.

M. Bullet Resisting Material:
1. Glaze as recommended by manufacturer, using glazing material which will permit expansion and contraction of the bullet resistive material in the frame.

2. The polycarbonate surface shall not be cleaned by scraping, razor blade, squeegee, or use of highly alkaline cleaner. At no time shall polycarbonate material be exposed to chemical solvents (benzene, gasoline, acetone, paint thinners) or aromatic hydrocarbons (toluene or xylene), nor shall any of these solvents or fumes by used or present in confined area such as Marine Guard Booth. Due care shall be exercised (paint formula, ventilation, protection of polycarbonate) when painting becomes necessary to interiors of rooms of hardline glazed units; exposure to chemical solvents could result in irreparable damage to security glazings (delaminations, distortions, cracks, severe stress crazing, air bubbles).

SPEC WRITER NOTES:
1. Select the following articles in coordination with window and framing systems specified in other sections.

2. When glazing a pressure equalized system, it is necessary to create the air barrier and vapor retarder seal at the inside perimeter of the glass unit to create an air space void that equalizes with exterior air pressure and permits moisture drainage to the exterior. For exterior glazing requiring continuity of air and vapor seal from adjacent construction, select the "wet/dry" or "wet" method.

3.4 INSTALLATION - DRY METHOD (TAPE AND GASKET SPLINE GLAZING)

SPEC WRITER NOTES:
1. Select this glazing method where neither air barrier and vapor retarder seal to glazing frame nor pressure equalized glazing space is required.

2. Glazing spline may be a roll-in type or a pressure type. Verify sealant used is compatible with the glazing tape compound.

3. Select this glazing method for horizontal sliding aluminum windows. Install glass in continuous glazing gaskets secured with beads.
4. Select this glazing method for aluminum doors unless door manufacture requires otherwise.

A. Cut glazing // tape // // spline // to length; install on glazing pane. Seal corners by butting and sealing junctions with butyl sealant.
B. Place setting blocks at // 1/4 // // 1/3 // points with edge block no more than 150 mm (6 inches) from corners.
C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.
D. Install removable stops without displacing glazing spline. Exert pressure for full continuous contact.
E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
F. Trim protruding tape edge.

3.5 INSTALLATION - WET/DRY METHOD (PREFORMED TAPE AND SEALANT)

SPEC WRITER NOTE:
1. Verify sealant used is compatible with the glazing tape compound.
2. This method is intended to achieve air barrier and vapor retarder seal through glazed assembly to glazing frame and achieve a pressure equalized glazing space.
3. Use this system with aluminum windows with glazing beads unless window manufacturer requires otherwise.

A. Cut glazing tape to length and set against permanent stops, 5 mm (3/16 inch) below sight line. Seal corners by butting tape and dabbing with butyl sealant.
B. Apply heel bead of butyl sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete the continuity of the air and vapor seal.
C. Place setting blocks at // 1/4 // // 1/3 // points with edge block no more than 150 mm (6 inches) from corners.
D. Rest glazing on setting blocks and push against tape and heel bead of sealant with sufficient pressure to achieve full contact at perimeter of pane or glass unit.
E. Install removable stops, with spacer strips inserted between glazing and applied stops, 6 mm (1/4 inch) below sight line. Place glazing tape on glazing pane or unit with tape flush with sight line.
F. Fill gap between glazing and stop with ______ type sealant to depth equal to bite of frame on glazing, but not more than 9 mm (3/8 inch) below sight line.

G. Apply cap bead of ______ type sealant along void between the stop and the glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.6 INSTALLATION – WET METHOD (SEALANT AND SEALANT)

SPEC WRITER NOTES:
1. Verify sealant used is compatible with the glazing tape compound.
2. This method is intended to achieve air barrier and vapor retarder seal through glazed assembly to glazing frame and achieve a pressure equalized glazing space.

A. Place setting blocks at // 1/4 // // 1/3 // points and install glazing pane or unit.

B. Install removable stops with glazing centered in space by inserting spacer shims both sides at 600 mm (24 inch) intervals, 6 mm (1/4 inch) below sight line.

C. Fill gaps between glazing and stops with ______ type sealant to depth of bite on glazing, but not more than 9 mm (3/8 inch) below sight line to ensure full contact with glazing and continue the air and vapor seal.

D. Apply sealant to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.7 INSTALLATION – EXTERIOR BUTT GLAZED METHOD (SEALANT ONLY)

SPEC WRITER NOTE:
1. Usually selected only for monumental buildings.
2. Method is highly dependent upon adhesion of structural glazing sealant. Verify that adhesion testing was done on actual job site materials in accordance with ASTM C794. Include procedures for primer, if necessary, and sealant.
3. Verify that gaskets and backers have been tested for compatibility involving exposure to 2000-4000 microwatt per square centimeter UV radiation for 21 days while in contact with sealant on glass. Spacers with full contact on structural silicone shall not discolor white silicone sealant during this test.
A. Temporarily brace glass in position for duration of glazing process.
   Mask edges of glass at adjoining glass edges and between glass edges
   and framing members.
B. Temporarily secure a small diameter non-adhering foamed rod on back
   side of joint.
C. Apply sealant to open side of joint in continuous operation; thoroughly
   fill the joint without displacing the foam rod. Tool the sealant
   surface smooth to concave profile.
D. Permit sealant to cure then remove foam backer rod. Apply sealant to
   opposite side, tool smooth to concave profile.
E. Remove masking tape.

3.8 INSTALLATION – INTERIOR WET/DRY METHOD (TAPE AND SEALANT)
A. Cut glazing tape to length and install against permanent stops,
   projecting 1.6 mm (1/16 inch) above sight line.
B. Place setting blocks at // 1/4 // // 1/3 // points with edge block no
   more than 150 mm (6 inches) from corners.
C. Rest glazing on setting blocks and push against tape to ensure full
   contact at perimeter of pane or unit.
D. Install removable stops, spacer shims inserted between glazing and
   applied stops at 600 mm (24 inch) intervals, 6 mm (1/4 inch)
   below sight line.
E. Fill gaps between pane and applied stop with ______ type sealant to
   depth equal to bite on glazing, to uniform and level line.
F. Trim protruding tape edge.

3.9 INSTALLATION – INTERIOR WET METHOD (COMPOUND AND COMPOUND)
A. Install glazing resting on setting blocks. Install applied stop and
   center pane by use of spacer shims at 600 mm (24 inch) centers, kept 6
   mm (1/4 inch) below sight line.
B. Locate and secure glazing pane using // glazers' // // spring wire //
   clips.
C. Fill gaps between glazing and stops with glazing compound until flush
   with sight line. Tool surface to straight line.

3.10 INSTALLATION – REGLAZING HISTORIC FRAMING
A. Steel Windows: For glazing with glazing beads: ASTM C920.
B. Wood Sash: For glazing with glazing beads: Tape or ASTM C920, gunnable
   sealant.
3.11 REPLACEMENT AND CLEANING

A. Clean new glass surfaces removing temporary labels, paint spots, and defacement after approval by Resident Engineer.

B. Replace cracked, broken, and imperfect glass, or glass which has been installed improperly.

C. Leave glass, putty, and other setting material in clean, whole, and acceptable condition.

3.12 PROTECTION

Protect finished surfaces from damage during erection, and after completion of work. Strippable plastic coatings on colored anodized finish are not acceptable.

SPEC WRITER NOTES:
1. Check details on drawings for types of glazing.
2. Defining glazing required on drawings is preferred to the glazing schedule.
3. Omit schedule or omit following paragraphs where types, thicknesses and locations of glass are indicated on the drawings.
4. Where not indicated, edit paragraph to suit project; ADD types, thicknesses and locations of the glass not indicated. Coordinate paragraphs in Part-2 with the schedule.
5. Use this glazing schedule as a guide for defining glazing required.
6. In double glazed windows, only the interior pane is to be laminated glass or other safety glazing for interior occupant safety.

3.13 GLAZING SCHEDULE

A. Fire Resistant Glass:

1. Install clear wire glass in interior fire rated or labeled doors and windows.

2. Install clear wire glass in exterior windows and doors indicated to receive wire glass.

3. Install patterned (obscure) wire glass in bath, toilet, and locker room windows, except where indicated to receive clear wire glass. //

SPEC WRITER NOTE: Identify exact locations of special Fire Resistant Glass without wire mesh.

3. Use Fire Resistant Glass without wire mesh in the following:

a. //

SPEC WRITER NOTES:
08 80 00-30
b.                   .//

B. Tempered Glass:
1. Install in full and half glazed doors unless indicated otherwise.
2. Install in storefront, windows, and door sidelights adjacent to doors.
3. Use clear tempered glass on interior side lights and doors, and on exterior doors and sidelights unless otherwise indicated or specified.

   SPEC WRITER NOTE: When insulating glass is used insure storefront frames have thermal breaks. Do not use insulating glass in metal doors.

   //4. Use SEU clear tempered insulating glass on storefronts and sidelights.//
   //5. Use SEU tinted tempered and clear tempered insulating glass on storefront and sidelights.//
   //6. Use SEU Low E tempered and clear glass, G-41, on storefront and sidelights.//
   //7. Use SEU reflective tempered and clear tempered glass on storefront and sidelights.//
   //8. Use tinted tempered glass in exterior pane and clear tempered glass in interior pane unless specified otherwise of insulating glass units adjacent to door.//
   //9. Use clear tempered glass in exterior and interior panes unless specified otherwise at insulating glass units adjacent to door.//

D. Clear Glass:
1. Interior observation windows not specified otherwise.
2. Interior pane of dual glazed windows not receiving tempered, laminated or organic coated glass, or other special glass indicated or specified.

E. Tinted Glass: Exterior pane of dual glazed windows not receiving tinted tempered glass.

   SPEC WRITER NOTES:
   1. If more than one type and thickness of insulating glass is required, expand subparagraph to clearly describe locations of each type and thickness.
   2. Insure insulating glass is set in sash with thermal breaks.

F. Insulating Glass:
1. Install SEU clear tempered glass in windows, // interior pane of dual glazed windows, // storefronts, // curtain walls, // adjacent to entrances or walks.
2. Install SEU clear glass in windows, // interior pane of dual glazed windows, // storefronts, // curtain walls, // not adjacent to entrances or walks.
3. Install SEU tinted tempered and clear tempered glass in storefronts, // curtain walls // adjacent to entrances or walks.

SPEC WRITER NOTES:
1. See Laminated Glazing Assemblies Article; edit for other assemblies if used on project.
2. Consider tempered glass for psychiatric Nursing Units and Seclusion Bedrooms.
3. Where more than one laminated glazing assembly is specified, indicate clearly where each one is scheduled.

G. Laminated Glass: Install as specified in doors, observation windows and interior pane of dual glazed windows where indicated.
1. Provide laminated glass for all windows in Psychiatric Nursing Units, Alcohol Dependency Treatment Nursing Units, Drug Abuse Treatment Nursing Units and Security Bedrooms. Laminated glass shall be 7/16-in thick in locked patient units and security rooms, 5/16-in thick elsewhere. (min. 1.5 mm interlayer).
2. If laminated glass is required for double glazed windows, provide it for interior panes only.
3. Where laminated glass is required for blast-resistant windows, follow UFC4-010-01, DOD Minimum Antiterrorism Standards for Buildings.

H. Bullet Resisting Assembly, Install specified assembly in service windows at // Pharmacy // // Agent Cashier // // Credit Union // // other location //.

I. Transparent Mirror (One-Way-Vision Glass): Install in observation windows where indicated.

J. Pattern Glass (obscure):
1. Install in interior pane of dual glazed windows of toilets, baths, and locker rooms and where indicated.
2. Pattern Glass (obscure), unless specified otherwise.
3. Fire Rated Doors: Use patterned (obscure) wire glass.
4. Other Doors: Use tempered patterned glass.

K. Spandrel Glass: Install specified spandrel glazing where indicated.

SPEC WRITER NOTES:
1. The following glazing items have not been scheduled as they are special glazing items not normally used:
   a. Tinted Heat absorbing and Light Reducing glass.
   b. Tinted Light Reducing glass.
   c. Reflective Tempered glass.
   d. Low E Tempered glass.
   e. Acrylic sheet.
   f. Polycarbonate sheet.
   g. Obscure glazing assembly (laminated).
   h. Insulating glass, Tinted Heat Absorbing and Clear Tempered glass.
   i. Insulating Glass, SEU Low-E Tempered and Clear Glass.
   j. Insulating Glass, SEU Reflective and Tempered and Clear Tempered.
   k. Insulating Glass, SEU Light Reducing and Clear glass.
   l. Insulating glass FEU Clear glass.
   m. Switchable Privacy Glass.
2. Add paragraphs to clearly define these locations when required in the project.