SECTION 08620

CIRALIGHT SUNTRACKER ACTIVE SKYLIGHTS

EDIT NOTE: CIRALIGHT SUNTRACKERS ALLOW INTERIOR SPACES TO REPLACE ARTIFICIAL LIGHTING WITH NATURAL DAYLIGHT DURING THE DAY TIME BY CONTINUALLY TRACKING THE SUN'S POSITION AND CONSISTENTLY REFLECTING IT'S LIGHT INDOORS. CIRALIGHT SUNTRACKERS ARE RECOMMENDED FOR LARGE SPACES SUCH AS GYMNASIUMS, LIBRARIES, , HALLWAYS AND WAREHOUSE FACILITIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. 4X4 SunTracker 400

B. 4X8 SunTracker 800

C. Work required for this section includes skylights with integral active daylighting control system capable of tracking the sun's path throughout the day with supplementary items necessary to complete the installation.

1.2 RELATED SECTIONS

A. Section 03300 - Cast-In-Place Concrete: Structural concrete roof decks.

B. Section 03510 - Cementitious Roof Deck.

C. Section 03520 - Lightweight Concrete Roof Insulation.

D. Section 06100 - Rough Carpentry for preservative-treated wood blocking and curbs.

E. Section 07500 - Membrane Roofing.

F. Section 07620 - Sheet Metal Flashing and Trim: Metal flashing and counter flashing installation and requirements.

G. Section 07700 - Roof Accessories for roof hatches and smoke vents.

H. Section 07700 - Roofing System for roofing membrane.

I. Section 09500 - Ceilings for type of system.

1.3 REFERENCES

A. The Aluminum Association, Inc. (AA): SAS-30 - Specifications for Aluminum Structures

B. ASTM D785: Standard Test Method for Rockwell Hardness of Plastics and Electrical Insulating Materials

C. ASTM E 283 - Standard Test Method for Determining Rate of Air Leakage 300 Pa (6.2 psf)

D. ASTM E 330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference

E. ASTM E 331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference

F. ASTM B 221: Standard Specification for Aluminum and Aluminum-Alloy

G. ASTM D543: Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents

H. ASTM D1003: Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics

I. ASTM E1651: Standard Test Method for Total Luminous Reflectance Factor by Use of 30/t Integrating-Sphere Geometry

J. ISO 175: Plastics - Methods of Test for the Determination of the Effects of Immersion in Liquid Chemicals

K. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). ASHRAE 90.1 - Energy Standard for Buildings Except Low-Rise Non Residential and Residential Buildings.

L. United States Military Standards MIL-STD-1540C - Test Requirements for Launch, Upper-Stage, and Space Vehicles and MIL-STD-810F, Method 506.4 - Environmental Engineering Considerations and Laboratory Tests

M. National Fenestration Rating Council (NFRC): NFRC 100 - Procedure for Determining Fenestration Product U-Factors and NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance of Normal Incidence. Refer to report No: B0876.01-301-46

N. North American Fenestration Standard (NAFS): The Voluntary Performance Specification for Windows, Skylights, and Glass Doors.

O. AAMA A440-05 Certification: Lab No: L-10-1608R1 Ciralight SunTracker Skylight Testing for Standard Performance Requirement: Air Leakage per ASTME283, Water Penetration per ASTM E331, Uniform Load Deflection per ASTM E330, and Uniform Load Structural per ASTM E330.

P. Solar Heat Gain Coefficient vs. Sun Altitude Report, Report No.: A9976.01-301-41 (4x4) base on test method of NFRC 201-2010.

Q. 30 Year Life Cycle Test by Suntron: Ciralight SunTracker Skylight successfully completed the prescribed 30 year life cycle test and from this testing it is reasonable to expect that the product will have a 30 years expected life. For further information and performance details please request Testing Report from Ciralight.

R. Florida Product Approval: Report FL #14468.1 – Ciralight SunTracker Skylight. For further information go to Florida Department of Business and Professional Regulation. Here is the link to the product report: http://www.floridabuilding.org/pr/pr_app_lst.aspx

1.4 PERFORMANCE REQUIREMENTS

A. This is a performance specification and skylight system manufacturer is responsible for complete design and engineering required to meet specified performance requirements within physical and aesthetic requirements established.

B. Design Requirements:

1. Skylight shall include active daylighting system with a solar powered GPS controller and a mirror array that tracks the sun precisely throughout the day and the year.
2. Skylight shall include extruded aluminum-framing members with integral leak proof gutter system for drainage of condensation.

C. Performance Requirements:

1. Ciralight Suntracker Skylight went through rigorous testing under the Smith-Emery Laboratories for AAMA certification. Passed all of the follow ASTM – E283, E331, E330. Therefore met the performance requirements specified in AAMA/WDMA/CSA101/I.S.2/A440-05 for SKPC30 1295x1295(51x51). Refer to report Lab No: L-10-1608R1. If report is needed please request from Ciralight.

2. General Skylight Specification:

a) Dome: The Dome is available in Acrylic or Polycarbonate material.

i. The Acrylic Dome is made of extruded sheet of high impact, optically clear, acrylic with UV protection. Light Transmissions: ASTM D-1003, 91% at 0.177 thickness. Rockwell hardness: ASTM D-785 (M Scale), 45 Impact Strength: ASTM D-256 (IZOD). 1.2 at 73 degrees F and 0.5 at 0 degrees F.

ii. The Polycarbonate dome is made of an optically clear solid polycarbonate sheet, thickness .177 in. (4.4958 mm), UV protected on one side, ASTM E-84 - Class A, ASTM D-635 - CC1, UL Classified - V2 (File e221255), BS 476/7 Class 1Y, Impact Falling Weight (ISO 6603/1 E50) - 117 lb. ft, Rockwell Hardness (ASTM D-785) - 125R (R Scale), Light Transmissions: ASTM D-1003, 89% at 0.12in. Outer Dome Glazing Color: Colorless, transparent.

b) Frame: Extruded aluminum alloy type 6063 TS welded, with integral condensation gutters, gaskets with a factory mounted airtight acrylic or polycarbonate diffuser lens glazing (overall thickness of 3mm and 91% translucence) secured in place with weather stripping and aluminum bracket. Dome Frame sits on top of curb and is fastened to the curb with screws. The frame includes an Aluminum retaining cap which is extruded aluminum alloy type 6063 TS welded. The retaining cap is placed on top of Dome and secures the Dome in the Frame with 4 self tapping retaining screws on each side of the four skylight sides.

i. Aluminum Finishes General: Comply with NAAMM "Metal Finishes Manual" recommendations for application and designations of finishes.

ii. Condensation Control: The leak proof dome frame is designed with internal gutters and non-clogging weeps to specifically collect and drain any condensation to the exterior.

c) Mirror Array: There are two different mirror array design options available, a single mirror array system and a triple mirror array system. The single mirror array system includes a single piece of highly reflective Alanod aluminum that serves a mirror. The Alanod aluminum thickness is .02 in. Reflection to ASTM: E-1651 (95%). The triple mirror array system includes three pieces of aluminum reflector coated with a super reflective Oxide-layer system on one side to reflect light. Reflection to ASTM: E-1651 (95%). Each of the three mirrors are at slightly different angles to best capture low angles of the sun. The triple mirror array system is recommended for regions above the 40th parallel to the north in the northern hemisphere and below the 40th parallel to the south in the southern hemisphere.

d) Light Well: Constructed of four interlocking light well panels, made of .040 aluminum with pre-coated white reflective material. Light wells are sealed at the corners with weather stripping and screwed together with self-tapping screws.

e) GPS Controller: Solar powered solar tracking GPS controller has the ability to accurately calculate and track the sun's position regardless of weather. The solar tracking GPS controller is a Polycarbonate/ABS blend case, pre-programmed at the factory to work anywhere in the world. Uses super capacitors to store solar power generated, no batteries, and no electrical hookup needed.

f) Diffuser Lens: Upper prismatic diffuser lens is a flat impact modified acrylic or polycarbonate mounted airtight at factory and located within the Dome frame at the top of the Light well. Lower diffuser lens options include formed impact modified acrylic or polycarbonate, located and sealed at the bottom of the light well. Lower diffuser lens options include a) pyramid prismatic lens, b) flat prismatic lens, and c) low ceiling lens which are best for installations at 12 ft or lower.

g) Energy Performance: U Value = .40 SHGC = .3196 DOME VLT = 91%, Meets OSHA fall protection (report #72202.01-109-44)

3. Provide skylight system capable of accommodating expansion and contraction of components resulting from an ambient temperature change of 200 degrees F without causing buckling, excessive stresses on glazing, structural elements or fasteners, failure of seals, reduction of performance or other detrimental effects as outlined in MIL-STD-1540C.

4. The skylight system shall be tested according to MIL-STD- 1540C and capable of continued operation while being subjected to temperatures of at least 190 degrees F.

5. The skylight system shall be subjected to a wind and blowing rain test per MIL-STD-810F, Method 506.4, and Procedure 1. The skylight system will resist wind speeds up to 105 miles per hour and blowing rain of 4 inches per hour blowing at 70 miles per hour.

6. Plastic unit skylights shall conform to recommendations of the AA Specifications for Aluminum Structures.

7. Skylights must be designed to carry a minimum 30 psf tributary roof load or greater per site as specified in the current International Building Code or prevailing model code.

8. Skylight must be installed per manufactory requirements.

9. Energy Requirements: Glazing material must have a maximum light distribution characteristic that maximizes the shading factor. Per Addendum D of ASHRAE 90.1, the diffusing qualities of glazing must have a minimum haze factor of 90 percent or greater. The combined inner/outer lens target values shall be as follows:

    a) Light Transmittance: 67.8 percent minimum. CLASS 1 & CLASS 3 ACRYLIC
    b) Light Transmittance: 60.0 percent minimum. Clear Armor Polycarbonate (Lexan SLX)
    c) Diffusion / Haze Factor: 100 percent min.
    d) Solar Heat Gain Coefficient (SHGC): 0.49 maximum. NFRC 200
    e) "U" Value: 0.82 or lower (glazing and framing) in accordance with NFRC 100 or "unlabeled skylight" default requirements of ASHRAE 90.1

10. OSHA FALL PROJECTION TEST (refer to report 72202.01-109-44)

    a) 200 lbs-ft (applied) impact to center of dome – No Damage

    b) 400 lbs-ft (2’ drop height) impact to center of dome – No Damage

11. Hail Resistance Level: Class 1 & 3 as tested by certified testing engineer company.

12. Approved for use outside HVHZ.

    a) Projects which fall under the jurisdiction of the Florida Building Code must have a current Florida Building Code (FBC) Number to meet the High Velocity Hurricane Zone (HVHZ) requirements and are required for acceptance of Work specified in this section.

    b) Projects which fall under the jurisdiction of Miami / Dade County must have a current Dade County Product Control Notice of Acceptance (NOA) to meet the High Velocity Hurricane Zone (HVHZ) requirements and are required for acceptance of Work specified in this section.

    c) Skylight systems must comply with the jurisdictional code body's submittal data and supporting drawings and documentation. Where the city jurisdiction acceptance criteria differ from these specifications regarding components and hardware, the code body's requirements shall govern.

1.5 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, finishes, and manufacturer’s installation instructions.

C. Skylight Layout: Provide roof plan or reflected ceiling plan showing the layout of the skylight for final approval from owner. Plan must include dimensions and vertical height to bottom of skylight light source.

D. Shop Drawings: Submit roof plan show all location of skylights, reflected ceiling plan, curb and roof flashing detail, and section as required to show relation of roof and ceiling (if there is a lay-in ceiling or hard lid ceiling). Include all details necessary for a proper and complete installation.

1.6 QUALITY ASSURANCE

A. Manufacturer and Supplier Qualifications: Product must be supplied by an approved manufacturer and/or Supplier per Ciralight Global approved list. Product supplied by a NON-approved source will not receive manufacture warranty.

B. Installer Qualification: Product should be installed by a recommended installer, and in accordance with Ciralight's installation manual. Final installation should be inspected by Ciralight approved installer for performance compliance.

C. Fire-Test Response Characteristics of Plastic Glazing: Provide plastic glazing sheets identical to those tested for fire-exposure behavior per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

1. Self-Ignition Temperature: 650 deg F or greater for plastic sheets in thickness indicated when tested per ASTM D 1929.
2. Smoke Production Characteristics: Comply with either requirement below:

    a. Smoke-Developed Index: 450 or less when tested per ASTM E 84 on plastic sheets in manner indicated for use.
    b. Smoke Density: 75 or less when tested per ASTM D 2843 on plastic sheets in thickness indicated for use.

3. Relative-Burning Characteristics: Tested per ASTM D 635.

    a. Acrylic Glazing: Class CC2, burning rate of 2.5 inches per minute or less for nominal thickness of 0.060 inch or thickness indicated for use.
    b. Polycarbonate Glazing: Class CC1, burning extent of 1 inch or less for nominal thickness of 0.060 inch or thickness indicated for use.

1.7 DELIVERY, STORAGE, AND HANDLING

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

B. Storage and Protection: Store protected from harmful weather conditions. Do not leave the backs of the mirrors exposed to the sun for long periods of time.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard Warranty in which manufacturer agrees to repair or replace components of unit skylights that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:

1. Uncontrolled water leakage.
2. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
3. Yellowing of acrylic glazing.
4. Breakage of polycarbonate glazing.
5. Failure of GPS Controller to track the sun.

B. Warranty Period: Ten years from Substantial Completion.

PART 2 - PRODUCTS

2.1 PRODUCT STANDARD

A. The Contract Documents are based on the following product to establish a standard of quality. Other acceptable manufacturers with products having equivalent characteristics may be considered provided deviations are minor and do not change the intended aesthetic, functional, and performance requirements as judged by the Architect.

1. Manufacturer assembling plant: Ciralight, Inc., 670 E. Parkridge Unit 112, Corona, CA 92879 Telephone (877) 520-5005 Fax (877) 520-5995.
2. Product: Ciralight SunTracker Active Daylighting System

B. For consideration of manufacturers other than the named product standard, submit as a substitution according to the Conditions of the Contract and Division 1 Specification Sections.

2.2 DOMED ADVANCED DAYLIGHTING SKYLIGHTS

A. General: Manufactured units and components including glazing, extruded-aluminum glazing retainers, gaskets, and inner frames for site-assembly.

B. Unit Shape and Size: As indicated.

C. Acrylic or Polycorbonate Domed and Diffuser Lens Glazing: ASTM D 4802, thermoformable, monolithic sheet, Category as standard with manufacturer, Type UVA (formulated with UV absorber), Finish 1 (smooth or polished).

1. Outer Domed Glazing Color: Colorless, transparent.
2. Mirror Tray Diffuser Lens: As described below.

D. Acrylic or Polycarbonate Diffuser Lens Glazing: Thermoformable, extruded monolithic sheets, UV resistant, burglar resistance rated per UL 972, and with average impact strength of 12 to 16 ft-lb/in. of width when tested per ASTM D 256, Test Method A (Izod). Diffuser lens finish as described below.

E. Active Daylighting Mirror Assembly: Aluminum reflector(s), electrolytically brightened anodized and coated with a super reflective oxide-layer system on one side to reflect light. Reflection to ASTM E1651 (TR-2).

1. Tracking Unit: Solar powered global positioning system (GPS) to calculate and track the current sun position once every five minutes.
2. Motor: Powered by super capacitors charged by a photovoltaic cell. Precision gears and sealed bearing for maintenance free operation.

F. Diffuser Lenses:

1. Flat Diffuser Lens at Mirror Tray at top of light well: Prismatic optic acrylic or polycorbonate. Overall thickness of 3mm and 91% translucence.
2. Standard Interior Diffuser Lens at bottom of light well: Clear acrylic or polycarbonate formed into a raised pyramid shape, with an overall thickness of 3mm and 91% translucence.
3. Optional Interior Diffuser Lens at bottom of light well: White flat acrylic lens with 70% translucence for low ceiling installations.

G. Glazing Gaskets: Manufacturer's standard closed cell foam.

H. Aluminum Components:

1. Sheets: ASTM B 209, alloy and temper to suit forming operations and finish requirements but with not less than the strength and durability of alclad alloy 3005-H25.
2. Extruded Shapes: ASTM B 221, alloy and temper to suit structural and finish requirements but with not less than the strength and durability of alloy 6063-T52.

I. Condensation Control: Fabricate skylights with integral internal gutters and non-clogging weeps to collect and drain condensation to the exterior.

J. Thermal Break: Fabricate skylights with thermal barrier separating interior metal framing from materials exposed to outside temperature.

K. Light Well Liner: Highly reflective material, standard of skylight manufacturer, in adjustable lengths to accommodate shaft requirements from roof to ceiling with integral angle frame support for bottom lens.

L. Optional Accessories:

1. Security Burglar Frame: As required by local requirements. Provide tamper-resistant fasteners.
2. Shade: Infrared electrically powered and controlled shade when closed stops approximately 100% of light from entering light well. Mounted at the top of the light well.

    a. Preinstalled in an aluminum frame with nylon glides.
    b. Cellular room darkening fabric.
    c. Remote control.
    d. Shade system is also available powered by Solar Power or by hand crank.

2.3 ALUMINUM FINISHES

A. General: Comply with NAAMM "Metal Finishes Manual" recommendations for application and designations of finishes.

B. Finish designations prefixed by AA conform to the system for designating aluminum finishes established by the Aluminum Association.

C. Clear-Anodized Finish: AA-C22A41 (Chemical Finish: etched, medium matte; Anodic Coating: Class I Architectural, clear film thicker than 0.7 mil) complying with AAMA 611.

2.4 INSTALLATION MATERIALS

A. Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic, nominally free of sulfur and containing no asbestos fibers, formulated for 15-mil dry film thickness per coating.

B. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.

C. Elastomeric Sealant: ASTM C 920; Type S; Grade NS; Class 25; and Uses NT, G, A, and (as applicable to joint substrates indicated) O; recommended by unit skylight manufacturer and compatible with joint surfaces.

D. Roofing Cement: ASTM D 4586, asbestos free, designed for trowel application or other adhesive compatible with roofing system.

E. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories; compatible with adjacent materials. Finish exposed fasteners to match material being fastened.

F. Site-Built Preservative-Treated Wood Curb: As specified in Division 06 Section "Rough Carpentry".

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not install unit until roofing substrates have been properly prepared and structurally braced. Substrate and flashing detail is the responsibility of the architect and GC to comply to the building codes.

B. Clean surface thoroughly prior to installation and preface surfaces per manufacturer recommendation to achieve the best results.

C. Examine substrates surfaces to receive skylights and associated work and conditions under which work will be installed. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to installer. Starting work within a particular area will be construed as installer's acceptance of surface conditions.

3.2 INSTALLATION

A. Coordinate skylight installation with installation of substrates, roof insulation, roofing, wood or steel curbs, and flashing as required to ensure that each element of the Work performs properly and that combined elements are waterproof and weather tight. Comply with manufacturer's written instructions for protecting, handling, and installing skylight components.

1. Unless otherwise indicated, install skylights according to construction details of NRCA's "The NRCA Roofing and Waterproofing Manual".
2. Fit frame joints to produce hairline joints free of burrs and distortion.
3. Rigidly secure non-movement joints.
4. Accommodate thermal and mechanical movements.
5. Install framing components to drain water passing joints and to drain condensation and moisture occurring or migrating within skylight system to the exterior.
6. Coordinate installation of insulation and flashings at skylight perimeters to maintain continuity of thermal and water barriers.

B. Where metal surfaces of units will contact incompatible metal or corrosive substrates, including wood, apply bituminous coating on concealed metal surfaces, or provide other permanent separation recommended in writing by skylight manufacturer.

C. Anchor skylights securely to supporting substrates.

D. Erection Tolerances: Install skylight components true in plane, accurately aligned, and without warp or rack. Adjust framing to comply with the following tolerances:

1. Variation from Plane: Limit variation from plane or location shown to 1/8 inch in 10 feet in; 1/4 inch over total length.
2. Alignment: Where surfaces abut in line and at corners and where surfaces are separated by less than 3 inches, limit offset from true alignment to less than 1/32 inch; otherwise, limit offset from true alignment to 1/8 inch.

E. Set skylight flanges in thick bed of roofing cement to form a seal, unless otherwise indicated. Comply with requirements in Division 07 Section "Joint Sealants".

F. Where cap flashing is indicated, install to produce waterproof overlap with roofing or roof flashing. Seal with thick bead of mastic sealant.

3.3 CLEANING

A. Clean skylights inside and outside, immediately after installation and after sealants have cured, according to manufacturer's written recommendations.

1. Remove temporary protective coverings and strippable coatings from prefinished metal surfaces. Remove labels and markings from all components.

B. Remove excess sealant according to sealant manufacturer's written recommendations.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION