Triax systems

# PRODUCT MANUAL

The No-Weld Shade Structure System

*Simple. Better.*

# 1. Introduction to the Triax System

**Triax is a patented, no-weld fitting system for building custom shade and membrane structures. Its couplings join standard steel tubes at any angle and lock permanently on site. They can be custom-tailored and built with exacting precision in a fraction of the time.**

### Flexible and innovative design

- Can be wall-mounted
- Roof-mounted
- Freestanding on posts.
- Fittings can be fixed at any angle, allowing full 360-degree design flexibility.

### Quick and easy installation

- Permanently joins two crossing tubes without welding.
- Couplings are fixed
- Adjustments can be made on site right up until the final fastening.

### Robust and versatile

- Couplings achieve a span of up to 6 m between supporting bearers
- Do not need to be level or parallel.

# 2. How the System Works

During a shade structure installation, the rafters and Triax couplings are clamped in place before being permanently fixed with Tek screws so the installer is sure it is correctly positioned.

## Mounting options

The same fittings support three mounting approaches within a single project:

1. Freestanding on posts — the typical barrel-vault carport or walkway configuration.
2. Wall-mounted — fixing one edge of the structure to an existing building.
3. Roof-mounted — anchoring to an existing roof structure.

**Design principle**

Clamp first, check alignment, then fix. Because nothing is welded, the geometry stays adjustable until the moment a coupling is screwed off — which is what makes precise, bespoke curves achievable by hand.

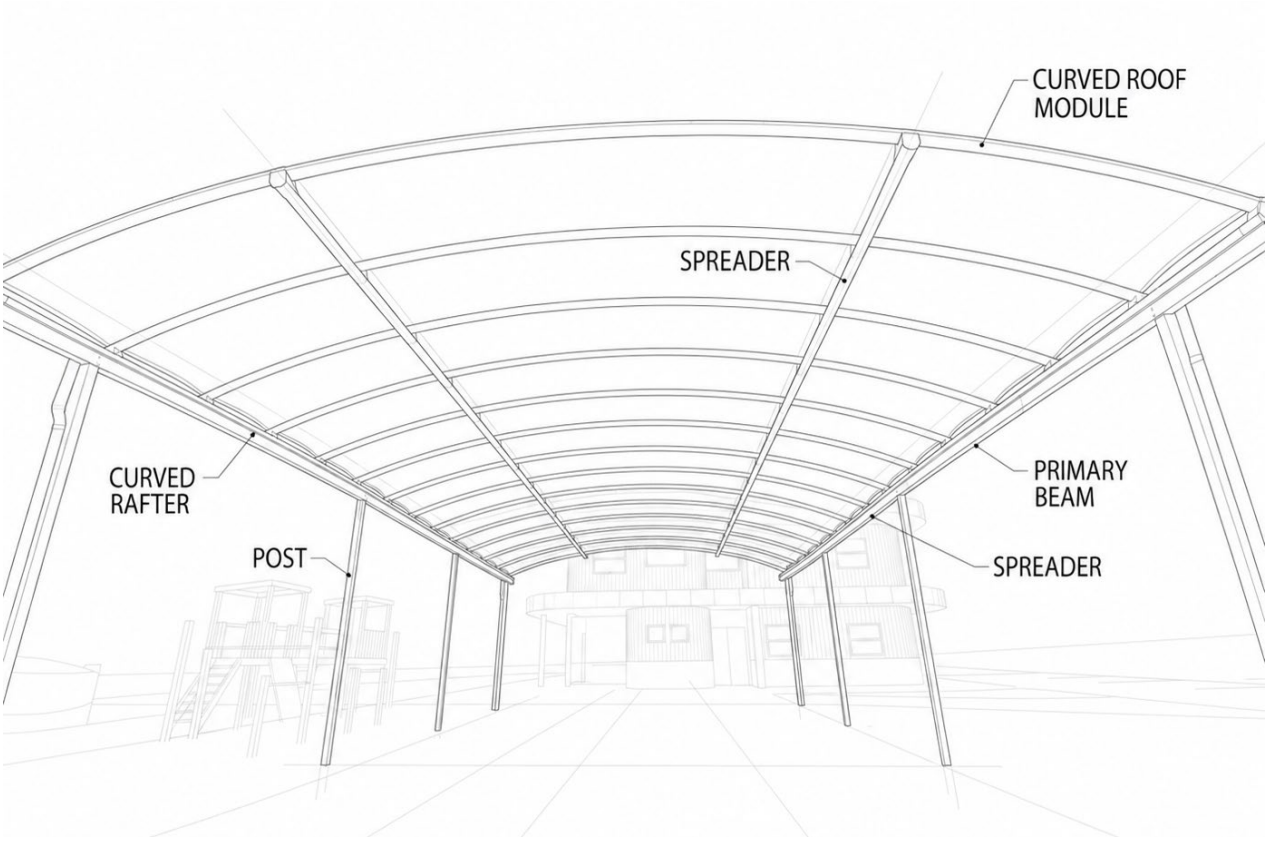
# 3. Structure Overview & Terminology

**A Triax structure is from four main elements:**

| Term | Element | Function |
|---|---|---|
| Post | 80NB vertical tube | Carries the structure to the ground or fixing surface. |
| Bearer | 50NB horizontal tube | Runs along each side and supports the rafters. |
| Rafter | 50NB curved tube | Spans across the structure to form the curved roof profile. |
| Spreader | 50NB tube (central rafter tie) | Ties the rafters together at the centre and prevents them from rolling inward under cover tension. |

## How the elements connect

1. Posts are capped and coupled to bearers using a PC80 post cap paired with a T50 bracket.
2. Rafters sit on the bearers and are joined to them with FX50 fixed brackets.
3. The spreader is fixed beneath the rafters at their centre using FX50 brackets.
4. The membrane cover is anchored at the rafter ends and tensioned with the Straight Edge.

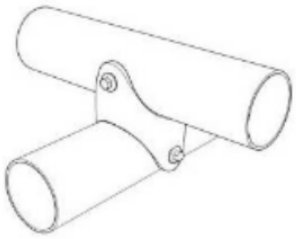


# 4. Component Catalogue

## 4.1 Structural couplings & brackets

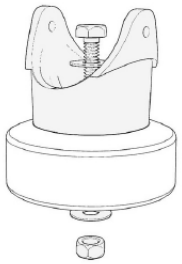
### T50 Bracket

T50 brackets anchor the bearers in place. Two Triax T50 brackets bolt together, back-to-back, to form an adjustable coupling for 50NB pipe.



### FX50 Fixed Bracket

FX50 brackets can be used in place of the double T50 couplings if the pipes are crossing at 90° to one another.

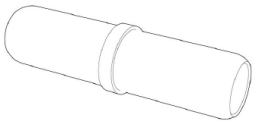


### PC80 Post Cap

PC80 are an end cap for 80NB pipe and provide an anchor point when attaching a bearer to the top of a post using a T50 bracket.

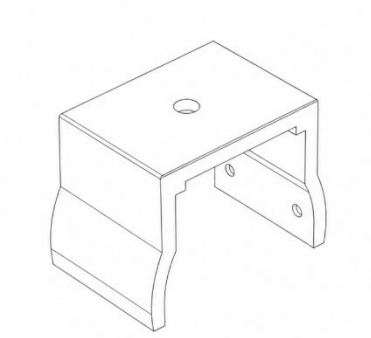
### PC100 Post Cap

PC100 post caps are used to cap 100 × 100 square hollow sections. PC100 also act as an anchor point for T50 brackets.



### J50 Pipe Joiner

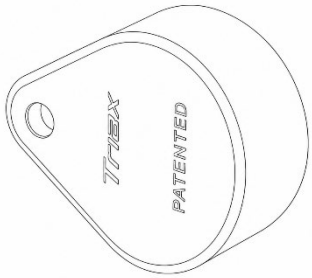
The J50 allows 50NB pipes to be joined end-to-end, without welding.



### TX80

The Triax TX80 is the key to the system and is used for longer spans.

## 4.2 End caps, plugs & anchor points

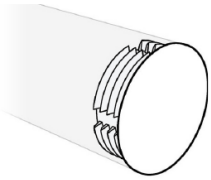



### EC50 End Cap

EC50 end caps are used to provide an anchor point for the membrane cover at the ends of each rafter.

### TR50 Tensioning Ring

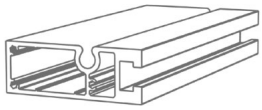
TR50 provides firm and adjustable anchor points for your membrane cover. Similar to EC50, but can slide along the rafter.



### EP50 End Plug

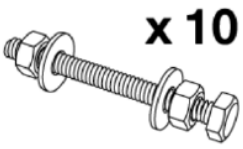
EP50 end plugs are push-fit HDPE inserts that neatly finish the ends of 50NB pipes.

## 4.3 Edge, tensioning & finishing



### TSE V5 — Triax Straight Edge

The Triax Straight Edge simplifies the Triax construction and provides a clean and crisp edge along the length of your structure. A simple rope or keder edge along the whole length is all that is required. See Section 5.




### TBS Tensioning Bolts

Used to attach the TSE to EC50 end caps or TR50 rings, providing easy tensioning and a clean finish.

# 6. Installation Guide

**Before you start — engineering certification**

Prior to construction of any Triax structure, certification from an independent, registered engineer must be obtained. The certificate should detail the correct rafter, bearer, and post spacing for the project. Contact Shade Smart if you require a referral.

Throughout installation, ensure OH&S requirements are followed and safety precautions observed. Appropriate certificates must be held and correct procedures followed for working at heights.

## 6.1 Recommended tools and materials

### Materials

- Triax fittings (see Section 4)
- Posts (80NB), bearers (50NB), rafters (50NB) and spreader / central rafter tie (50NB)
- Triax Straight Edge (TSE V5)
- TSE joiners (for structures over 4 m long)
- TSE bolt set (8 mm stainless steel)
- Standard keder rope tracks
- Necessary bolts, washers, nuts and 14G Tek screws
- Triaxadon (optional)

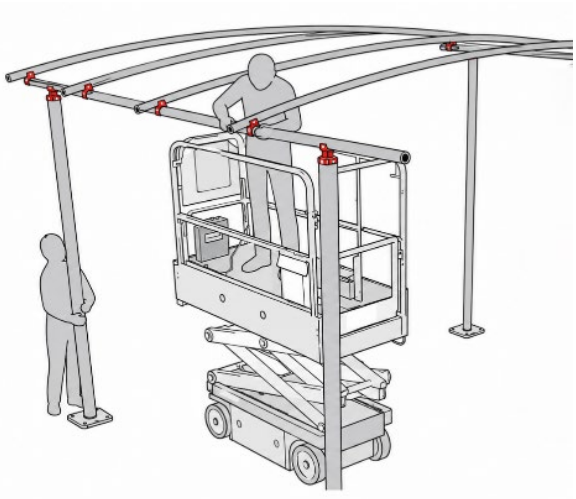
### Tools & equipment

- Impact driver with 3/8" driver bit
- Impact wrench (for bolt-down footings)
- Ratcheting ring spanner
- Quick-Grip clamps
- Ladders / scissor lifts
- Spirit levels
- Tape measures
- Mallet
- Laser or string line
- Safety equipment (eye protection, ear protection, etc.)

## 6.2 Secure the footings

Several footing options are available for post installation. Select the appropriate option for the site and engineering specification:

4. Bored pier
5. Screw piles
6. Hold-down bolt cage
7. Mechanical fixing to an existing slab



Refer to the design specifications for post spacing.

**Considerations**

Use a laser or string line to ensure posts form a straight line / grid for the bearers and rafters.

In a typical installation, the tops of the posts must finish at the same height so that the bearers sit flat. Posts can be cut to the desired height after installation.

## 6.3 Install the bearers

1. Join the PC80 and T50 using M10 8.8/S bolts with washers and Nylock locking nuts to form the post couplings. These couplings are secured to the tops of the posts.
2. Sit the PC80 side of each coupling on top of the 80NB posts.
3. Lay the 50NB bearers into the T50 couplings before securing, to confirm correct direction and alignment.
4. Confirm positioning with tape measures, referring to the design for the required overhang at each end.
5. Once correct alignment is achieved along the bearer, secure the Triax couplings with Tek screws.

### PC80–T50 coupling reinforcement

Depending on engineering requirements, the PC80–T50 coupling can be strengthened using a Triax eye bolt and a hex-head bolt tie. A typical reinforced coupling comprises, from top to bottom: the T50 bracket fixed with a self-tapping screw and Nylock nut; the PC80 post cap; a hex nut and washer; the Triax eye bolt; and a hex-head bolt secured with a Nylock nut.

## 6.4 Install the rafters

1. Using FX50 fittings, place couplings on top of the bearers at the positions corresponding to each rafter.
2. Lay the rafters on top of the FX50 fittings.
3. Use spirit levels (or a trained eye) to ensure rafters are plumb and not rolling inward or outward before fixing off.
4. Use a tape measure to confirm the correct rafter overhang, as per the design.
5. When correct alignment is achieved, secure the FX50 fittings to both the bearers and the rafters with Tek screws.
6. Work along the structure, maintaining proper alignment and rotation of the rafters as you go.

> **Installer tips**
>
> Pre-drilling holes in the metalwork is possible, provided holes stay within the parameters of 14G Tek screws and positions are measured accurately.
>
> Use Quick-Grip clamps to seat the rafter tightly into the coupling. This ensures a secure fit and adjusts the angle of the FX50 at the bearer to meet the curvature of the rafter.

## 6.5 Install the spreader (central rafter tie)

Once all rafters are in place, the spreader is installed to help prevent rotation of the end rafters under tension.

1. At the centre of the rafters, secure FX50 fittings using Tek screws.
2. Bring the spreader beam up to the underside of the FX50s and hold it in place with Quick-Grip clamps.
3. Secure the FX50s to the spreader with Tek screws.

## 6.6 Fit the end caps and plugs

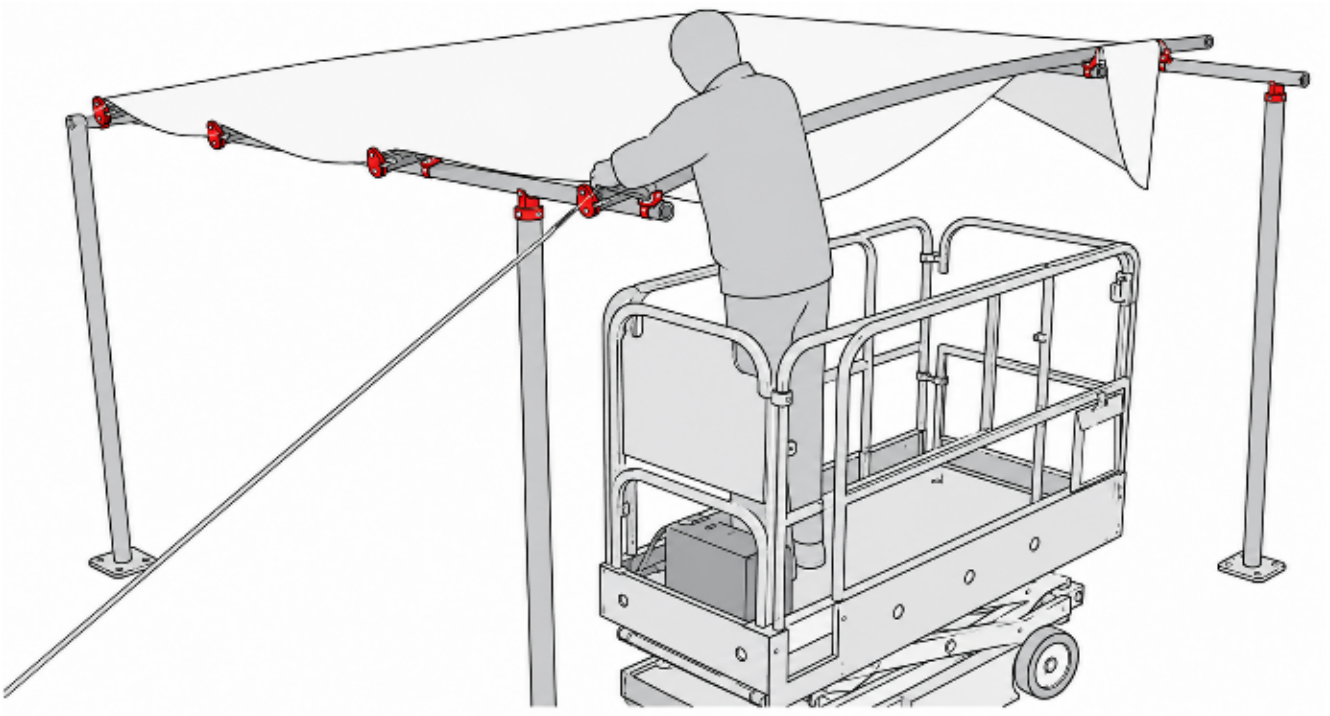
Using a mallet, press the EC50 end caps into the ends of the rafters, then fix them off with Tek screws. For the bearers and the spreader, press EP50 plugs into the open ends for a clean finish.

## 6.7 Install and tension the canopy

1. Lay the canopy over the Triax structure and pull it towards the edges, ensuring correct orientation.
2. Along the two curved ends (the rafters), slide a standard keder rope track onto the keder edging of the canopy. Repeat on the opposite edge.
3. Fix the keder track to the Triax frame with screws every 300–500 mm, placing two screws closely spaced at each end of each rope track.
4. Install the TSE V5 onto the canopy length that runs parallel to the bearers.
5. Slide the 8 mm tensioning bolts along the TSE channel so they line up with the EC50s at the rafter ends. Ensure the stainless-steel washer and TSE locking nut are in place before feeding each bolt through the EC50.
6. Use the brass nuts to tension the canopy, tightening with a ratcheting ring spanner until proper tension is achieved.
7. Once tension is achieved, ensure both stainless-steel locking nuts are firmly in place.

> **Single-operator tip**
> The Triaxadon tensioning tool can be used to apply the required tension while fixing screws, enabling single-operator installation.

*With the canopy tensioned and the locking nuts secured, the structure is complete.*



# 7. Price Guide

> **Internal / commercial reference**
> This appendix is a removable commercial reference. Remove it before issuing the manual to clients where pricing should not be disclosed. All prices exclude GST and are subject to change.

*Prices exclude GST.*

| Component | Description | Price (ex GST) | Unit |
|---|---|---|---|
| T50 Bracket | The original multipurpose fitting | **$17.00** | each |
| EC50 End Cap | Cast end cap for 50NB pipe | **$17.00** | each |
| FX50 Fixed Bracket | Fixed 90° for rectangular structures | **$22.00** | each |
| PC80 Post Cap | Cast cap for 80NB post (adaptor for T50) | **$21.00** | each |
| TR50 Tensioning Ring | Extruded tensioning collar for 50NB rafters | **$7.95** | each |
| PC100 Post Cap | Cast cap for 100 × 100 post | **$25.00** | each |
| EP50 End Plug | End plug for 50NB pipe | **$2.50** | each |
| J50 Pipe Joiner | Joiner for 50NB pipe | **$17.00** | each |
| TBS Tensioning Bolts | Tensioning bolt set | **$39.00** | per set |
| TSE V5 — Triax Straight Edge | Triax Straight Edge tension bar | **$85.50** | per length |
| Triaxadon | Sail track tensioner for 50NB pipe | **$290.00** | each |

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