

1 **PART 1 - GENERAL**

1.1 SECTION INCLUDES

- 1.1.1 Design, labor, products, equipment and services necessary for exterior building integrated photovoltaics (BIPV) facade work, in accordance with the Contract Documents.

1.2 SYSTEM DESCRIPTION

- 1.2.1 Work of this section to be designed by a Professional Engineer registered in state/province of location of project.
- 1.2.2 Design, fabricate and erect work to satisfy the requirements of this section.
- 1.2.3 Design system based on rainscreen principle.
- 1.2.4 Structural & Thermal Movements: Accommodate movement of building structure and movement caused by thermal expansion and contraction of system component parts without causing bowing, buckling, cracking, oil canning, failure of joint seals, excessive stress on fasteners or any other detrimental effects.
- 1.2.5 Dead Loads: Support self-weight of system components.
- 1.2.6 Panel Removal: Design system to allow removal of any individual panel.
- 1.2.7 Design panel joint system in conformance with Solstex® BIPV; any components behind the panel system should not be visible.
- 1.2.8 Panel joint system to be free of extruded trim returning on the face of the BIPV curtainwall.
- 1.2.9 Produce photovoltaic energy systems that satisfy specified requirements and maintain architectural concepts per drawings and as needed for a complete, certified installation.
- 1.2.10 Provide details of electrical connections, power generation estimates, and destination of power produced.
- 1.2.11 The installation of electrical equipment shall comply with all code sections relevant to the location of the project. I.E, all necessary calculations regarding short circuit and high-voltage considerations.
- 1.2.12 Electrical Connections: Inter-panel connections to be hidden from view by the panel system. Home-runs to terminate at the proper terminals, with co-ordination.

1.3 QUALITY ASSURANCE

- 1.3.1 Installer Qualification: Trained and approved by the manufacturer, and having the necessary experience, staff, and training to install manufacturer's products. Manufacturer's willingness to sell its products to installers does not in itself confer qualification on installer. Provide letter of certification from manufacturer stating that installer is a certified applicator of its products, and is familiar with proper procedures and installation requirements recommended by the manufacturer. Installer shall have proven experience with exterior facade systems for a minimum of ten (10) years and to have completed at least ten (10) major wall facade projects. Installer shall abide by Elemex's warranty and warranty the install of the project, including any remedial work as the result of warranty claims.
- 1.3.2 Pre-Installation Meeting: Two weeks prior to commencing work of this section, arrange for the manufacturer's qualified installer to visit the site and review preparatory and installation procedures to be followed, conditions under which the work will be done, and inspect the

surfaces to receive the work of this section. Consultant is responsible for scheduling the date and time of the meeting.

- 1.3.3 Manufacturer's Site Inspection: The manufacturer's qualified installer will inspect the site weekly, providing inspection reports and photographs, to verify that the work of this section is correctly installed.
- 1.3.4 Supply Manufacturer Qualification: Supply manufacturers shall have proven experience manufacturing photovoltaic equipment for a minimum of ten (10) years. They shall be able to produce equipment on schedule. Their facility shall be certified to ISO 9001 and ISO 14001.
- 1.3.5 Regulatory: System shall meet codes of local, federal, and state jurisdiction, both of an electrical nature and of a structural nature. Photovoltaic modules shall meet requirements of UL-1703.
- 1.3.6 Source Limitations: Obtain each type of product from a single manufacturer.
- 1.3.7 Panel Lines and Angles: sharp and true.

1.4 PERFORMANCE REQUIREMENTS

Solar Panel Requirements

- 1.4.1 IEC 61730

DC Combiner Box:

- 1.4.2 Listed to UL 1741
- 1.4.3 Meets NFPA 70 requirements for Overcurrent Protection
- 1.4.4 Meets NFPA 70 requirements for Rapid Shutdown if no other means of Rapid Shutdown is present within the system design

DC-to-AC Inverter:

- 1.4.5 Listed to UL 1741, UL 1998
- 1.4.6 Anti-Islanding Protections
- 1.4.7 Meets NFPA 70 requirements for Rapid Shutdown activation with optimizers or combiners if no other means of Rapid Shutdown activation is present within the system design

Wiring:

- 1.4.8 Listed to UL 4703, UL 44 RHW-2, UL 854 USE-2

1.5 SUBMITTALS

- 1.5.1 Product Submittals: Photovoltaic panels, AC and DC combiner boxes, DC to AC power inverters, system wiring, system disconnects and meters
- 1.5.2 For each product: include material descriptions, key dimensions and all relevant electrical/operating characteristics, as well as manufacturer's storage and installation instructions
- 1.5.3 Datasheets: Certified datasheets confirming stated characteristics of equipment
- 1.5.4 Submit samples in accordance with section [01 33 23]
 - 1.5.1.1 [(6"-24")] [150mm-600mm] long of support framing, trims and corners.
 - 1.5.1.2 [(6" or 12")] [150mm or 300mm] x [(6" or 12")] [150mm or 300mm] samples of each panel selected by Consultant
 - 1.5.1.3 [(6" or 12")] [150mm or 300mm] x [(6" or 12")] [150mm or 300mm] mounted samples of four equal sized panels showing four-way joint.
 - 1.5.1.4 Identify samples with project number, date and name of contractor.
- 1.5.5 Shop Drawings: Bearing seal and signature of the Professional Engineer who is registered in the state/province of location of project, and who is responsible for the engineering design of

work of this section. Clearly indicate type and thicknesses of system components, size, spacing and location of support framing, sub-girts, connections, types and locations of fastenings. Indicate provisions for structural and thermal movement between panel system and adjacent materials.

1.6 MAINTENANCE DATA

- 1.6.1 Provide maintenance data for all electrical equipment.
- 1.6.2 Provide maintenance data for panel finishes and cleaning procedures for incorporation into manual specified in section [01 78 23 16].

1.7 PRODUCT DELIVERY, HANDLING AND STORAGE

- 1.7.1 Materials shall be delivered in accordance with manufacturer's instructions, in original packing with identification labels.
- 1.7.2 Electrical equipment should be stored inside, in a dry environment.
- 1.7.3 Store solar panels and installation system materials in a dry location; handle in a manner to prevent chipping or breakage. The solar panels should be stored in an upright position. Panels stored in their vertical position should be on their long side. This side must be protected by means of wooden crating, cardboard or polystyrene.

1.8 MOCK-UP

- 1.8.1 Submit mock-up in accordance with section [01 43 39]
- 1.8.2 Erect mock-up of the Elemex® Solstex® BIPV approximately [____] long x [____] high in location directed by Consultant.
- 1.8.3 Mock-up of the Elemex® Solstex® BIPV shall include all components of the wall system and if approved by Consultant may be incorporated into finished work.
- 1.8.4 Notify 72 hours before installation of mock-up for inspection by Consultant. Do not proceed with panel system work until mock-up has been approved.

*Note: Above section to be deleted if a mock-up is not required.

1.9 COORDINATION

- 1.9.1 Coordinate with installers of wall mounted items, equipment, mechanical, and electrical work so that installation will not subvert the integrity of the cladding system.
- 1.9.2 Coordinate building penetrations for conduit/wiring purposes.
- 1.9.3 Coordinate interface of photovoltaic system with existing/planned building electrical design.
- 1.9.4 Panel penetrations must be pre-approved by manufacturer before on-site work can commence.
- 1.9.5 Coordinate interface, transition, lapping, flashings and compatibility of membranes with other trades.

1.10 WARRANTY

- 1.10.1 For product finish: 10-year panel manufacturer warranty against any defect in material or manufacture from date of initial purchase.

- 1.10.2 For work in this section, system warranty by manufacturer against defects or deficiencies in materials or workmanship shall be for a period of one (1) year from date of substantial completion.
- 1.10.3 For power production, 25-year manufacturer warranty ensuring power production is at 80% or higher after 25 years from date of electrical connection to local use, storage, or grid.
- 1.10.4 Elemex will be responsible for replacing or repairing Solstex panels in the event that more than 2% of panels are not meeting their expected power production within the first year.

2 PART 2 – PRODUCTS

2.1 MANUFACTURER

- 2.1.1 Specified Products: Work of this section is based on the Elemex® Solstex® BIPV, to meet this system's function, design, performance, and construction process, complying with requirements set forth in this section and subject to the consultant's acceptance.
- 2.1.2 All requests for equivalency to be submitted for review no later than 10 days before tender closing. No alternates will be reviewed post tender.
- 2.1.3 For additional information on the Elemex® Solstex® BIPV please contact Elemex® Inc. at info@elemex.com, telephone 1(844) 435-3639

2.2 MATERIALS

Frameless Solar Panel:

[5/16" (8 mm+) thick Glass-on-Glass Solar Module]

- 2.2.1 Crystalline silicon semiconductor cells sandwiched between two sheets of high transmission, heat strengthened glass
- 2.2.2 Standard Dimensions Solstex: 67" x 39.37" (1700mm x 1000mm); Custom sizing up to 4000 mm x 2000 mm
- 2.2.3 Solar Panel Colors: White, Polar White, Lime White, Grey, Polar Grey, Anthracite, Blue, Deep Blue, Green, Intense Green, Coral Brown, Marble Brown, Terracota, Corten Steel, Sand, Ocher, Clay
- 2.2.4 Solar Panel Power at standard size: 85-238 W

DC Combiner Box:

- 2.2.5 Has relevant certification marks for install in proposed jurisdiction
- 2.2.6 NEMA 4/4X Rated for Outdoor Use
- 2.2.7 Compatible with Selected Inverter and PV source circuit design

DC-to-AC Inverter:

- 2.2.8 Has relevant certification marks for install in proposed jurisdiction
- 2.2.9 NEMA 4/4X Rated for Outdoor Use
- 2.2.10 Compatible with Selected Combiner Boxes and PV source circuit design

Wiring:

- 2.2.11 Designed and produced in use for photovoltaic systems
- 2.2.12 Rated for Outdoor Use
- 2.2.13 Compatible with Selected Electrical Equipment and PV source circuit design



Unity® Attachment Technology:

- 2.2.14 A Concealed Mechanically Fastened Aluminum Framing System as manufactured by Elemex® Inc. that can support a variety of veneer finishes. ACM (FR), Plate. Stonitex® - Natural Stone and Ceramitex® adjacent to Elemex® Solstex® will seamlessly integrate and finish at the same plane.
- 2.2.15 Aluminum Infill Treatment: Alumitex® FR-Core infill strip;
 - .1 Color: [To match Extrusions]
- 2.2.16 Compression Gaskets: Continuous extruded EPDM of 80 Durometer A hardness. Insert Gasket to integrate with the Elemex® Proprietary Unity® Attachment Technology.
- 2.2.17 Aluminum Treatment:

There are two types of coatings used on the aluminum extrusions:

 - 1) *Standard black*: two-stage anodized (electrochemical process) method;
 - 2) *Standard white*: mill finished extrusions are treated with a chromate conversion process (i.e. Alodine). The extrusions are then masked at structural silicone contact locations. This is followed by a PVdF coating (polyvinylidene fluoride) in standard white. Custom color joints only available on quantities over 20,000 SF per color; requirement must clearly be indicated in specification and on elevation legend.
- 2.2.18 Solar Panel Adhesive:

Dow Corning 983 Structural Silicone: Project requires a batch specific modified ASTM C794 Adhesion-in-Peel of Elastomeric Joint Sealants Test Report with Dow Corning Adhesion Performance Warranty Report.

Related Products:

- 2.2.19 Supporting Framing: Enviroclip™ by Elemex®: Load bearing, thermal break clip, manufactured from [Z-275] galvanized steel with a bonded thermal retardant membrane. Adjustable angles, Z-bars and channel subgirts: manufactured from [Z-275] galvanized steel and shall be designed to accommodate expansion and contraction, dynamic movements and design load requirements.
- 2.2.20 Air/Vapor Barrier: Use approved material as required by local building code.
- 2.2.21 Semi-rigid, Rigid, Sprayed Insulation:
 - .1 Use approved insulation material conforming to local building codes.
 - .2 Thickness: [_____]
 - .3 Acceptable Material:
 - .1 [_____]
- 2.2.22 Trims and Closures: Inside corners, outside corners, control joints, wall fixtures and termination trims. Painted steel.

2.3 FABRICATION

- 2.3.1 Co-ordinate and verify job site dimensions affecting work of this section. Ensure suitability of adjacent building components in relation to work of this section.
- 2.3.2 Panels to be factory fabricated in a controlled environment.
- 2.3.3 Fabricate work to profiles and sizes as indicated on the architectural drawings and confirmed site dimensions, as defined in this section's scope of work; complete with trims, flashings and

filler components as required to interface with work of other sections. Make provisions for thermal and structural movements.

- 2.3.4 The location and sizes of all penetrations to be provided by all trades to the manufacturer prior to shop drawings for architect's approval. Any additional required penetrations after first submittals will be an expense to that trade. Exterior penetrations greater than 12" x 12" (300mm x 300mm) to be reinforced to details as indicated or to the manufacturer's standard.

3 **PART 3 - EXECUTION**

3.1 EXAMINATION

- 3.1.1 Examine work of other sections upon which work of this section depends.
3.1.2 Report any unsatisfactory conditions to consultant in writing. Do not start work until unsatisfactory conditions are rectified.

3.2 INSTALLATION – GENERAL

- 3.2.1 Install supporting framing required to support work of this section.
3.2.2 Install work in accordance with manufacturer's written instructions, plumb with intersecting parts joined together to provide accurately fitted joints with adjoining surfaces in true planes. Attach components in manner not restricting movement.
3.2.3 Apply isolation coating/tape to concealed surfaces of dissimilar metals and metals in direct contact with concrete or masonry.
3.2.4 Install electrical equipment as per manufacturer's written instructions, ensuring equipment is installed in a safe, operable, and accessible (as necessary) manner.
3.2.5 Installer Qualification: Trained and approved by the manufacturer as per 1.3.1.

3.3 INSTALLATION

- 3.3.1 Complete Installation: Provide mounting hardware compatible with the Elemex® Solstex® BIPV, manufacturer's standard profiles, joint closures and perimeter trim as required for a complete installation.
3.3.2 When thermal break is required and/or desired, attach thermal clip to the given substrate with the appropriate fasteners as per type of the substrate. Confirm spacing and type of fastener with local Engineers to determine the appropriate attachment method.
3.3.3 Mechanically fasten sub-girts to thermal clip; following manufacturer's installation guidelines.
3.3.4 Lay out home-run wiring and connectors as per manufacturer's instructions.
3.3.5 Align Elemex® Solstex® panels end-to-end to provide accurate fit with adjacent panels. Ensure adjacent panels are parallel and straight at joints. Make connections between panels and to appropriate home-run wiring per system details.
3.3.6 Install interior electrical equipment to the supply manufacturer's instructions, when convenient, as per the building plan.

3.4 INSTALLATION TOLERANCES



- 3.4.1 Variation in Line Over Entire Area: For positions shown in plan and continuous lines, do not exceed 1:500 or 15 mm, whichever is less.
- 3.4.2 Variation in Plumb Over Entire Area: Vertical lines, external corners and other vertical conspicuous lines, do not exceed 1:500.
- 3.4.3 Variation in Level, Panel to Panel: Horizontal bands, horizontal grooves, and other horizontal conspicuous lines, do not exceed 1:500.
- 3.4.4 Variation in Panel Joint Width: Do not exceed 3 mm.
- 3.4.5 Variation in Plane Between Adjacent Panels (Lipping or Step-in-Face): Do not exceed 1 mm difference between planes of adjacent panels.
- 3.4.6 Jog in Alignment of Edge of Adjacent Panels: Do not exceed 1 mm.

3.5 CLEAN-UP

- 3.5.1 Clean exposed panel surfaces in accordance with manufacturer's instructions.

END OF SECTION

