



Design - Manufacturing - Build Specifications

Tensioned Fabric Shade Structures

Shade Sail Structures (7/22/20)

CSI MasterFormat 2016 Division 13-31-23



GENERAL QUALITY ASSURANCES

Single-vendor contractual responsibility for all phases of the design-manufacturing-build process (i.e. design, engineering, fabrication, shipping, unloading, footing construction, structure erection, & warranty servicing).

- Design & Engineering
 - To current, local California building code by Professional Structural Engineer licensed in California.
 - PE designed & engineered hundreds of commercial, cable-tensioned fabric structures.
 - Wind design speed: 110+ MPH 3-second wind gusts with fabrics attached (or higher per code).
- In-Plant Fabrication
 - 20+ years experience exclusively manufacturing tensioned fabric shade structures.
 - All welding performed in factory certified by City of Los Angeles as Type 1 fabricator.
 - To ensure fit & finish, fabricator does both steel work and sews shade sails.
 - All materials shall be free of sharp edges, corners, & extremely rough surfaces.
 - All materials shall be new and conform to all specifications as herein stated.
- Construction
 - 15+ years dedicated experience constructing cable-tensioned fabric shade structures.
 - Licensed California contractor with "B" (Gen'l Building) and "C61-D03" (Awnings) license.
 - Department of Industrial Relations registration #1000020770.
 - Completed hundreds of commercial (i.e. non-residential) California structures.
 - Completed 5+ California municipal projects in last 3 years.
 - Accredited safety training in rigging, forklift, boom lift, & scissor lift operations.
 - Building permit will always be obtained when required.
 - Proof of Insurance minimums:
 - Workers Compensation: \$1M Each Accident
 - General Liability: \$2M General Aggregate; \$1M Each Occurrence
 - Automotive Liability: \$1M Each Accident

1.0 MATERIALS

1.1 FABRIC

A. High density polyethylene (HDPE) fabric shall be Alnet Extra Block shade cloth or approved equal

- Weighs 9.6 ounces per square yard for durability (ASTM 3776)
 - Fabric strength: Monofilament & tape construction
 - Tensile Strength (ASTM D 5034) Warp: 278 lbf/ft.; Weft: 340 lbf/ft.
 - Tear Strength (ASTM D 2261) Warp: 33lb; Weft: 36 lb



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- Elongation at Break: (ASTM D 4595-87) Warp: 71%; Weft: 74%
- Burst Strength (ASTM 3787 Ball) 363 lb
- Burst Strength (ASTM 3786 Mullen) 460 psi
- UV stabilized for protection
- UVR% blocked: 93-98% (color dependent) UV Protection Factor: 13-33 (color dependent)
- Shade Factor (visual light): 79-98% (color dependent)
- Stentored to maintain shape under tension and minimize sag
- Rachel-knitted to prevent unraveling if cut
- Temperature stability: -13 to 176 degrees F
- 10 year warranty

B. Alnet Extra Block fire resistance approvals

- California State Fire Marshal Section 13115 Registration # F-94501
- NFPA 701-99 (Test Method 2)
- ASTM E-84

1.2 THREAD

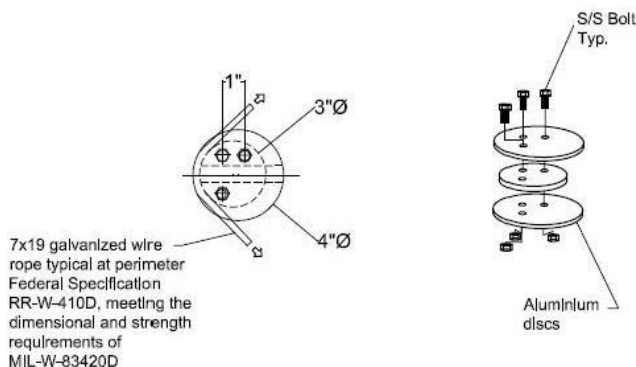
- A. Shall be Gore Tenara high density; high strength and low shrinkage.
- B. Shall be abrasion resistant and immune to UV radiation.
- C. Shall be unaffected by non-hydrocarbon based cleaning agents, acid rain, mildew, rot, chlorine, saltwater, and industrial pollution.

1.3 CARBON STRUCTURAL STEEL

- A. All fabricated steel shall conform to approved shop drawings and calculations.
- B. P i p e c o l u m n s shall be ASTM A-53 Type E. Square columns shall be HSS ASTM A500 Grade B (Fy=46 ksi). Steel plate shall be ASTM A36.

1.4 TENSIONING CABLE, CORNER DISCS & HARDWARE

- A. 7x19 steel cable shall conform to ASTM A-603. It shall not be field-cut.
- B. Cable diameter determined by calculated engineering load
 - 1/4" diameter for small-to-medium loads; 3/8" diameter for heavy loads
- C. C a b l e , cable connectors, & turnbuckles shall be hot dipped galvanized or T316 stainless steel with Fy = 30,000 psi minimum.
- D. D-shackles shall be T316 stainless steel with Fy=30,000 psi minimum.
- E. Aluminum discs at each shade sail corner for added strength and to ensure tension equalization.



- F. Each shade sail shall have a single, continuous cable. Cables shall not be terminated at each corner.
- G. Each post to have welded chain link to facilitate erecting and removing shade sails.

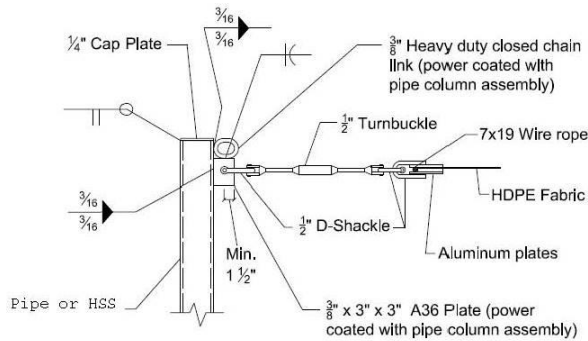


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NOTE - Chain link for initial erection of cable and fabric structure only, permanent connection to chain link is not allowed

1.5 ANCHOR BOLTS

- A. Anchor bolts set in new concrete shall be A36 threaded rod, ASTM A-325, or A-307.
- B. All anchor bolts, nuts, & washers shall be hot dipped galvanized.

1.6 FOOTING REINFORCEMENT

- A. All reinforcement shall conform to ASTM A-615 grade 60.
- B. All reinforcing steel shall conform to approved shop drawings and calculations.

2.0 PROCESSES

2.1 WELDING

- A. All shop welds shall comply with the latest edition of the American Welding Society Specifications.
- B. Welding procedures shall comply with the AWS D1.1-AWS Structural Welding Code-Steel.
- C. All welds to be performed by AWS-certified welders.
- D. All welds shall be continuous where length is not given, unless otherwise noted on drawings.
- E. All welds shall develop the full strength of the weaker member.
- F. All welds shall be made using E70xx electrodes.
- G. Shop connections shall be welded unless noted otherwise.
- H. All fillet welds shall be a minimum of 3/16" unless otherwise noted.
- I. All steel shall be welded shut at terminations to prevent leakage.
- J. Field connections shall be indicated on the drawings.
- K. Columns factory-welded watertight at both ends to prevent corrosion.

2.2 CORROSION PROTECTION

- A. Columns & plates to be sandblasted; contaminants removed; and coated with zinc-rich primer prior to powder coating with TGIC polyester powder topcoat (min. thickness = 2.5 mils).
- B. Powder coating shall meet ASTM D2794, B3363, B2247, & B117 standards.
- C. No field-drilling to permeate water barrier.

2.3 SEWING

- A. On-site sewing of fabric will not be accepted.
- B. Corners shall be reinforced with extra non-tear material & strap
- C. Perimeters containing cables shall be double row lock stitched.



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2.4 FOOTING CONSTRUCTION

- A. Footings shall conform to approved engineering specifications.
- B. Reinforcement fabricated & placed per ACI Detailing Manual & Manual of Standard Practice.
- C. Concrete work shall conform to latest edition of American Concrete Building Code ACI 318.
- D. Concrete specifications shall conform to approved engineering specifications.
- E. 28 Days Strength $F'c = 3000$ psi or 2500 psi per engineering specifications.
- F. Contractor shall not pour concrete when daily ambient temperature is below 55 degrees F.

2.5 STRUCTURE ERECTION

- A. Erect structures & hardware in compliance with fabricators' instructions.
- B. Securely fasten all parts to be attached.
- C. Ensure all parts interact freely & smoothly without binding.
- D. Install shade structure in a timely manner & coordinate with the work of other trades.

3.0 WARRANTY

- 3.1 The structural integrity of the steel shall be warranted for twenty (20) years.
- 3.2 Shade sails shall have a pro-rated warranty of ten (10) years against breakdown caused by UV light.
- 3.3 When used in its designed capacity, the structure shall be guaranteed for five (5) years from original installation against:
 - A. Steel frame corroding or deteriorating under normal conditions.
 - B. Inappropriate design of supporting structure.
 - C. Sails shall be warranted for winds & gusts up to a specified design. The fabric warranty is void if winds or gusts exceed such design.
 - D. Excessive loss of fabric color under normal exposure conditions (i.e. sunlight, rot, & normal atmospheric chemicals).
 - E. Wearing or wind blowouts caused by poor installation or design.
- 3.4 The sails should be removed before extreme wind conditions that exceed its design capacity.
- 3.5 The contractor reserves the right to repair or replace any item covered by the warranty.
- 3.6 Shade structures located in areas where they may be damaged from other construction shall be protected and or removed from the locations until hazardous conditions cease.

