TESLA SOLAR ROOF CONSTRUCTION SPECIFICATION

TESLA SPECIFICATION NOTE: This guide specification is provided in CSI Format for use by design professionals for individual construction projects as a technical support tool. This document should be reviewed and edited to suit Project needs and requirements by a qualified design professional. Contact Tesla for more information on the Solar Roof system.

SECTION 07 31 00: Roof Shingles and Shakes

PART I - GENERAL

1.1 SUMMARY

A. Manufacturer's requirements for the proper design, use, and installation of a Building Integrated Photovoltaics (BIPV) Roofing System, including underlayment and flashing accessories.

B. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

C. Related Sections: Refer to the following specification sections for coordination:

1. Section 06 10 00 - Rough Carpentry
2. Section 06 16 00 - Sheathing
3. Section 07 62 00 - Flashing and Sheet metal: Sheet metal flashing not associated with Solar Roof; Gutters and Downspouts
4. Section 08 63 00 - Unit Skylights: Skylight
5. Section 07 92 00 - Joint Sealant
6. Section 26 05 11 - Requirements for Electrical Installations

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's product data and installation instructions, including surface preparation recommendations, and storage and handling requirements.

1.3 REFERENCED STANDARDS

A. American Society for Testing Materials (ASTM)

1. ASTM D1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
2. ASTM D3161 - Standard Test Method for Wind Resistance of Steep Slope Roofing Products (Fan-Induced Method)
3. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings

B. Underwriters laboratories (UL)

1. UL 790 - Standard Test Methods for Fire Tests of Roof Coverings
2. UL 2218 – Impact Resistance of Prepared Roof Coverings
3. UL 3741 - PV Hazard Control Solution
4. UL 61730 - Photovoltaic (PV) Module Safety Qualification
5. UL 7103 - Outline of Investigation for Building-Integrated Photovoltaic Roof Coverings

C. FM 4473 – Specification Test Standard of Impact Resistance of Testing of Rigid Roofing Materials by Impacting with Freezer Ice Balls

D. TAS 100 – Standard Test Method for Wind and Wind Driven Rain Resistance of Discontinuous Roof Systems

E. Sheet Metal and Air Conditioning Contractors National Association (SMACNA) - Architectural Sheet Metal Manual

F. National Roofing Contractors Association (NRCA) – Roofing Manual

G. American Society of Civil Engineers (ASCE)

1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

1.4 DELIVERY, STORAGE, AND HANDLING

A. General: Comply with manufacturer's current published product storage recommendations.

B. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

C. Storage: Store materials above ground, under waterproof covering, protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer. Store products in manufacturer's unopened packaging until just prior to installation. Use within one year of date of manufacture. Do not store at elevated temperatures as that will reduce the shelf life of the product.

D. Handling: Exercise caution in unloading and handling Solar Roof system to prevent bending, warping, twisting and damages to the tiles and accessories.

1.5 PROJECT CONDITIONS

A. Weather: Proceed with work only when existing and forecasted weather conditions will permit work to be performed in accordance with Tesla's recommendations.

B. All surfaces to receive the roof covering and underlayment shall be free from visible water, dew, frost, snow and ice.

PART II - PRODUCTS

2.1 MANUFACTURER

A. Acceptable Manufacturer: Tesla, Inc, tesla.com.

B. Basis of Design Produce: **Solar Roof** by Tesla.

2.2 Solar Photovoltaic (PV) Shingles

A. Photovoltaic module with fiberglass substate and film layers. UL 790 Class A rated; ASTM D 3161, Class F wind resistant; UL 2218 Class 4 rated. California Cool Roof Compliant. Florida Building Code Approved. **Solar Roof** by Tesla.

2.3 Non-energy Producing Shingles

A. Metal Tile

1. 24 Gauge Galvalume steel with a black PVDF-coated, textured surface designed to use in non-energy producing areas of the roof. **Metal Tile** by Tesla.

B. Glass Tile

1. Tempered glass with fiberglass substate and black silicone backer, textured surface designed to use in non-energy producing areas of the roof. **Glass Tile** by Tesla.

2.4 Self-Adhering Sheet Membrane Roof Underlayment

A. Fire resistive (FR), cold applied, synthetic composite, self-adhering, primer-less, non-asphaltic membrane with pressure sensitive adhesive, interwound with a disposable release film. UV stabilized construction (180 days). Meets ASTM D1970 and approved by ICC, Florida Building Code, and Dade Country. AC188 Class A rated.

B. Non-fire resistive (Non-FR), cold applied, self-adhering, primer-less, non-asphaltic membrane interwound with a disposable release film. Meets ASTM D1970 and approved by ICC, Florida Building Code, and Dade Country. AC188 Class C rated.

C. Detail Roll, cold applied, self-adhering polymer modified membrane interwound with a disposable release paper. Meets or exceeds ASTM D1970 and approved by ICC, Florida Building Code, and Dade Country.

2.5 ROOF ACCESSORIES

A. UV stable solid molded, elastomeric compression collar, Kynar PVDF coated 26 gauge galvalume metal base resizable flashing boot.

B. Accessory Bracket and Snow Guards

1. System must be properly designed to resist required snow loads.

2.6 VENTILATION ACCESSORIES

A. Ridge Vent

1. Flexible rigid plastic ridge ventilator designed to allow the heat and moisture removal from attics, while resisting rain, snow and insect infiltration. Provides 12.5 sq inches Net Free Ventilation Area per lineal foot (26460 sq.mm/m). **Ridge Roll** by Tesla.
2. Galvalume cap. **Cap** by Tesla.

B. Tile Vent

1. Rooftop mounted, low-profile, rectangular-top designed, ventilator designed to remove heat and moisture from attics. Each vent provides 40 sq in NFVA. **Tile Vent** by Tesla.

2.7 FASTENING

A. Nails

1. Stainless steel, ring shank nail with 1.25 inch length.

B. Deck Screw

1. 1 inch length

C. Self-tap Screw

1. Stainless steel 3/4 inch length

D. Wood Screw

1. 2 3/8 length

2.8 METAL FLASHING

A. Galvalume sheet steel, complying with ASTM A792, AZ 55.

1. 24 Gauge
2. 26 Gauge

2.9 SOURCE QUALITY CONTROL

1. Source: Obtain roof shingles, flashing and other accessories from a single manufacturer.

PART III - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until the roof deck has been properly installed and prepared.

B. If roof deck preparation is the responsibility of another installer, notify the architect or building owner of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Verify existing conditions to ensure deck surfaces are suitable for installation of roofing underlayment.

B. Verify that the deck is structurally sound. Deck should be free of any depressions, waves, projections and deterioration.

C. Replace damaged or deteriorated deck with new materials.

D. Remove dust, dirt, loose materials, and protrusions from deck surface.

E. Install crickets on the upslope side of any chimneys and penetrations wider than 30" (610mm).

F. Starting work indicates installers acceptance of existing conditions.

3.3 UNDERLAYMENT INSTALLATION

A. Install roofing underlayment over entire roof surface.

B. Installation shall follow with manufacturer's written installation instructions, in accordance with local building codes. When local codes and application instructions are in conflict, the more stringent requirements shall take precedence.

C. General, but not limited to the following:

1. Schedule installation such that underlayment is covered by roofing within the published exposure limit of the underlayment.
2. Do not install underlayment over frosted or wet surface.
3. Install when surface temperature of substrate is a minimum of 40 degrees F (5 degrees C).
4. Install membrane on clean, dry, continuous structural deck. Fill voids and damaged or unsupported areas prior to installation.
5. Install membrane in a positive lapping manner such that all laps shed water. Work from the low point to the high point of the roof at all times. Apply the membrane in valleys before the membrane is applied to the eaves. Following placement along the eaves, continue application of the membrane up the roof.
6. Side laps minimum 3 inches (76 mm) and end laps minimum 6 inches (152 mm) following lap lines marked on underlayment.
7. Detail penetrations and patch damage using manufacturer's recommended methods.

3.4 SOLAR ROOF COVERING INSTALLATION

A. General: Comply with manufacturer's installation instructions including but not limited to special techniques, interface with other work, and integrations of systems.

B. Fasten Solar Roof covering at each tile at location, spacing, and using proper fasteners as recommended by the manufacturer.

3.5 ACCESSORY INSTALLATION

A. General: Install accessories using techniques recommended by manufacturer and which will assure positive anchorage to building and weather tight mounting. Coordinate installation with flashings and other components.

B. Flashing and Trim: Comply with manufacturer's written installation instructions. Install work with laps, joints, and seams that will be permanently watertight.

3.6 INSTALLATION OF ATTIC VENTILATION

A. General: Ventilation must meet or exceed local code requirements.

B. Install ridge vent and/or tile vent in sufficient quantity to equal the vent areas per Project Document.

C. Install according to manufacturer's instruction for flashing vent penetrations.

3.7 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: If requested by Owner, provide manufacturer's field service consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

1. Site Visits: **<Insert requirements for site visits.>**

3.8 CLEANING

A. Remove temporary coverings and protection of adjacent work areas.

B. Clean installed tiles in accordance with manufacturer's instructions prior to Owner's acceptance.

C. Remove and lawfully dispose of construction debris from Project site.

3.9 PROTECTION

A. Protect installed products and finish surfaces from foot traffic and damage during construction.

B. Repair or replace any installed products that have been damaged.

C. Any roof areas that are not completed by the end of the workday shall be protected from weathering and contaminants.

END OF SECTION