

## Viracon Recommended Architectural Glass Specification

This specification is written according to the Construction Specifications Institute (CSI) 3-Part Format. The specification can be customized for your project by including details for the products you are specifying in Article 2.6 Product Schedule. The blue text is intended to be altered to identify the specific product you selected.

***Note: The information in this Architectural Glass Specification is offered to assist in specifying Viracon's Fabricated Glass Products. Viracon does not assume any responsibility for the adequacy of this specification for a particular application. The design professional must confirm applicable code and design.***

### Specifications Group (unnumbered)

### Facility Construction Subgroup (unnumbered)

### Division 08 – Openings

#### 08 40 00 Entrances, Storefronts, and Curtain Walls

##### 08 41 00 Entrances and Storefronts

08 41 26 All-glass entrances and storefronts (without metal framing)

##### 08 42 00 Entrances

08 42 26 All-glass entrances (without metal framing)

##### 08 43 00 Storefronts

08 43 26 All-glass storefronts (without metal framing)

##### 08 44 00 Curtain Wall and Glazed Assemblies

08 44 26 Structural Glass Curtain Walls

08 44 26.13 Structural Sealant Glazed Assemblies

08 44 33 Sloped Glazing Assemblies (glazed curtain walls in which the glazed panels are primarily on a sloped plane)

#### 08 80 00 Glazing

##### 08 81 00 Glass Glazing

08 81 13 Decorative Glass (includes low-e, HS, FT, etc)

##### 08 88 00 Special Function Glazing

08 88 19 Hurricane Resistant Glazing

08 88 23 Cable Suspended Glazing

08 88 53 Security Glazing

08 88 56 Ballistics-Resistant Glazing

## **PART 1 – GENERAL**

### **1.1 SUMMARY**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections apply to this Section.
- B. Section Includes:
  - 1. Transparent and translucent glass glazing for general and special purpose applications including; coated, float, heat-strengthened, impact resistant, insulating, low emissivity, laminated, spandrel and tempered glass.
  - 2. Work Results: Manufacture, handle, deliver and install glazing systems as shown on the architectural drawings or as otherwise specified and in accordance with the requirements of the contract documents.

### **1.2 REFERENCES**

- A. Abbreviations and Acronyms:
  - 1. AAMA American Architectural Manufacturers Association
  - 2. ANSI American National Standards Institute
  - 3. ASTM Formerly the American Society for Testing and Materials
  - 4. CPSC Consumer Products Safety Commission
  - 5. FT Fully Tempered
  - 6. GANA Glass Association of North America
  - 7. HS Heat-strengthened
  - 8. ICC International Code Council
  - 9. IGCC Insulating Glass Certification Council
  - 10. IGMA Insulating Glass Manufacturers Alliance
  - 11. LBNL Lawrence Berkeley National Laboratories
  - 12. LEED Leadership in Energy & Environmental Design
  - 13. Low-E Low emissivity
  - 14. LSG Light to Solar Gain
  - 15. NFRC National Fenestration Rating Council
  - 16. SHGC Solar Heat Gain Coefficient
  - 17. SC Shading Coefficient
  - 18. USGBC The U.S. Green Building Council
  - 19. VLT Visible Light Transmittance
- B. Definitions:
  - 1. Deterioration of Coated Glass: Defects developing from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking and other indications of deterioration in metallic coating.
  - 2. Deterioration of Insulating Glass: Failure of the hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture or film on interior surfaces of glass.
  - 3. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delaminating material obstructing vision through glass and blemishes exceeding those allowed by referenced laminated glass standards.

4. Interspace or Airspace: The space between lites of any insulating glass unit that contains dehydrated air or a specified gas.
  5. Manufacturer: A firm that produces primary glass or fabricated glass products as defined in referenced glazing publications.
- C. Reference Standards: This section does not require compliance with standards, but is merely a listing of those used. If compliance is required, statements will be included in the appropriate Section.
1. ASTM C 1036 Standard Specification for Flat Glass
  2. ASTM C 1048 Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass
  3. ASTM C 1172 Standard Specification for Laminated Architectural Flat Glass
  4. ASTM C 1376 Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass
  5. ASTM E 2190 Standard Specification for Insulating Glass Unit Performance and Evaluation (*replaces ASTM E773, E774 CBA, CAN / CGSB 12.8*)
  6. ASTM E 546 Standard Test Method for Frost/Dew Point of Sealed Insulating Glass Units
  7. ASTM E 576 Standard Test Method for Frost/Dew Point of Sealed Insulating Glass Units in the Vertical Position
  8. ASTM E 1300 Standard Practice for Determining Load Resistance of Glass in Buildings
  9. ASTM C 1349 Standard Specification for Architectural Flat Glass Clad Polycarbonate
  10. ASTM F 3057 Standard Test Method For Electromagnetic Shielding Effectiveness Of Glazings
  11. ANSI Z97.1 Performance Specifications and Methods of Test for Safety Glazing Materials Used in Buildings
  12. BS EN 14179 Glass in building - Heat-soaked thermally-toughened soda lime silicate safety glass
  13. CPSC 16 CFR 1201 Safety Standard for Architectural Glazing Materials

### 1.3 SUBMITTALS

- A. Samples: Submit 12-inch (305 mm) long samples of each type of glass indicated except for clear monolithic glass products and make-ups with Viracon Thermal Spacer (VTS™), and 12-inch (305 mm) long samples of each color required, except black, for each type of sealant or gasket exposed to view.
- B. Test and Evaluation Reports: Glazing contractor shall obtain compatibility and adhesion test reports from sealant manufacturer indicating that glazing materials were tested for compatibility and adhesion with glazing sealant as well as other glazing materials including insulating units.
- C. Sustainable Design Submittals: Submit manufacturer's documentation verifying product content, origin or other attributes for projects requiring special sustainability provisions, to meet the USGBC's LEED requirements or other sustainable goals.
- D. Warranties:
  1. Provide a written 10-year warranty from date of manufacture for sputter coated glass. Warranty covers deterioration due to normal conditions of use and not to handling, installing, and cleaning practices contrary to the glass manufacturer's published instructions.
  2. Provide a written 10-year warranty from date of manufacture for laminated glass. Warranty covers deterioration due to normal conditions of use and not to handling, installing, and cleaning practices contrary to the glass manufacturer's published instructions.
  3. Provide a written 10-year warranty from date of manufacture for insulating glass. Warranty covers deterioration due to normal conditions of use and not to handling,

- installing, protecting and maintaining practices contrary to the glass manufacturer's published instructions.
4. Provide a written 12-year warranty from date of manufacture for insulating glass with a Viracon Thermal Spacer (VTS™). Warranty covers deterioration due to normal conditions of use and not to handling, installing, protecting and maintaining practices contrary to the glass manufacturer's published instructions
  5. Provide a written 10-year warranty from date of manufacture for Viraspan ceramic frit including Digital Distinctions™ digitally printed ceramic ink. Warranty covers deterioration due to normal conditions of use and not to handling, installing, and cleaning practices contrary to the glass manufacturer's published instructions.
  6. Provide a written 10-year warranty from date of manufacture for fully tempered glass that has been Heat Soaked. Warrants that heat soaked tempered glass will not break spontaneously as a result of Nickel Sulfide (NiS) inclusions at a rate exceeding 0.3% (3/1000) for a period of Ten years from the date of manufacture.

#### **1.4 QUALITY ASSURANCE**

- A. Qualifications:
  1. Manufacturers: Fabrication processes, including low emissivity and reflective coatings, insulating, laminated, silk-screening and tempering shall be manufactured by a single manufacturer with a minimum of ten (10) years of fabrication experience and meet ANSI / ASQC 9002 1994.
- B. Mock-ups: Before glazing, build mockups for each glass product indicated in section 2.5 Product Schedule to verify selections and to demonstrate aesthetic effects and qualities of materials and execution.
  1. Construction: Build mockups with glass and glazing systems specified for the project, including typical lite size, framing systems and glazing methods.
  2. Scheduling: Notify architect seven days in advance of dates and times when mockups will be available for viewing.
  3. Quality Assurance: Maintain mockups during construction in an undisturbed condition as a standard for judging the completed work. Accepted mockups may become part of the completed work if undisturbed at the time of substantial completion.
- C. Publications: Comply with recommendations in the publications below, except where more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this section or in Article 1.2 References.
  1. GANA Glazing Manual
  2. GANA Engineering Standards Manual
  3. GANA Laminated Glazing Reference Manual

#### **1.5 DELIVERY, STORAGE AND HANDLING**

- A. Storage and Handling Requirements:
  1. Protect glass from edge damage during handling. For insulating units exposed to substantial altitude changes, comply with insulating glass manufacturers written recommendations for venting and sealing to avoid hermetic seal ruptures.
  2. Storage and Protection: Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun or other causes.

## 1.6 SITE CONDITIONS

- A. Ambient Conditions: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by the glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation or other causes.
  - 1. Do not install liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 40°F (4.4°C).

## PART 2 – PRODUCTS

### 2.1 MANUFACTURERS

- A. Source Listing: Acceptable source, Viracon, Inc.
- B. Substitution Limitations: In some cases, it may be necessary to use the specified product without substitution, either to match work-in-place or to match similar products used in another facility or for another reason determined by the owner. Confirm constraints with the Owner or other Authority Having Jurisdiction.
- C. Product Options: Obtain glass and glazing materials from one source for each product indicated. Coatings and finished assemblies, such as insulating units and laminated units, to be manufactured by the same fabricator in order to have a common source of warranty.

### 2.2 DESCRIPTION

- A. Provide glazing systems capable of withstanding normal thermal movements, wind loads and impact loads, without failure, including loss due to defective manufacture, fabrication and installation; deterioration of glazing materials; and other defects in construction.

### 2.3 PERFORMANCE / DESIGN CRITERIA

- A. Glass Strength: Analysis shall comply with ASTM E 1300 Determining Load Resistance of Glass in Buildings. Provide glass products in the thickness and strengths (annealed or heat-treated) required to meet or exceed the following criteria based on project loads and in-service conditions.
  - 1. Minimum thickness of annealed or heat-treated glass products to be selected so the worst case probability of failure does not exceed the following:
    - a. 8 breaks per 1000 for glass installed vertically or not 15 degrees or more from the vertical plane and under wind action.
    - b. 1 break per 1000 for glass installed 15 degrees or more from the vertical plane and under action of wind and/or snow.
  - 2. Deflection must be limited to prevent disengagement from the frame and be less than or equal to 1" (25mm).
- B. Thermal and Optical Performance: Provide glass products with performance properties specified in 2.5 Product Schedule. Performance properties to be manufacturer's published data as determined according to the following procedures:
  - 1. Center of glass U-Value: NFRC 100 methodology using LBNL WINDOW 7 computer program.
  - 2. Center of glass solar heat gain coefficient: NFRC 200 methodology using LBNL-35298 WINDOW 7 computer program.
  - 3. Solar optical properties: NFRC 300

## 2.4 FABRICATION

### A. Flat Glass:

1. Shall comply with ASTM C1036 Standard Specification for Flat Glass, Type 1, Class 1 (clear) or Class 2 (tinted, heat-absorbing and light reducing) and Quality q3
2. ASTM C 1048 Heat Treated Flat Glass, Kind HS or FT (remove ASTM Standard C 1048 if annealed glass), Condition A (uncoated), B (spandrel glass, one surface coated), or C (other coated glass)
  - a. Heat Treated Flat Glass to be by horizontal (roller hearth) process with inherent rollerwave distortion parallel to the bottom edge of the glass as installed.
  - b. Maximum peak to valley rollerwave 0.003" (0.08mm) in the central area and 0.008" (0.20mm) within 10.5" (267mm) of the leading and trailing edge
  - c. For clear or low-iron glass 1/4" to 3/8" thick without ceramic frit or ink, maximum + or - 100 mD (millidiopter) over 95% of the glass surface.
  - d. Maximum bow and warp 1/32" per lineal foot (0.79mm).
  - e. All tempered architectural safety glass shall conform with ANSI Z97.1 and CPSC 16 CFR 1201.
  - f. For all fully tempered glass, provide heat soak testing conforming to EN14179 which includes a 2 hour dwell at 290°C±10°C.

### B. Insulating Glass:

1. Shall comply with ASTM E 2190 Standard Specification for Insulating Glass Unit Performance and Evaluation.
  - a. Units shall be certified for compliance by the IGCC in accordance with the above ASTM test method.
2. The unit overall thickness tolerance shall be -1/16" (1.59mm) / +1/32" (0.79mm) for a 1" two ply insulating unit. Unit constructed with patterned or laminated glass shall be +/- 1/16" (1.59mm).
3. Shall comply with ASTM E 546 Standard Test Method for Frost Point of Sealed Insulating Glass Units
4. Shall comply with ASTM E 576 Standard Test Method for Frost Point of Sealed Insulating Glass Units in the Vertical Position
5. Sealed Insulating Glass Units to be double sealed with a primary seal of polyisobutylene or VTS™ and a secondary seal of silicone.
  - a. The minimum thickness of the secondary seal shall be 1/16" (1.59mm) for metal spacers and 5/32" (4.0 mm) for VTS™.
  - b. The target width of the primary polyisobutylene seal shall be 5/32" (3.97mm) and the target width of VTS™ shall be 1/4" (6.0 mm).
  - c. There shall be no voids or skips in the primary seal.
  - d. Up to a maximum of 3/32" of the spacer may be visible above the primary polyisobutylene sealant.
  - e. Gaps or skips between primary and secondary sealant are permitted to a maximum width of 1/16" (1.59mm) by maximum length of 2" (51mm) with gaps separated by at least 18" (457mm) and a maximum width of 1/16" (1.59mm) by maximum length of 6" along the VTS™ splice. Continuous contact between the primary seal and the secondary seal is desired.
6. To provide a hermetically sealed and dehydrated space, lites shall be separated by a boxed spacer with bent corners and straight butyl injected zinc plated steel straight key joints or an extruded VTS™ thermal plastic spacer.

### C. Laminated Glass:

1. Shall comply with ASTM 1172 Standard Specification for Laminated Architectural Flat Glass.

2. All laminated architectural safety glass shall conform with ANSI Z97.1 and CPSC 16 CFR 1201.
  3. Laminated Glass products to be fabricated free of foreign substances and air or glass pockets in autoclave with heat plus pressure.
- D. Coated Vision Glass:
1. Shall comply with ASTM C 1376 Standard for Pyrolytic and Vacuum Deposition Coatings on Glass
  2. Coated products to be magnetically sputtered vacuum deposition (MSVD)
  3. Edge Deletion – When low-e coatings are used within an insulating unit, coating shall be edge deleted to completely seal the coating within the unit.
    - a. The edge deletion should be uniform in appearance (visually straight) and remove 95% of the coating.
- E. Ceramic Coated Glass Products:
1. Shall comply with ASTM C 1048 Standard Specification for Heat-Treated Flat Glass – Kind HS, Kind FT Coated and Uncoated, Condition B
  2. Silk-screen pattern should be no more than 0.0625” (1.59 mm) off parallel from locating glass edge and no more than 0.125” (3.18 mm) from edges other than locating glass edge.
  3. Silk-screen pattern shall have a maximum of a 0.03125” (0.79 mm) variation in dot, hole or line location.
  4. Digital print should be no more than 1/16” (1.6 mm) off parallel from locating glass edge and no more than 1/8” (3 mm) from edges other than locating glass edge.
  5. Digital print shall have a maximum of a 1/32” (0.8 mm) variation in dot, hole or line location.
  6. Digital print may have an indefinite boarder of up to 1/32” (0.8 mm).

## 2.5 ACCESSORIES

- A. Glazing Materials: Select glazing sealants, tapes, gaskets and additional glazing materials of proven compatibility with other materials they will contact, including glass products, seals of insulating glass units and glazing channel substrates, under conditions of installation and service, as demonstrated by testing and field experience.
1. Setting blocks to be 100% silicone with a durameter hardness of 85±5.

## 2.6 PRODUCT SCHEDULE

All products shall comply with ASTM Standards and requirements in previous sections.

- A. Insulating Coated Glass:
1. {Overall Thickness} {Product Number, ex: VRE1-46} Insulating Coated Glass as manufactured by Viracon.
    - a. Exterior Glass Ply: {Thickness} {Color} {Heat Treatment - AN, HS or FT}
    - b. Coating: {Coating} on #2 Surface
    - c. Space: {Thickness} {Material – aluminum, stainless steel, VTS™, etc.} {finish – mill finish or black painted} {Gas – argon or air} filled
    - d. Silicone: {gray or black}
    - e. Interior Glass Ply: {Thickness} {Color} {Heat Treatment - AN, HS or FT}
  2. Performance Requirements
    - a. Visible Light Transmittance: { }%
    - b. Exterior Reflectance: { }%
    - c. Winter U-Value: { }
    - d. Summer U-Value: { }

- e. Shading Coefficient: { }
  - f. Solar Heat Gain Coefficient: { }
  - g. Light to Solar Gain Ratio: { }
- B. Laminated Coated Glass:
1. {Overall Thickness} {Product Number, ex: VLE1-57} Laminated Coated Glass as manufactured by Viracon.
    - a. Exterior Glass Ply: {Thickness} {Color} {Heat Treatment - AN, HS or FT}
    - b. Coating: {Coating} on #2 Surface
    - c. Interlayer: {Thickness} {Type – pvb, StormGuard, etc}
    - d. Interior Glass Ply: {Thickness} {Color} {Heat Treatment - AN, HS or FT}
  2. Performance Requirements
    - a. Visible Light Transmittance { }%
    - b. Exterior Reflectance { }%
    - c. Winter U-Value { }
    - d. Summer U-Value { }
    - e. Shading Coefficient { }
    - f. Solar Heat Gain Coefficient { }
    - g. Light to Solar Gain Ratio { }
- C. Monolithic Reflective Glass:
1. {Overall Thickness} {Product Number, ex: VS1-14} Monolithic Reflective Glass as manufactured by Viracon.
    - a. Glass Ply: {Thickness} {Color} {Heat Treatment - AN, HS or FT}
    - b. Coating: {Coating} on #2 Surface
  2. Performance Requirements
    - a. Visible Light Transmittance: { }%
    - b. Exterior Reflectance: { }%
    - c. Winter U-Value: { }
    - d. Summer U-Value: { }
    - e. Shading Coefficient: { }
    - f. Solar Heat Gain Coefficient: { }
    - g. Light to Solar Gain Ratio: { }
- D. Insulating Laminated Coated Glass:
1. {Overall Thickness} {Product Number, ex: VRE1-46} Insulating Laminated Coated Glass as manufactured by Viracon.
    - a. Exterior Glass Ply: {Thickness} {Color} {Heat Treatment - AN, HS or FT}
    - b. Coating: {Coating} on #2 Surface
    - c. Space: {Thickness} {Material – aluminum, stainless steel, VTS™, etc.} {finish – mill finish or black painted} {Gas – argon or air} filled
    - d. Silicone: {gray or black}
    - e. Interior Glass Ply 1: {Thickness} {Color} {Heat Treatment - AN, HS or FT}
    - f. Interlayer: {Thickness} {Type – pvb, StormGuard, etc}
    - g. Interior Glass Ply 2: {Thickness} {Color} {Heat Treatment - AN, HS or FT}
  2. Performance Requirements
    - a. Visible Light Transmittance { }%
    - b. Exterior Reflectance { }%
    - c. Winter U-Value { }
    - d. Summer U-Value { }
    - e. Shading Coefficient { }
    - f. Solar Heat Gain Coefficient { }
    - g. Light to Solar Gain Ratio { }
- E. Laminated Insulating Coated Glass:



1. {Overall Thickness} {Product Number, ex: VRE1-46} Laminated Insulating Coated Glass as manufactured by Viracon.
    - a. Exterior Glass Ply 1: {Thickness} {Color} {Heat Treatment - AN, HS or FT}
    - b. Interlayer: {Thickness} {Type – pvb, StormGuard, etc}
    - c. Exterior Glass Ply 2: {Thickness} {Color} {Heat Treatment - AN, HS or FT}
    - d. Coating: {Coating} on #4 Surface
    - e. Space: {Thickness} {Material – aluminum, stainless steel, VTS™, etc.} {finish – mill finish or black painted} {Gas – argon or air} filled
    - f. Silicone: {gray or black}
    - g. Interior Glass Ply: {Thickness} {Color} {Heat Treatment - AN, HS or FT}
  2. Performance Requirements
    - a. Visible Light Transmittance { }%
    - b. Exterior Reflectance { }%
    - c. Winter U-Value { }
    - d. Summer U-Value { }
    - e. Shading Coefficient { }
    - f. Solar Heat Gain Coefficient { }
    - g. Light to Solar Gain Ratio { }
- F. Triple Insulating Coated Glass:
1. {Overall Thickness} {Product Number, ex: VRE1-46} Triple Insulating Coated Glass as manufactured by Viracon.
    - a. Exterior Glass Ply: {Thickness} {Color} {Heat Treatment - AN, HS or FT}
    - b. Coating: {Coating} on #2 Surface
    - c. Spaces: {Thickness} {Material – aluminum, stainless steel, VTS™, etc.} {finish – mill finish or black painted} {Gas – argon or air} filled
    - d. Silicone: {gray or black}
    - e. Middle Glass Ply: {Thickness} {Color} {Heat Treatment - AN, HS or FT}
    - f. Coating: VE-85 on #4 Surface
    - g. Interior Glass Ply: {Thickness} {Color} {Heat Treatment - AN, HS or FT}
  2. Performance Requirements
    - a. Visible Light Transmittance: { }%
    - b. Exterior Reflectance: { }%
    - c. Winter U-Value: { }
    - d. Summer U-Value: { }
    - e. Shading Coefficient: { }
    - f. Solar Heat Gain Coefficient: { }
    - g. Light to Solar Gain Ratio: { }
- G. Insulating Coated Spandrel Glass:
1. {Overall Thickness} {Product Number, ex: VRE1-46} Insulating Coated Spandrel Glass as manufactured by Viracon.
    - a. Exterior Glass Ply: {Thickness} {Color} {Heat Treatment - AN, HS or FT}
    - b. Coating: {Coating} on #2 Surface
    - c. Space: {Thickness} {Material – aluminum, stainless steel, VTS™, etc.} {finish – mill finish or black painted} {Gas – argon or air} filled
    - d. Silicone: {gray or black}
    - e. Interior Glass Ply: {Thickness} {Color} {Heat Treatment - AN, HS or FT}
    - f. Ceramic Frit: {Frit Color – ex: V933 Warm Gray} on #4 Surface
  2. Performance Requirements
    - a. Winter U-Value: { }
    - b. Summer U-Value: { }
- H. Viraspan™ Insulating Coated Silk-screened Glass:
1. {Overall Thickness} {Product Number, ex: VRE1-46} Insulating Coated Silk-screened Glass as manufactured by Viracon.

- a. Exterior Glass Ply: {Thickness} {Color} {Heat Treatment - AN, HS or FT}
  - b. Coating: {Coating} on #2 Surface
  - c. Ceramic Frit: {Frit Color – ex: V933 Warm Gray} on #2 Surface
  - d. Pattern: {Viraspan Design, Viraspan Design-Plus or Viraspan Design-Original} {Screen #} {Pattern – dots, lines, custom, etc.}
  - e. Pattern Orientation: {Orientation - lines vertical, horizontal, etc.}
  - f. Space: {Thickness} {Material – aluminum, stainless steel, VTS™, etc.} {finish – mill finish or black painted} {Gas – argon or air} filled
  - g. Silicone: {gray or black}
  - h. Interior Glass Ply: {Thickness} {Color} {Heat Treatment - AN, HS or FT}
2. Performance Requirements
- a. Visible Light Transmittance: { }%
  - b. Exterior Reflectance: { }%
  - c. Winter U-Value: { }
  - d. Summer U-Value: { }
  - e. Shading Coefficient: { }
  - f. Solar Heat Gain Coefficient: { }
  - g. Light to Solar Gain Ratio: { }
- I. Viraspan™ Monolithic Spandrel Glass:
- 1. {Overall Thickness} Viraspan Monolithic Spandrel Glass as manufactured by Viracon.
    - a. Glass Ply: {Thickness} {Color} {Heat Treatment - HS or FT}
    - b. Ceramic Frit: {Frit Color – ex: V933 Warm Gray} on #2 Surface
  - 2. Performance Requirements
    - a. Winter U-Value { }
    - b. Summer U-Value { }
- J. Viraspan™ Monolithic Silk-screened Glass:
- 1. {Overall Thickness} Viraspan Monolithic Silk-screened Glass as manufactured by Viracon.
    - a. Glass Ply: {Thickness} {Color} {Heat Treatment - HS or FT}
    - b. Ceramic Frit: {Frit Color – ex: V933 Warm Gray} on #2 Surface
    - c. Pattern: {Viraspan Design, Viraspan Design-Plus or Viraspan Design-Original} {Screen #} {Pattern – dots, lines, custom, etc.}
    - d. Pattern Orientation: {Orientation - lines vertical, horizontal, etc.}
  - 2. Performance Requirements
    - a. Visible Light Transmittance { }%
    - b. Exterior Reflectance { }%
    - c. Winter U-Value { }
    - d. Summer U-Value { }
    - e. Shading Coefficient { }
    - f. Solar Heat Gain Coefficient { }
    - g. Light to Solar Gain Ratio { }
- K. DigitalDistinctions™ Insulating Digital Printed Glass:
- 1. {Overall Thickness} Insulating Digital Printed Glass as manufactured by Viracon.
    - a. Exterior Glass Ply: {Thickness} {Color} {Heat Treatment - HS or FT}
    - b. Digital Print File: {File # – ex: D5555} or {Custom artwork to be supplied by architect} on #2 Surface
    - c. Space: {Thickness} {Material – aluminum, stainless steel, VTS™, etc.} {finish – mill finish or black painted} {Gas – argon or air} filled
    - d. Silicone: {gray or black}
    - e. Interior Glass Ply: {Thickness} {Color} {Heat Treatment - AN, HS or FT}
  - 2. Performance Requirements
    - a. Visible Light Transmittance: { }%

- b. Exterior Reflectance: { }%
  - c. Winter U-Value: { }
  - d. Summer U-Value: { }
  - e. Shading Coefficient: { }
  - f. Solar Heat Gain Coefficient: { }
  - g. Light to Solar Gain Ratio: { }
- L. CyberShield™ Insulating Laminated RF Shielding Glass:
1. {Overall Thickness} {Product Number, ex: VRE1-46} Insulating Laminated Coated Glass as manufactured by Viracon.
    - a. Exterior Glass Ply: {Thickness} {Color} {Heat Treatment - AN, HS or FT}
    - b. Coating: {Coating} on #2 Surface
    - c. Space: {Thickness} {Material – aluminum, stainless steel, VTS™, etc.} {finish – mill finish or black painted} {Gas – argon or air} filled
    - d. Silicone: {gray or black}
    - e. Interior Glass Ply 1: 1/4" Clear {Heat Treatment - HS or FT}
    - f. Coating: Pilkington DATASTOP™ on #4 Surface
    - g. Interlayer: {Thickness, must be greater than .060} {Type – pvb, StormGuard, etc}
    - h. Interior Glass Ply 2: 1/4" Clear {Heat Treatment - HS or FT}
    - i. Coating: Pilkington DATASTOP™ on #6 Surface
  2. Performance Requirements
    - a. Visible Light Transmittance { }%
    - b. Exterior Reflectance { }%
    - c. Winter U-Value { }
    - d. Summer U-Value { }
    - e. Shading Coefficient { }
    - f. Solar Heat Gain Coefficient { }
    - g. Light to Solar Gain Ratio { }

## PART 3 – EXECUTION

### 3.1 EXAMINATION

- A. Verification of Conditions:
1. Verify prepared openings for glazing are correctly sized and within tolerance. Verify that the minimum required face and edge clearances are being followed.
  2. Verify that a functioning weep system is present.
  3. Do not proceed with glazing until unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Surface Preparation: Immediately before glazing, clean glazing channels and other framing members receiving glass. Remove coatings not firmly bonded to substrates.
- B. Demolition / Removal: Remove and replace glass that is broken, chipped, cracked or damaged in any way.

### 3.3 INSTALLATION

- A. Install products using the recommendations of manufacturers of glass, sealants, gaskets and other glazing materials including those in the GANA Glazing Manual except where more stringent requirements are indicated.

- B. Prevent glass from contact with contaminating substances that result from construction operations such as weld splatter, fire-safing or plastering.

#### **3.4 CLEANING**

- A. Clean excess sealant or compound from glass and framing members immediately after application using solvents or cleaners recommended by manufacturers.

**END OF SECTION**