This section specifies **View® Dynamic Glass** in CSI format for use by design professionals for use in Project Manuals. Typically edit by deletion based on your project requirements. Please call 408-514-6512 or visit www.viewglass.com for more information.

SECTION 08 88 00 – DYNAMIC GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Section Includes: View Glass Dynamic Glass insulating glass units changes the appearance of the glass from clear to tinted based on controller commands. Work includes, but is not limited to glass, wiring, controls, programming of controls, and system commissioning.

C. Related Requirements:
   1. Division 08 – Openings
   2. Section 25 13 00 - Integrated Control Network for Dynamic Glazing.
   3. Section 26 09 00 - Instrumentation and Control for Dynamic Glazing.
   4. Division 26 - Electrical

1.2 REFERENCES

A. ASTM E1300 Standard Practice for Determining Load Resistance of Glass in Buildings.

B. ASTM C1036 Standard Specification for Flat Glass

C. ASTM C 1048 Standard Specification for Heat-Treated Flat Glass

D. ASTM E2141 Standard Test Methods for Assessing the Durability of Absorptive Electrochromic Coatings on Sealed Insulating Glass Units

E. ASTM E2240 Standard Test Method for Assessing the Current Voltage Cycling Stability at 90° C (194° F) of Absorptive Electrochromic Coatings on Sealed Insulating Glass Units

F. ASTM E2241 Standard Test Method for Assessing the Current Voltage Cycling Stability at Room Temperature of Absorptive Electrochromic Coatings on Sealed Insulating Glass Units

G. ASTM E2354 Standard Guide for Assessing the Durability of an Absorptive Electrochromic Coating within Sealed Insulating Glass Units

H. ASTM E2355 Standard Test Method for Measuring the Uniformity of an Absorptive Electrochromic Coating on a Glazing Surface.

I. ASTM E2953 Standard Specification for Evaluating Accelerated Aging Performance of Electrochromic Devices in Sealed Insulating Glass Units

J. ASTM C1376 Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass.

K. ASTM C1172 Standard Specification for Laminated Architectural Flat Glass.

L. ASTM E2188 Standard Test Method for Insulating Glass Unit Performance.

M. ASTM E2189 Standard Test Method for Testing Resistance to Fogging in Insulating Glass Units.

N. ASTM E2190 Standard Specification for Insulating Glass Unit Performance and Evaluation.

O. IGMA TB-1201-89(05) Sealant Manufacturers Minimum Sealant Dimensions and Placement Survey.

P. IGMA TM-4000-02(07) Insulating Glass Manufacturing Quality Procedures Technical Manual.

Q. American National Institute (ANSI) Z97.1-2009 Standard - Safety Glazing Materials Used in Buildings.

R. Consumer Product Safety Commission (CPSC) 16 CFR 1201 - Safety Standard for Architectural Glazing Materials.

1.3 DEFINITIONS

A. Refer to Division 08 for industry standard glass and glazing definitions. The following apply to this section:
1. Busbar: Electrically conductive metal strip to apply voltage across electrochromic surface of insulated glass units.
2. IGU pigtail: Wire extending from individual special function insulating glass units.
3. Tinted: Dynamic tint state with a lower visible light transmission.
4. Clear: Dynamic tint state with highest visible light transmission.
5. Inboard lite: Pane of IGU that faces interior of building
6. Outboard lite: Pane of IGU that faces exterior of building
7. 2-ply laminated glass: 2-sheets of monolithic glass bonded together with plastic interlayer by heat and pressure
8. Laminate inner-ply: Glass pane in laminated glass construction that faces exterior of building
9. Laminate outer-ply: Glass pane in laminated glass construction that faces interior of building
10. Normal thermal movement: Resulting from ambient temperature range of 120 degrees F (67 degrees C) and from consequent temperature range within glass and glass framing members of 180 degrees F (100 degrees C).
11. Laminated glass deterioration: Defects materially obstructing vision through glass including edge separation or delamination or loss of tinting function.
12. Insulating Glass Unit surfaces and coating orientation:
    a. Surface 1: Exterior surface of outer pane
    b. Surface 2: Interior surface of outer pane
    c. Surface 3: Exterior surface of inner pane
    d. Surface 4: Room side surface of inner pane

1.4 SYSTEM DESCRIPTION

A. Design requirements:
1. Control system: Provided by manufacturer; refer to Section 26 09 00.
2. Remote connectivity: Required for manufacturer's commissioning, testing, performance monitoring and upgrades. Comply with Section 25 08 00.

B. Framing and glazing for special function glass systems: Provided under other sections. Comply with the following:
1. Framing system: Approved by manufacturer of dynamic glazing.
2. Insulating glass unit clearances:
    a. Edge: 1/4 inch (6 mm)
    b. Bite: 5/8 inch (16 mm)
    c. Face: 3/16 inch (5 mm)
3. Controls wiring: Per Section 26 09 00.
4. Glazing materials: Compatible with manufacturer's View Dynamic Glass components.

C. Performance requirements:
1. Glazing and framing systems: Capable of withstanding normal thermal movements, wind loads, and impact loads, without failure, permanent deformation or loss of system functionality.
2. Glass products: Comply with ASTM E1300 and as follows:
    a. Meet or exceed project loads and in-service conditions.
    b. Minimum thicknesses to ensure probability of failure does not exceed:
        1). 8 breaks per 1000 for glass installed vertically and under wind action.
        2). 8 breaks per 1000 for glass sloped not over 15 degrees off vertical and under

wind action.

3). 1 break per 1000 for glass installed 15 degrees or more from vertical plane and under action of wind, snow or both

1.5 SUBMITTALS

A. Comply with Division 01 General Requirements and submit for approval:

1. Product Data: Manufacturer's Dynamic Glass literature including data sheets, installation instructions, use restrictions and limitations.
2. Shop Drawings: Prepared by subcontractor for dynamic glazing, not dynamic glazing manufacturer. Subcontractor must provide copies of shop drawings to View Glass in PDF or CAD format.
   a. Ensure shop drawings show cables, cable routing, components, location of connectors, and exit from framing.
   b. Large scale drawings for fabrication, installation and erections including plans, elevations, details, anchorages, connections and accessories along with head, jamb, sill and joining details. Provide templates for work installed by others.
   c. Field Measurements: Take accurate field measurements before fabrication and indicate same on shop drawings.
3. Samples: Provide View Dynamic Glass IGU sample showing two end states.
   a. Intermediate state samples: Not included, provide via mock-ups.

1.6 QUALITY ASSURANCE

A. Base glass materials

All base glass materials used in the fabrication of View Dynamic Glass products will meet or exceed the requirements of ASTM C1036-11e1 Standard Specification for Flat Glass: Type I Transparent Flat Glass; Class 1 Clear; and Quality Q3 (cut-size or stock sheets) for architectural glazing products including: coated glass, insulating glass units, laminated and other select glass products.

B. Heat-treated glass

Glass requiring heat-treatment for greater resistance to mechanical and thermal stresses shall be heat-treated in accordance with and comply with the requirements of ASTM C 1048-04 Standard Specification for Heat-Treated Flat Glass – Kind HS, Kind FT Coated and Uncoated.

C. Coated glass

View Dynamic Glass coated glass products are fabricated to provide compliance with:

1. ASTM E2141 Standard Test Methods for Assessing the Durability of Absorptive Electrochromic Coatings on Sealed Insulating Glass Units
2. ASTM E2240 Standard Test Method for Assessing the Current Voltage Cycling Stability at 90° C (194° F) of Absorptive Electrochromic Coatings on Sealed Insulating Glass Units
3. ASTM E2241 Standard Test Method for Assessing the Current Voltage Cycling Stability at Room Temperature of Absorptive Electrochromic Coatings on Sealed Insulating Glass Units
4. ASTM E2354 Standard Guide for Assessing the Durability of an Absorptive Electrochromic Coating within Sealed Insulating Glass Units
5. ASTM E2355 Standard Test Method for Measuring the Uniformity of an Absorptive Electrochromic Coating on a Glazing Surface
6. ASTM E2953 Standard Specification for Evaluating Accelerated Aging Performance of Electrochromic Devices in Sealed Insulating Glass Units
7. ASTM C1376- 10 Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass (scratches, pinholes, and defects)

Thermal and optical properties of View Dynamic Glass coated glass will meet requirements of the International Glazing Database and the National Fenestration Rating Council.

View Dynamic Glass® sealed insulating glass units may incorporate low-emissivity coated glass products outsourced from other glass manufacturers. Base coated glass supplied by other

supplier will meet or exceed requirements of ASTM C1376-10 Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass.

D. Laminated glass

Laminated glass products shall be outsourced from suppliers that fabricate product in accordance with the requirements of ASTM C1172-09 Standard Specification for Laminated Architectural Flat Glass.

E. Insulating glass

Sealed insulating glass units will be fabricated to meet or exceed the requirements of:

1. ASTM E2188 Standard Test Method for Insulating Glass Unit Performance
2. ASTM E2189 Standard Test Method for Testing Resistance to Fogging in Insulating Glass Units
3. ASTM E2190 Standard Specification for Insulating Glass Unit Performance and Evaluation
4. IGMA TB-1201-89(05) Sealant Manufacturers Minimum Sealant Dimensions and Placement Survey
5. IGMA TM-4000-02(07) Insulating Glass Manufacturing Quality Procedures Technical Manual

Sealed insulating glass units fabricated by View Dynamic Glass will be tested and certified in accordance with the highest industry standards as set forth by:

1. Insulating Glass Certification Council (IGCC)
2. Insulating Glass Manufacturers Alliance (IGMA)
3. National Fenestration Rating Council (NFRC)

F. Safety glazing materials

Glass for glazing applications requiring safety glazing materials will be fully tempered glass or laminated glass that meets:

1. American National Standards Institute (ANSI) Z97.1-2009 Standard - Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test, or the federal Consumer Product Safety Commission (CPSC) 16 CFR 1201 - Safety Standard for Architectural Glazing Materials, and will be marked and labeled accordingly

Fully tempered glass will be fabricated by View Inc., and certified as a safety glazing material through participation and testing in accordance with requirements of the Safety Glazing Certification Council (SGCC).

1. Laminated glass will be outsourced from fabricators who also participate and certify their products through SGCC.

1.7 DELIVERY, STORAGE AND HANDLING

A. Comply with product requirements, delivery storage and handling provisions of Division 01 and the following:

1. Do not deliver panels until job is ready for installation.
2. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
3. Store materials in original packaging, protected from exposure to harmful environmental conditions including static electricity, and at temperature and humidity conditions recommended by manufacturer.
4. Exercise care to prevent edge damage to glass, wire, and coatings on glass.
5. If insulating glass units will be exposed to substantial altitude changes, avoid hermetic seal ruptures by complying with manufacturer’s recommendations for venting and sealing.

1.8 PROJECT CONDITIONS

A. Verify frame channel dimensions are adequate for wire runs as designed.

B. Environmental Requirements: Ensure that substrate surface and ambient air temperature are minimum of 40 degrees F (5 degrees C) and rising at application time and remain above 40 degrees F (5 degrees C) for at least 24 hours after application of sealants.

1.9 WARRANTY

A. Provide manufacturer's standard limited warranty including the following:
   1. Insulating glass units shall be free from material obstruction of vision as a result of fogging or film formation on the internal glass surfaces caused by failure of the hermetic seal due to defects in material and workmanship.
   2. The Electrochromic Coating shall perform the function of switching the tint level of such for the Limited Warranty Period specified below.

B. The warranty period shall commence on the date of delivery of insulating glass units by the dynamic glass IGU manufacturer.

C. Warranty period:
   1. Insulating Glass Unit which does not include laminated glass or sloped glazing: 10 years
   2. Insulating Glass Unit which does include laminated glass or sloped glazing: 5 years.

1.10 SYSTEM START-UP / OWNER INSTRUCTIONS / COMMISSIONING

A. Provide start up, commissioning and Owner instructions to ensure system functions and is used properly.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis-of-Design: View Dynamic Glass Insulating Glass Units (IGUs) Standard Construction as manufactured or supplied by:

VIEW Inc.
195 S. Milpitas Blvd, Milpitas, CA 95035
Telephone: 408-514-6512
E-mail: sales@viewglass.com
Internet: http://www.viewglass.com.

B. Substitutions: Not permitted

C. Proposed substitutions: Will be reviewed only if submitted in writing for approval by the design professional of record a minimum of 10 working days prior to the bid date and made available to all bidders. Proposed substitutes shall be accompanied by review of specification noting compliance on a line-by-line basis.

2.2 MATERIALS

A. Provide materials complying with the following:
   1. Base glass: ASTM C1036 Standard Specification for Flat Glass: Type I Transparent Flat Glass; Class 1 Clear; and Quality Q3 (cut-size or stock sheets) for architectural glazing product.
   2. Heat treated float glass: ASTM C 1048-04 Type I, Class 1 (clear), Quality Q3, Kind HS, coated and uncoated.
   3. Tempered float glass: ASTM C 1048-04 Type I, Class 1 (clear), Quality Q3, Kind FT, coated and uncoated.
   4. Coated, laminated, safety and insulating unit glass: Comply with reference standards above.

2.3 MANUFACTURED UNITS

A. Special function insulating glass units; comply with the following:
   1. Acceptable model: View Dynamic Glass Insulating Glass Units (IGUs) - Standard Construction.
   2. Outboard Lite:

a. Glass Type: Clear float glass
b. Glass Tint: Variable electrically
c. Nominal Thickness: 0.25 in (6 mm) per industry standards
d. Heat Treatment: Tempered
e. Coating Orientation: Surface No. 2
f. Busbar Location: Along the edge of the glass
g. Dynamic glass to have full area tinting with no bus bars or scribe lines in the daylight opening (DLO) of the IGU

3. Air Space:
   a. Spacer Material: a triple seal design suitable for Structural Glazing, consisting of a thermoset foam spacer incorporating integral 3A desiccant, pre-applied adhesive for glass bonding, a captive polyisobutylene primary seal, and a structural seal. Edgetech Super Spacer TriSeal™ or approved equivalent.
   b. Nominal Thickness: 0.50 plus/minus 0.02 inch (12.5 mm plus/minus 0.5mm)
   c. Gas Fill: 90 percent argon
4. Inboard Lite:
   a. Glass Type: Clear float glass
   b. Glass Tint: Clear
   c. Nominal Thickness: 0.250 inch (6 mm)
   d. Heat Treatment: Tempered
5. Pigtail: Manufacturer's custom cable as follows:
   a. Length: Approximately 12 inches (300mm)
   b. Termination: IP67 rated, environmentally sealed, 5/16" (8mm) circular connector.
   c. Minimum diameter hole through framing: 7/16" (11mm).

B. Standard insulating glass configuration performance:
1. Tint 1 Performance Characteristics (Center of Glass):
   a. Visible Transmittance: 58 percent
   b. Interior Visible Reflectance: 18 percent
   c. Exterior Visible Reflectance: 15 percent
   d. U-factor (U-value): 0.29
   e. Solar Heat Gain Coefficient (SHGC): 0.41
2. Tint 2 Performance Characteristics (Center of Glass):
   a. Visible Transmittance: 40 percent
   b. Interior Visible Reflectance: 17 percent
   c. Exterior Visible Reflectance: 12 percent
   d. U-factor (U-value): 0.29
   e. Solar Heat Gain Coefficient (SHGC): 0.28
3. Tint 3 Performance Characteristics (Center of Glass):
   a. Visible Transmittance: 6 percent
   b. Interior Visible Reflectance: 16 percent
   c. Exterior Visible Reflectance: 9 percent
   d. U-factor (U-value): 0.29
   e. Solar Heat Gain Coefficient (SHGC): 0.11
4. Tint 4 Performance Characteristics (Center of Glass):
   a. Visible Transmittance: 1 percent
   b. Interior Visible Reflectance: 17 percent
   c. Exterior Visible Reflectance: 10 percent
   d. U-factor (U-value): 0.29
   e. Solar Heat Gain Coefficient (SHGC): 0.09.

C. Fabrication:
1. Laminated glass: Fabricate in autoclave with heat and pressure, free of foreign substances and air pockets.
2. IGU units: Hermetically sealed IGU with dehydrated airspace sealed as follows:
   a. Primary seal of polyisobutylene (PIB), color: gray
   b. Secondary seal of silicone, color: black

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine site conditions and verify that:
   1. Site conditions are acceptable for glass installation.
   2. Openings for glazing are correctly sized and within tolerance.
   3. Weep system is installed per GANA Glazing Manual specifications.
   4. Face and edge required minimum clearances are met.
   5. Verify that glazing channels and recesses are clear and free of obstructions, weeps are clear, and that channels and recesses are ready for glazing.

B. Correct conditions deemed unsatisfactory and do not proceed until required corrections are complete.

3.2 PREPARATION

A. Comply with manufacturer's recommendations and as the following:
   1. Clean and prepare glazing channels and framing to receive glass and wire.
   2. Remove coatings and other harmful materials that will prevent glass and glazing installation from meeting performance criteria specified.

B. Glazier installers will attend a minimum of (1) pre-installation training session conducted by View Project Manager either in person or via web hosted by View Project Manager prior to IGU installation into framing system. Attendance at training session to be confirmed by View Project Manager.

3.3 INSTALLATION

A. Install products using manufacturer's recommendations for glass, sealants, gaskets, and other glazing materials, except where more stringent requirements are indicated, such as those referenced in the GANA Glazing Manual.

B. Verify IGU secondary seal is compatible with glazing sealants.

C. Install glass in prepared glazing channels and other framing members.
   1. Comply with glass manufacturer's labels and instructions for glass orientation.

D. The active tint area shall reach edge to edge of the finished window system.
   1. Verify there is no visible light along window perimeter or through center of glass.

E. Protect IGU pigtail from damage during installation.
   1. Prepare Frames (drill holes, deburr hole edges or insert silicone grommet, and seal penetration with silicone) as needed to route View cable per View interconnect drawings.
   2. If IGU pigtail connector is damaged during installation, notify manufacturer and repair connector using manufacturer's approved method.

F. Install setting blocks in rabbets per specifications in the GANA Glazing Manual, IGMA Glazing Guidelines, and manufacturer's Glazing Guidelines.

G. Use edge blocks for installed panes to prevent glass from walking post installation.

H. Provide bite on glass, minimum edge and face clearances, and glazing material tolerances per GANA Glazing Manual, and as approved manufacturer.

I. Provide weep system per specifications in the GANA Glazing Manual.

J. Ensure weight of glass unit is distributed along entire edge, not at corners.

K. Provide expansion joints and anchors, thermal movement accommodations, glass openings, and installation of weep systems, setting blocks, glass spacers, and edge blocks per specifications of framing manufacturer and referenced industry standards.

L. Protect glass from edge damage during handling and installation.

M. Protect glass from contamination of contact with byproducts of construction operations such as weld spatter, fireproofing, or plaster.

N. Remove labels from IGUs within 30 days of exposure to sunlight or any UV light source following removal from manufacturer's packaging.

O. Install per specification of IGMA North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use TM-3000-90(04):
   1. For dry glazed systems, adequate seal shall consist of:
      a. 0.70 N/mm (4lb/in) minimum and not exceeding 1.75 N/mm (10 lb/in) applied to edges of glass unit by gaskets or other fastening systems.

P. Label each end of IGU cables with their respective window controller (WC) ID number as specified on elevation drawings contained in View Glass interconnect drawings.

Q. Notify View on As-Built of any changes to cable routing or cable dimensions on View interconnect drawings.

3.4 ADJUSTING / CLEANING / PROTECTION

A. Adjusting: Remove and replace with new material broken, chipped, or otherwise damaged glass.

B. Clean glass inside and outside per manufacturer's instructions immediately following installation and curing of sealants.
   1. Remove labels and markings from glass.
   2. Clean glass inside and outside immediately following installation and curing of sealants per:
      a. GANA Glass Informational Bulletin GANA 01-0300 - Proper Procedures for Cleaning Architectural Glass Products
      b. GANA Glass Information Bulletin GANA TD-02-0402 - Heat-Treated Glass Surfaces Are Different

C. Protection: Protect assemblies until acceptance of the work of this section.

D. Protection during testing: Comply with the following:
   1. Do not use a high-voltage spark gas analyzer such as the Sparklike Gasglass to evaluate gas content of View Dynamic Glass products.
   2. Use of such device may damage film and controls, potentially voiding View Inc. product warranty.

3.5 COMMISSIONING

A. As part of the work of this section, perform the following
   1. Conduct visual inspection to verify insulating glass units and corresponding pigtail cables are installed in the right orientation as specified in the View IGU product data sheet.
   2. Verify that all IGU pigtails are accessible for connection to the main trunk line
   3. Provide information requested by the commissioning agent for final commissioning documentation.
   4. Utilize View Glass provided hand held IGU testing device to complete View Glass Site Installation and Verification Checklist requirements for glazing subcontractor to verify IGU cable integrity. IGU testing procedures are to be conducted after jobsite installation for field glazed framing system. IGU testing is to be completed for unitized framing system (shop glazed) after unitization and prior to jobsite installation.
   5. Evaluate any performance irregularities and recommend corrective action for any IGU test failure to general contractor and View Glass project manager.
   6. Provide signed and dated Site Installation and Verification Checklist to general contractor verifying that all installed IGUs are functional based on View test procedures.
   7. Provide Site Installation and Verification Checklist verifying that all installed IGUs are functional based on View test procedures signed and dated by General Contractor.
   8. Provide means for the commissioning agent to access, visually observe, and confirm proper operation of the View Dynamic Glass system.

END OF SECTION 08 88 00

The information contained in this publication is offered for assistance in the specification of View Inc. products. It is not intended to be complete and View Inc. Does not assume any responsibility for the adequacy of the specification for a particular application. Due to continual research and product improvement, the specifications are subject to change without notice and without incurring obligation. Actual performance may vary in specific applications. An appropriate and qualified design professional must verify suitability of the product for use in a particular application, as well as review final specifications. Contact View Inc. sales to obtain up-to-date information relevant to your specific project or warranty information.