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TECHNICAL SPECIFICATIONS:

GENERAL: ShadeSystems™ products are designed and manufactured to the most exacting specifications by skilled craftsmen, and certified by Professional Engineers for structural soundness of designs. All ShadeSystems are shipped knocked-down, with complete assembly instructions, and ready for easy in-field installation.

ENGINEERING DATA: Structures are engineered to meet or exceed the requirements of the International Building Code (IBC), with the following specifications:

Wind speed	Frame only:	165 m.p.h.
	Frame w/canopy:	90 m.p.h.
Live Load:	None	
Snow Load:	None	

Optional designs with greater wind speeds, live loads, and snow loads are available.

MATERIAL: All materials shall be structurally sound and appropriate for safe use. Product durability shall be ensured by the use of corrosion-resistant metals such as stainless steel, and coatings such as zinc-plating, galvanizing, and powder-coating on steel parts, subject to the Project-Specific requirements below. Fabrics used shall include UV-stabilizers and fire retardants for longevity and safety.

WELDMENTS: All tubing members are factory-welded by Certified Welders to American Welding Society (AWS) specifications and to the highest standards of quality workmanship. Weldments are finished with a zinc-rich galvanized coating. No field welding is required in the assembly of Shade Systems products.

POSTS, STRUCTURAL FRAME TUBING, AND HARDWARE: All tubing used shall be cold-formed and milled per ASTM A-135 and ASTM A-500. Material testing is in accordance with ASTM E-8. Minimum yield is 40,000 psi with a minimum tensile strength of 45,000 psi on all posts. All tubing shall be pre-cut to appropriate lengths, and where applicable all outside surfaces shall be galvanized, with an interior corrosion-resistant zinc-rich coating. Where required, support pipes shall be schedule 40 hot-dip galvanized or powder-coated black steel. All fastening hardware shall be stainless steel.

ARCHITECTURAL POWDER-COATING PROCESS: All powder-coated parts undergo a rigorous multi-step process to ensure color fastness and durability per the specific sequential steps itemized below. All parts are completely sandblasted, pre-treated, and coated with coastal primer prior to powder coating. Powder-coating is then electrostatically applied and oven-cured at 375 to 425 degrees Fahrenheit. Powders shall meet or exceed ASTM standards for Adhesion, Hardness, Impact, Flexibility, Overbake Resistance, and Salt Spray Resistance. Colors shall be specified.

The following seven (7) specific steps shall occur in sequence:

1. Sandblasting. All powder-coated parts shall be completely sandblasted with the use of 80 grit garnet abrasives.
2. Mechanical smoothing. A traditional mechanical method shall be used for removing remaining foreign matter for surface preparation by use of sanding, grinding, and rounding rough edges to smoothness.
3. Initial Surface Preparation. A heavy-duty liquid cleaner such as Calvary Industries Inc Cal Clean 675 shall be applied for initial surface preparation.
4. Corrosion resistant Coating. A liquid detergent iron phosphate, such as Calvary Industries Inc, Cal Prep 63, shall be applied, thereby resulting in a superior quality corrosion resistant coating.
5. Final Surface Preparation. All parts shall then be sealed using a reactive, non-chrome sealer product such as Calvary Industries, Advantech S1488E Sealer. The sealer enhances corrosion protection and increases paint adhesion, effectively increasing salt spray hours on all metal substrates.
6. Coastal Primer. Prior to powder-coating, a rust inhibiting coastal primer shall be applied on all parts, such as PPG Envirocron™. The coastal primer coating provides a combination of good physical and chemical resistance properties, and is the ideal solution for smooth, low-bake durability and physical property requirements for the most demanding environments.

   Primer attributes:

Gloss (ASTM D-523):	0-10 @ 60°
Adhesion (ASTM D-3359):	100% (5B Pass)
Hardness (ASTM D-3363):	2H Pencil (Eagle)
Impact Resistance (ASTM D-2794):	80 In.-lbs. Direct
Conical Mandrel (ASTM D-522):	1»8"- No Cracking
Salt Spray (ASTM B-117):	4000 Hours Pass
1000 Hours (degrease only)	
Humidity (ASTM D-1735):	100F, 100% RH-2000+ Hours
Scab Corrosion (SAE-J2334):	120 Cycles - Pass
Film Properties (Thickness):	2 mils

7. Application of Powder-Coating. Lastly, PPG Envirocron™ Ultradurable powder coatings shall be used to provide a combination of excellent physical and chemical resistance properties, outstanding resistance to outdoor weathering, and a durable and uniform final coat.

   Powder Coat Characteristics:

Gloss (ASTM D-523):	80 Minimum @ 20°
Gloss (ASTM D-523):	80 Minimum @ 60°
Adhesion (ASTM D-3359):	100% (5B Pass)
Hardness (ASTM D-3363):	2H Pencil (Eagle)
Impact Resistance (ASTM D-2794):	40 In.-lbs. Direct
20 In.-lbs. Reverse	
Conical Mandrel (ASTM D-522):	1»8" Mandrel - No Cracking
Salt Spray (ASTM B-117):	1000 Hours Pass
< 1»8" Scribe Creep	
No Blisters	
Humidity (ASTM D-1735):	1000 Hours Pass
< 1»16" Scribe Creep	
No Blisters	
Film Properties (Thickness):	3 mils

STANDARD FOOTINGS: Footings shall be designed per stringent International Building Code (IBC) for the specific structure. Columns will be provided as standard direct embedment or optional pier mount (anchoring hardware not supplied by Shade Systems). Other footing methods are available upon request.

ROOFING: Structural frames and/or fabric sails are designed by Shade Systems only for use with CoolNet™ polyethylene shade fabric. Fabric is attached to frame or columns using the Fastening Systems below in conjunction with vinyl covered stainless steel cables. Cable fasteners are zinc-plated copper for maximum corrosion resistance.

FASTENING SYSTEM (Frame Structure): Coolnet™ Shade Fabric shall be delivered complete with independent cables pre-inserted in fabric hems. Each cable shall be looped and clamped at each end. Fastening System to consist of the Turn-N-Slide™ fastening device which is factory installed at each roof rafter corner. The Turn-N-Slide features a concealed mechanism which allows the attachment hook and sleeve at each rafter corner to move along a track in the rafter. Cables are attached to hook which is welded to the moving sleeve, thereby distributing tension evenly over rafters and not directly onto the mechanism. Rafters are sealed with no penetrations on the top side, thereby preventing water from entering. Such moving sleeve with hook allows the looped ends of each cable to slide over the hook when the sleeve is at its upper position, and then by turning the concealed fastener within the rafter, moves the sleeve with hook outward (toward end of rafter), thereby tensioning the cables and securing the fabric at the proper tautness. A locking cap is secured at the end of each rafter with a vandal-resistant bolt (special wrench provided by the manufacturer) to prevent unauthorized access to the Turn-N-Slide mechanism. To remove the canopy, the cap is

removed, and the mechanism rotated counter- clockwise. The sleeve with hook moves inward (toward peak of roof), thereby de-tensioning the cables, and allows fast removal of the canopy. Continuous one-piece cables, cables which are not independent per side and pre-looped and clamped at the factory, and/or cables which must be tensioned with the use of turnbuckles or tools not provided by the manufacturer are not acceptable. Structures which do not feature the Fastening Mechanism on each and every rafter, or fastening mechanisms which do not feature a sealed top rafter and moving outer sleeve such as the Turn-N-Slide, are not acceptable.

FASTENING SYSTEM INSTRUCTIONAL VIDEO: Product must be delivered complete with a minimum 5-minute instructional video on an USB Flash Drive. Video must show the viewer the exact procedure for removing and re-attaching canopy using an actual shade structure in the field. Submittals which do not include the video on an USB Flash Drive are not acceptable.

FASTENING SYSTEM (Sail Structure): CoolNet™ Shade Fabric shall be delivered complete with fastening system installed. Fastening System to consist of factory-formed stainless steel tensioning plates pre-attached to fabric canopies at each corner, and cables per the above hemmed into the fabric at the factory and terminating in the bracket. Posts shall be equipped with an adjustable 360-degree swivel and pivot attachment mechanism to which the tensioning plate fastens. Tensioning plate includes a stainless steel adjustment bolt which, when turned, tensions the fabric for a taut fit. Fabrics, cables, and brackets which are not pre-assembled at the factory are not acceptable. Cables which attach to posts with u-bolts or 'S' hooks, and which do not use a stainless steel bracketing system similar to the above are not acceptable.

CoolNet™ SHADE FABRIC: Knitted of monofilament and tape construction high density polyethylene with Ultra-Violent (U.V.) stabilizers and flame retardant. Coolnet™ offers the ultimate combination of maximum sun protection, strength and durability to ensure maintenance free long-life performance. UV- Block Factor varies by standard color offered from 90% to 97%.

Coolnet™ Properties:

Nominal Fabric Mass:		Min. 340 g/m^2 // 10 oz/yd^2
Fabric Thickness:	ASTM D5199-12	.06 inch
Temperature Range:		22^{O}F to 155^{O}F
Roll Width:		9 ft. 10 in.
Roll Length:		131 ft.
Tensile Strength:	ASTM D5034-09	Warp (202.4 lbf) / Weft (403.2 lbf)
Elongation:	ASTM D5034-09	Warp (112.3%) / Weft (50.8%)
Tongue Tear:	ASTM D2261-13	Warp (47.9 lbf) / Weft (50.1 lbf)
Burst Strength:	ASTM D6797-15	383.0 lbf
Flammability:	ASTM E-84	Class A
Lead:		PASS
Phthalate:		PASS

Coolnet™ Shade Fabrics meet the most stringent Fire Standards for shade fabrics including CSFM 1237.1 and NFPA 701 across all color variants.

All hems and seams are double row lock stitched using exterior grade UV-stabilized polyethylene GORE™ TENARA® sewing thread (GORE and TENARA are trademarks of W. L. Gore & Associates).

INSURANCE: Manufacturer must show acceptable evidence of the following minimum insurance coverages, all written on the Occurrence Form:

- Commercial Product Liability/Completed Operations of $1,000,000 per claim and $2,000,000 aggregate;
- Professional Liability (Errors & Omissions) of $2,000,000 per claim;
- And an additional $3,000,000 umbrella coverage.

WARRANTY: ShadeSystems,Inc. warrantsthat the equipmentsold will conform in kind and quality to the specifications listed in the Order Acknowledgment and will be free of defects in workmanship or materials. ShadeSystems further warrants:

- LIMITED 20 YEAR WARRANTY on all upright posts, cables, and tensioning plates against failure due to rust-through corrosion.

- LIMITED 10 YEAR WARRANTY on all CoolNet™ fabric and GORE™ TENARA® stitching thread against degradation, cracking or material breakdown resulting from ultra-violet exposure. This warranty excludes failure of fabric due to chemical erosion or as a result of flying objects.

- LIMITED 1 YEAR WARRANTY on powder-coating, or any other product or part not covered by one of the above warranties.

The above warranties are not pro-rated. Pleaserefer to the full text of our complete Limited Warranty for additional details and other important warranty information.

MANUFACTURER EXPERIENCE: Bidder must show evidenceof at least six (6) public municipal installations where manufacturer's product as proposed pursuant to this bid has been installed and has been in continuous use for a minimum of five (5) years each.

MANUFACTURING FACILITY: Bidder's productsmustbe completelymanufactured entirely in its own factory by its own employees,including powder-coating, thereby ensuring complete quality control. Bidder must certify that no aspectof its production – including powder-coating – is contracted out to third parties.

AL TERNATE PRODUCT APPROVAL PROCEDURE: Ten (10) day prior approval required for substitution of product design, materials and features specified above. Submittals must include plans, drawings, cut sheets, material data sheets, testing results and samples. Bids failing to meet this requirement will be deemednon-responsive.