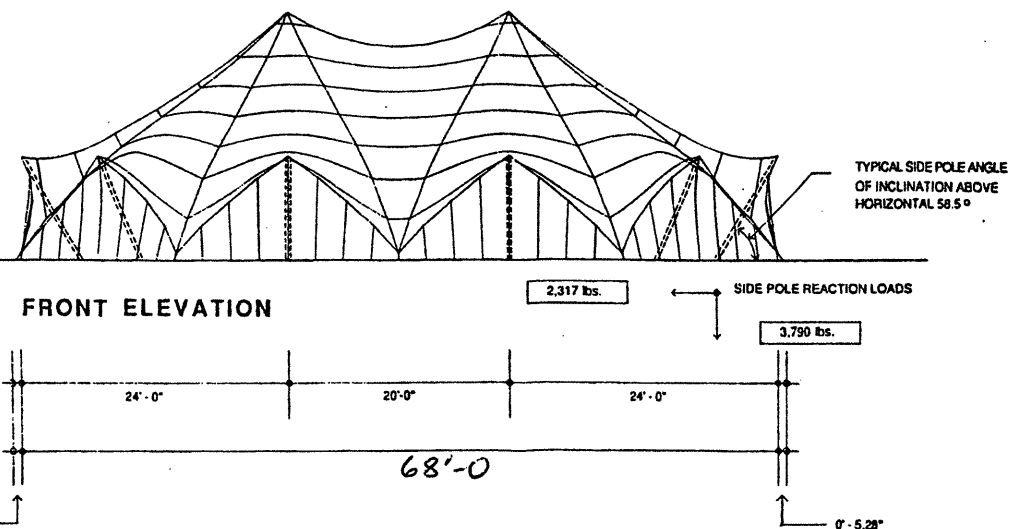
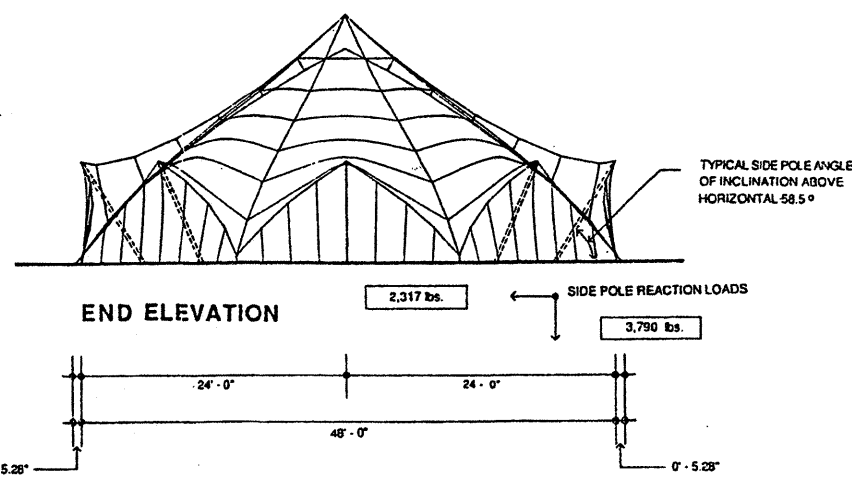


This number represents the actual anchor link load anticipated under maximum design load.

This number represents the pre-stress force which is the amount of tension necessary in the anchor link to properly pull the tent out and keep it properly tensioned.

This number represents the actual pull-out load that the anchoring device must resist in the direction of its corresponding guy rope under full load (includes safety factor of 2.0).



**GENERAL**

The information on this drawing pertains only to the Armbruster 40' wide Wind Version Tension Tent, a Future Tents® Design by Todd Oland of FTL Associates, New York, manufactured exclusively by Armbruster Manufacturing Company, Springfield, Illinois. If used for review or approval of a particular Armbruster 40' wide Wind Version Tension Tent application or installation, this FTL Associates drawing should be accompanied by the manufacturer's engineer's assurances that the materials, sizes and specification requirements on this drawing will be met or exceeded, and the installer's engineer's assurances that the anchoring requirements and the installation and maintenance recommendation will be met or exceeded. The following criteria, resulting design loads and typical material sizes are considered appropriate for many applications and installations of this standardized structure. The adequacy and appropriateness of the engineering criteria selected for the structure should be reviewed for each installation and site based on local climate wind conditions, geographical locations, exposure, duration of installation, occupancy, and building code requirements.

**ENGINEERING CRITERIA**

The engineering criteria selected for the Armbruster 40' wide Wind Version Tension Tent is as follows:

Design Wind Pressure: 20 psf.  
Uniform Download: 5 psf.  
(Structure is not engineered for snow loading)

Pressure coefficients from wind tunnel tests performed on similar tent structures have been used to calculate surface pressures.

The equilibrium surface form and load carrying behavior of this tent have been determined using computer programs for geometrically non-linear analysis involving finite elements and techniques of dynamic relaxation. Computer-aided structural analysis using Minotac, N.A. form-finding and analysis software has been prepared by FTL Associates for wind directions for uplift over the entire roof, and for a nominal download case. All information pertains to structures mounted at grade on a horizontal ground plane.

**INSTALLATION TIPS**

- All anchor locations must be laid out accurately as shown on the attached diagram (in advance of laying out the fabric) to a tolerance of +/- 6" in any direction (right or left, forward or back, up or down, etc.) All column base location must be laid out accurately to a tolerance of +/- 3" in any direction.
- Anchor and column locations shown on the diagram assume a perfectly flat site. If the actual site has variations in elevation that prevent all the anchors and column bases from being at the same level, new anchor locations and/or column lengths must be accurately calculated to preserve original design geometry and vectors.
- Make sure that the anchors installed are adequate to resist the pull out loads shown on the diagram. Actual testing of some individual anchors to 75% of the anchor pull out load is recommended for seasonal installations and for earth anchors which are to be permanently installed for repeated use in one location.
- Make sure adequate tension to pull the fabric tight (pre-stress load) is applied to the guying cables before installation is complete. Pre-stress loads for each guy are shown on the diagram.
- Measuring the angle of the masts and side poles offers a very good check on the geometrical accuracy of the installation. This can easily be done with an Angle-o-meter. As illustrated in this drawing, each end every sidepole should be inclined from front to back 58.5° above the horizontal ground plane and from side to side. It is in a plane perpendicular to the horizontal ground plane. The center poles should be perpendicular to the horizontal ground plane.

**NOTE:** All the above considerations must be carefully met in order for the structure to obtain proper geometry, pre-stress, and anchor holding power, all of which are necessary to achieve full design load capacity.

**DERIVED STRUCTURAL FORCES**

**MATERIALS SIZES AND SPECIFICATIONS FOR THE ARMBRUSTER 40' WIDE WIND VERSION TENSION TENT**

**1. FABRIC:**  
Maximum Fabric Stress: 30 lb./in. Warp  
37 lb./in. Fill

Recommended Safety Factor for Fabric: 4.0 times maximum design load (Federal Standard No. 191, Method 5102).

Use: Vinyl-laminated polyester fabric with a strip tensile strength (per Federal Standard No. 191, Method 5102) of:

120 lb./in. Warp  
148 lb./in. Fill

Fabric to be top-coated to resist UV degradation and soiling.

**FABRIC SEAMS:**

a. Recommended Factor of Safety for fabric seams: 2.0 times the maximum design load (Federal Standard No. 191, Method 5102)

Use: Seam strength of 74 lb./in. Fill (Federal Standard No. 191, Method 5102).

b. To pass a hanging "dead load seam test" of not less than four hours duration with no visible failure or slippage when subjected to a continuous load of 100% of the maximum design load at 90° F.

100% of maximum design load: 30 lb./in. Warp  
37 lb./in. Fill

**2. WEBBING BELT REINFORCEMENTS:**

**RIDGE WEBBING BELTS:**

Webbing belt ridge with greatest design load has been selected to size all ridge belts.

Webbing belt design load (tension): 3,700 lb.

Factor of Safety on polyester webbing belts: 4.0 times maximum design load.

Use: Polyester webbing with minimum break strength of 14,800 lb. (with maximum elongation of 12% to 15% at break).

**PERIMETER CATENARY WEBBING BELTS:**

Perimeter catenary with greatest design load:

Webbing belt design load (tension): 2,029 lbs.

Use: Polyester webbing with minimum break strength of 8,116 lb. (with maximum elongation of 12% to 15% at break).

Every webbing belt shall be individually terminated at each end fitting and sewn back onto itself for a distance 12 times as long as the belt is wide (i.e. for a 2" wide belt, the sew back length should be 24", for a doubled 2" wide belt the sew back distance should be 48").

Thread for stitching belts to fabric should be high quality UV resistant bonded polyester. Thread and stitching on belt sew backs should be adequate to develop the full breaking strength of the belt.

Load carrying contribution of polyester fabric reinforcement bands which are effectively mechanically attached to the polyester webbing belt may be considered when using the belts to resist the above loads.

**3. COLUMNS:**

Center Poles:  
Length: 22'  
Design Load: 8,864 lbs.

Factor of Safety for Columns: 2.0 times maximum design load.  
Use: 5" nom. dia. schedule 40 aluminum pipe (6061-T6 alloy)

Side Poles:  
Length: 10.54'  
Design Load: 4,443 lbs.

Use: 2.5" nom. dia. schedule 40 aluminum pipe (6061-T6 alloy).

**4. TIE DOWN**

Point A:  
Design Load: 9,052 lbs.

Point B:  
Design Load: 5,013 lbs.

Point C:  
Design Load: 5,013 lbs.

**5. CONNECTING HARDWARE**

All connecting hardware such as shackles, turnbuckles, pear-shaped rings, and fabricated plates or assemblies shall be rated or tested to 2.0 times the maximum design load of the vectors acting on the connectors under maximum design load.

**INSPECTION**

Each component of each Armbruster 40' wide Wind Version Tension Tent should be inspected at the beginning and the end of each installation for visual signs of damage by the installer. All damaged materials should be replaced immediately.

**ANCHORING**

A Factor of Safety of 2.0 times the design load is recommended for ground anchors for temporary structures.

A wide variety of ground anchoring devices are commonly used. Soil conditions and resulting ground anchor holding capacities vary from site to site, and can vary within a particular site. The Owner and/or Installer of the Armbruster 40' wide Wind Version Tension Tent is fully responsible for assuring that the selection and installation of the anchoring devices is adequate and appropriate to resist the pull out loads on this drawing, for typical installations.

Among other considerations, the Factor of Safety for the anchoring device has to do with the possibility of reduced anchor performance under wet soil conditions. Care should be taken that water is not allowed to drain or collect near anchors.

Anchoring device holding capacity can be developed using a single larger device, or by using multiple smaller devices.

**INSTALLATION**

Correct "pulling out" and "dressing out" of a rental tent requires diligence and considerable skill and expertise which can be obtained only through proper in-field training and experience on a professional rental tent. Suspended Installation Crew which is instrumental to obtaining optimal structural behavior of the Armbruster 40' wide Wind Version Tension Tent.

**GENERAL GUIDELINES:**

- Clear the site to prepare for the planned activity
- Drop cloths can be used to prevent soiling or damage to the fabric membrane.
- Any objects with sharp projections which must remain on site under the tent should be padded and taped.
- Tent sections are placed on site, unfolded, and laced together, and secured to anchorages and attached to masts by hand.
- Before lift-up, all equipment is checked for operational condition.
- Center poles are raised to their final position.
- Columns and guy ropes are then checked and methodically adjusted into final design geometry to obtain proper loading in the fabric. Any components showing visible signs of damage should be replaced immediately.

**MAINTENANCE**

Since a variety of materials and weather factors can result in fabric stretch, webbing belt stretch, row stretch, mast foot settling, anchor settling, etc., changes to the design geometry of the tent, and consequently the structural performance characteristics of the tent can occur while the tent is unattended by the professional installer.

It is recommended that for many installations a Maintenance Agreement be arranged between the Client and the installer involving periodic inspections and adjustments.

All information and recommendations contained herein have been prepared by FTL Associates at the request of Armbruster Manufacturing Company and have been accepted and approved by Armbruster Manufacturing Company.



**48' WIDE TENSION TENT WIND VERSION**

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