Structural Ceiling

Tate Duo User Installation Reference Guide

THIS INFORMATION MUST BE SHARED WITH ALL SERVICE PROVIDERS WHO INTEND TO SUSPEND SERVICES FROM THE TATE GRID SYSTEM

NOTE: MAX. TORQUE OF 30 IN-LBS FOR ALL CONNECTIONS TO GRID

Download
Installation Guide

Safety Guidelines

THIS INFORMATION MUST BE SHARED WITH ALL SERVICE PROVIDERS WHO INTEND TO SUSPEND SERVICES FROM THE TATE DUO SYSTEM

Tate Duo is a structural ceiling system designed to support static vertical loads. When installing services to the bottom 3/8"-16 or ½"-13 threaded channel, the following instructions must be adhered to:

1. Tate Duo is limited to a maximum point load of 800 lbs or distributed load of 112 lb/ft^2 at 4ft hanger spacing. See data table for ratings at other spans.
    a. Exceeding these values may cause a failure in the system.

2. When hanging equipment from the ½" slot, an anti-splay washer must be used to prevent separation of the slot under heavy loads.

3. Do not torque the threaded rod or bolts above 30 in-lbs. Over torquing will damage the threaded slots reducing the load capacity of the Tate Duo System.
    a. Failure to adhere to this may result in the shearing of bottom slot threads reducing the load capacity of the Tate Duo system.

4. Equal care must be taken during the installation of the Tate Duo to not exceed the 30 in-lbs torque limit on the top screws connecting the Tate Duo to the suitable connector.
    a. Failure to adhere to this may result in the shearing of top slot threads reducing the load capacity of the Tate Duo system.

5. Only screws supplied by Tate should be used on the top slot.
    a. Failure to adhere to this may result in the reduction of the load capacity of the Tate Duo system.

6. For threaded rod connections, the rod should be fully engaged. For bolted connections bolts should be carefully selected to maximize thread engagement, but should not be oversized to avoid bottoming out. There must be at least 0.67 in. thread length into the ½" slot or 1.4 in. thread length into the 3/8" slot as measured from the bottom to the flange.
    a. Failure to adhere to this may result in the reduction of the load capacity of the Tate Duo system.

7. Do not impose a dynamic load on the connection to Tate Duo. During installation of supported services, bracing is required to prevent dynamic load on the Tate Duo ceiling.
    a. Moment forces imposed on the Tate Duo system may cause failure of the connection between the services and the Tate Duo system.

8. All bottom thread fixings should be completed with suitable washers.

9. Tate Duo is NOT a walk-on ceiling.

10. In certain conditions the loading capacity of the Tate Structural Ceiling System may be greater than the loading capacity of the building structure and/or means of attachment to the building structure. Consult with a licensed structural engineer to obtain site specific recommendations regarding the attachment of the Tate Structural Ceiling System and any associated loading to the building structure.

11. Structural ceiling systems as a whole shall be analyzed and designed to local codes by a qualified engineer.

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THIS INFORMATION MUST BE SHARED WITH ALL SERVICE PROVIDERS WHO INTEND TO SUSPEND SERVICES FROM THE TATE DUO SYSTEM

Introduction

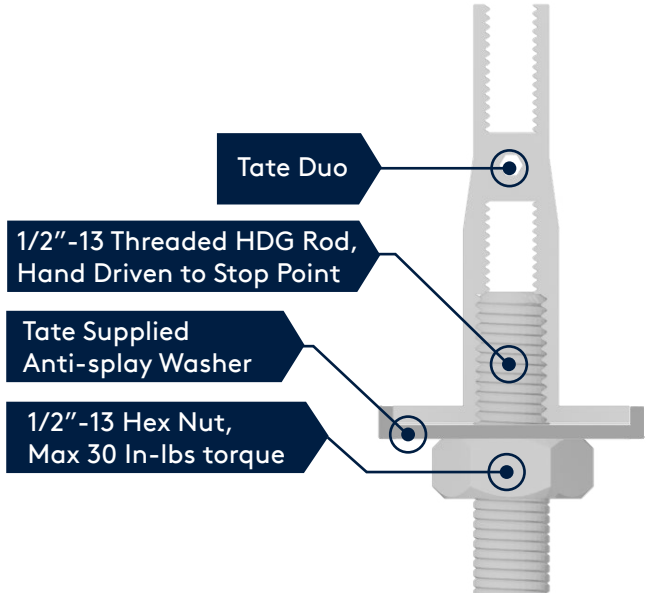
Thank you for choosing Tate Duo. The purpose of this guide is to provide you with a reference for typical installation situations. We would be interested in hearing any comments you have on this installation manual, product, or overall experience. Please call or email Technical Services: Phone: 410-799-4200, Email: TateInfo@tateinc.com

Safety

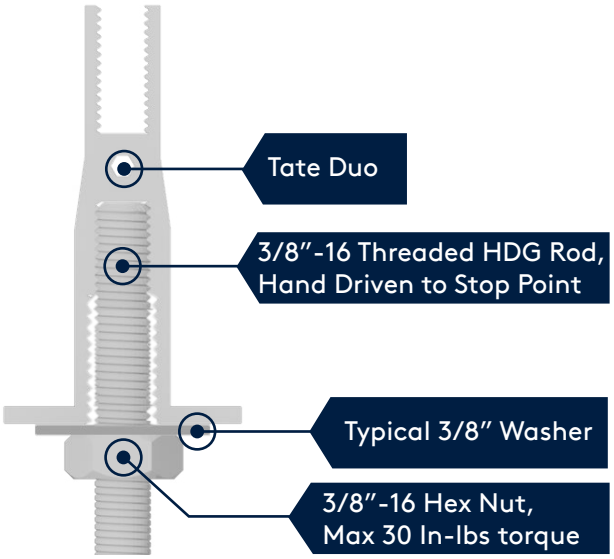
Tate Duo is a structural ceiling system designed to support static vertical loads. When installing services to the bottom threaded channel, the following instructions must be adhered to:

1. Do not torque the threaded rod or bolts above 30 in-lb. Over torquing will damage the threads of the slot reducing the load capacity of the Tate Duo system.
2. For threaded rod connections, the rod should be fully engaged. For bolted connections bolts should be carefully selected to maximize thread engagement, but should not be oversized to avoid bottoming out. There must be at least 0.67 in. thread length into the ½" slot or 1.4 in. thread length into the 3/8" slot as measured from the bottom to the flange.
3. Be sure all bolts, nuts, and threaded rods are properly tightened down as described in this guide.
4. Do not impose a dynamic load on the connection to Tate Duo. During installation of supported services, bracing is required to prevent dynamic load on the Tate Duo ceiling.
5. All bottom thread fixings should be completed with anti-splay washer for 1/2" rod and typical washer for 3/8" rod and tightened upto 30 in-lb. to prevent separation of the slot under load.
6. Do not put a load on the system until the installation is complete.
7. Tate Duo is NOT a walk-on ceiling.
8. 2 or more people are required for handling some of the pieces for this system.
9. Wear personal protective equipment (PPE) when drilling, cutting, or installing. PPE includes gloves, safety eyeglasses, hard hats, etc.

1/2" Connection Methodology



3/8" Connection Methodology



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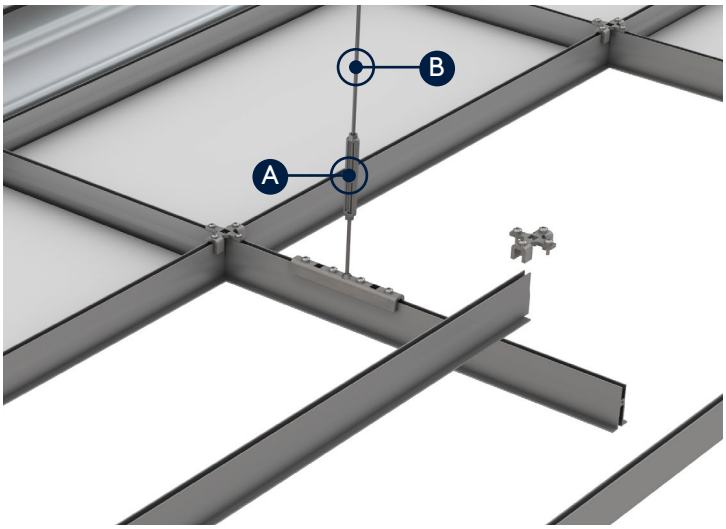
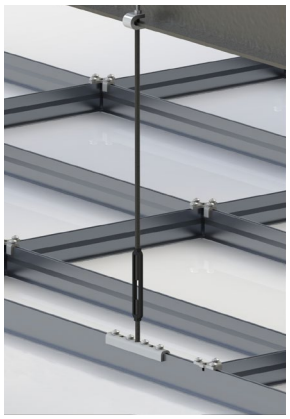
1. Building Connections

Tate Scope of Supply:

Tate supplies Grid components up to the turnbuckle (A), suitable drop rod and building connections (B) must be sourced by others.





Tate Duo hanging method from steel building

Tate Duo hanging method from concrete building

The Tate Duo system may be hung either directly from structural steel or the above concrete slab.

Drop Rod Frequency:

Tate Duo requires hangers every 4′ to 8′ on center along the mains which are always spaced 4′ nominal apart. Hangers are always required along the perimeter.

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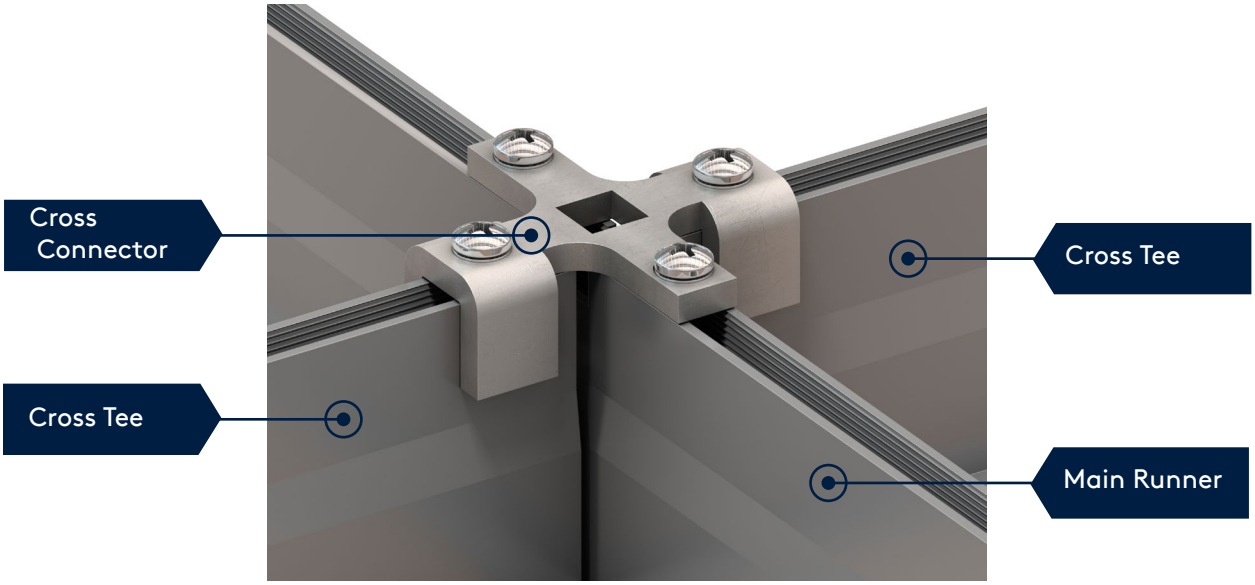
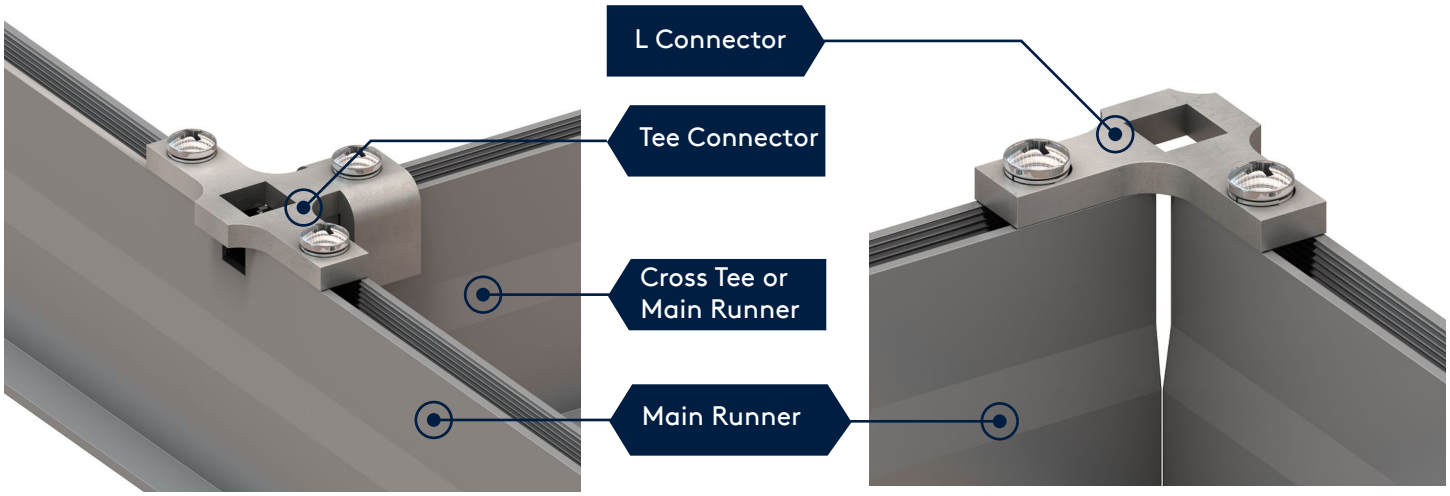
2. Connector Details

Tate Duo Field Connectors

There are three different types of Field Connectors; 4-way (standard), 3-way (tee) and 2-way (corner). Note that the flanges that fold down on the 4-way and 3-way connectors are intended to be placed on the tees with the flats on the main:

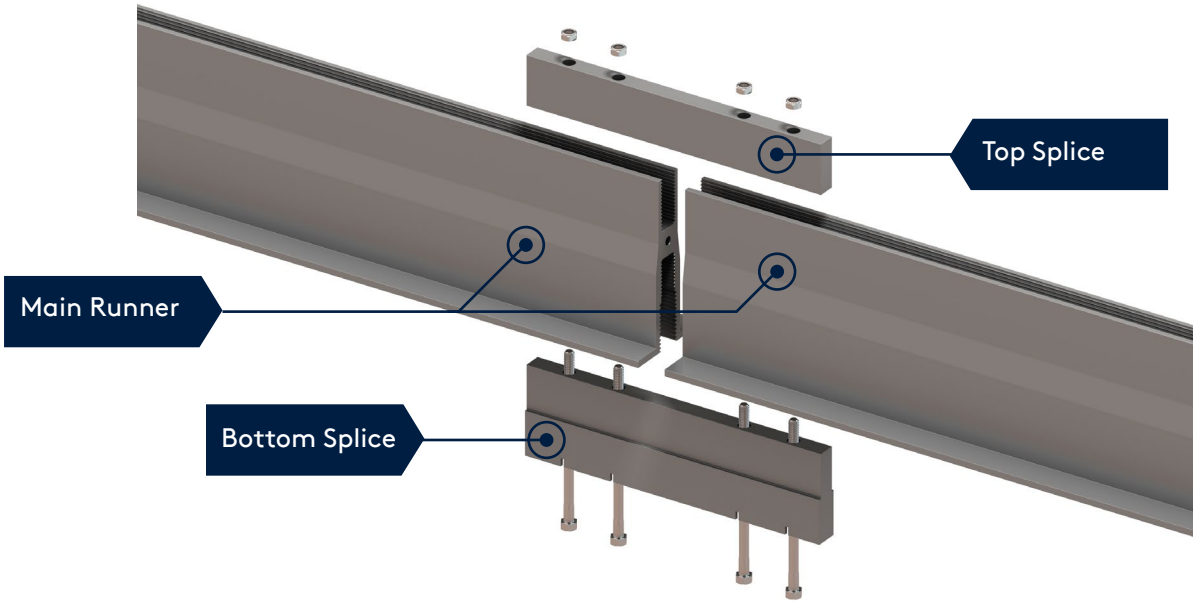




3. Splice Details

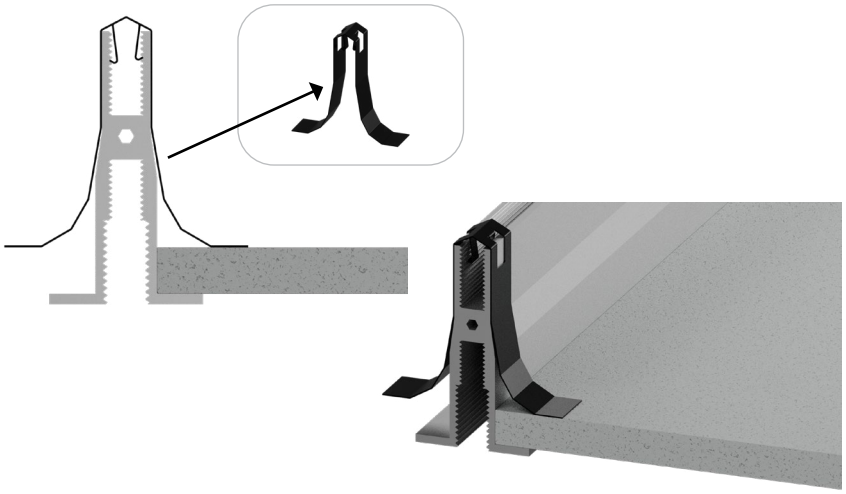
Main Runner Splice Connectors

As shown below, the main runners need to be connected with upper and lower steel splice connectors. The ends of each main runner have holes predrilled for the screws that hold the splices in place. The splice connectors should be assembled as shown below:



Hold Down Clips

- Hold down clips can be provided with the Tate Duo system as an option.
- Two hold down clips are recommended per tile.
- Hold down clips are installed by pressing them into the top thread by hand or lightly tapping them with a mallet.
- Hold down clips are designed for use with 1/2" - 1" thick ceiling tiles
- PN44404



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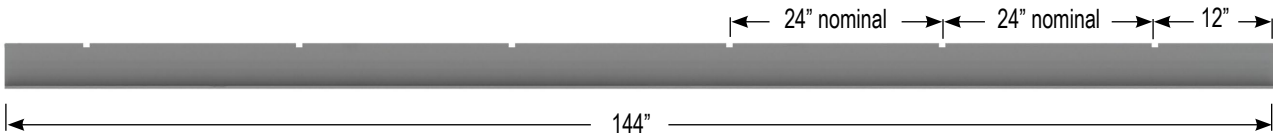
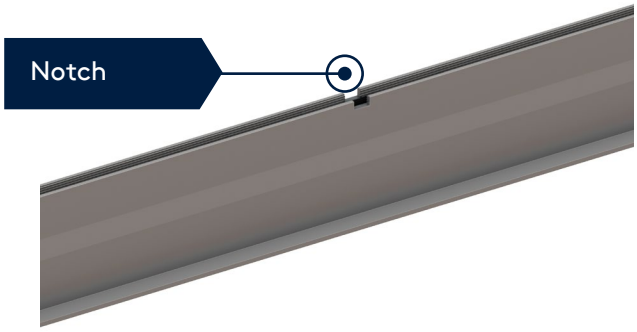
4. Notch Details

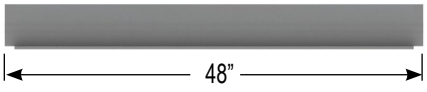
The Tate Duo structural ceiling grid system consists of ~12 ft main runners, ~4 ft cross tees and ~2 ft cross tees (used only for 2′x2′ grids). The mains are notched every ~2 ft to help with alignment of the cross tees. For 2x2 grids, the 4 ft tees will have a notch in the middle.

Main Runners are roughly 12 feet long with notches along the length





Cross Tees are roughly 4 feet long with copes at each end



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5. Perimeter Details

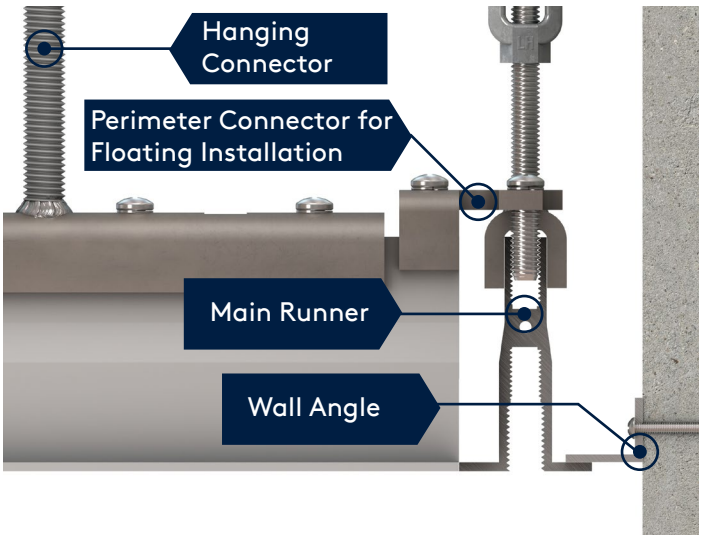
Perimeter Options:

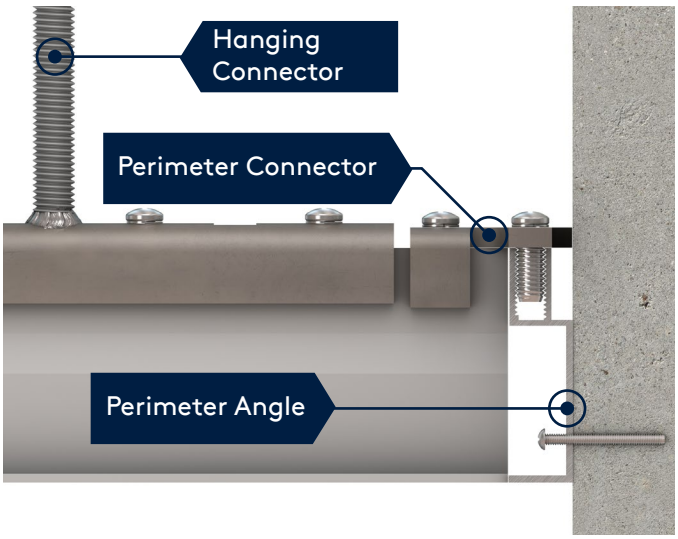
The Tate profile should run along all perimeters and should be anchored every 4′. This serves multiple purposes:

- An engineering, it ensures no part of the system is cantilevered.
- An installation, the notches every 24″ on the profile help you set out during installation.
- It also has aesthetic and air sealing benefits as the tiles sit better in this design.

If this design is not followed, the members of Tate Duo terminating at the wall may not be structurally sound and may deflect and fail under load.

There are two options when installing Tate Duo at the perimeter of a data hall: Floating and Fixed. Floating perimeters utilize standard Main Runner components which can also be used in other areas of the data hall. Fixed Perimeter details utilize special 12′ Fixed Perimeter Angles and typically don't require hangers in the case where the connection to the wall is engineered for the purpose of carrying the rated capacity of the grid.





Floating Installation Detail

Main Runners are utilized when installing with a floating detail. When installing with a floating perimeter, Perimeter Connectors can be utilized to align the main runner with the grid while installing close enough to the wall so that angle can be used to fill the void. A hanger is required at the end of each tee to ensure full load rating.

Additionally it is recommended to utilize a Wall Angle attached to the perimeter.

Fixed Installation Detail

Perimeter Extrusions are designed to create a fixed perimeter detail. Perimeter Extrusions can be cut on site to desired length when assembled along perimeter walls. Perimeter Extrusions can also be bolted directly to the wall with appropriate fasteners for the wall type. A hanger is required at the end of each tee to ensure full load rating.

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6. Ceiling Assembly

Bolt Torque

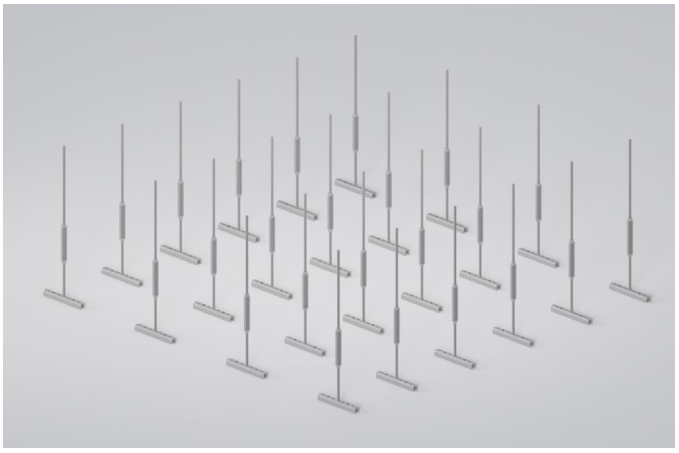
All bolt connections to the top slot of the grid should be tightened flush to a washer with a **maximum torque value of 30 in-lb**, using a torque limiting screw gun or ratchet similar to:

All bolt or nut connections to the bottom slot of the grid should be tightened flush to a washer or mounting bracket with a **maximum torque value of 30 in-lb**, using a torque limiting screw gun or wrench similar to:

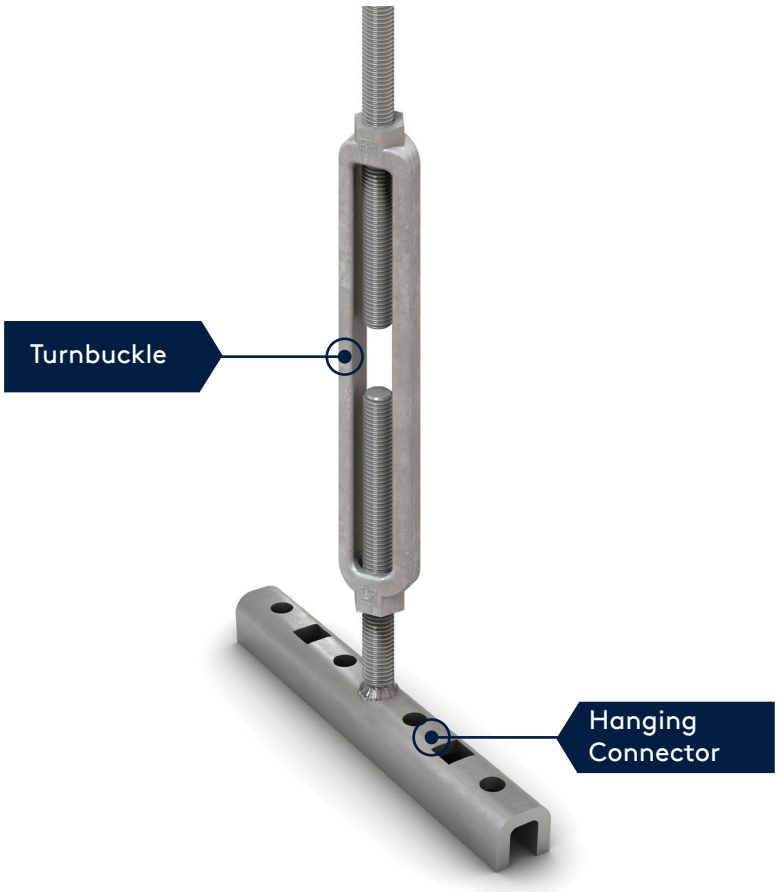
Thread Engagement

When threading bolts or threaded rod into bottom slot to hang equipment, ensure that the bolt or rod is long enough to fully engage the depth of the slot entirely or thread tear-out could be possible. Any less than 0.67 in. thread length into the ½" slot or 1.4 in. thread length into the 3/8" slot as measured from the bottom to the flange could cause thread tear-out at less than rated loads for the system.

Step 1: Attach turnbuckles and hangers to threaded rod drops



Turnbuckles and hanging connectors should be installed in alignment with the main runners. Hang from the building structure at specific increments per job specification.



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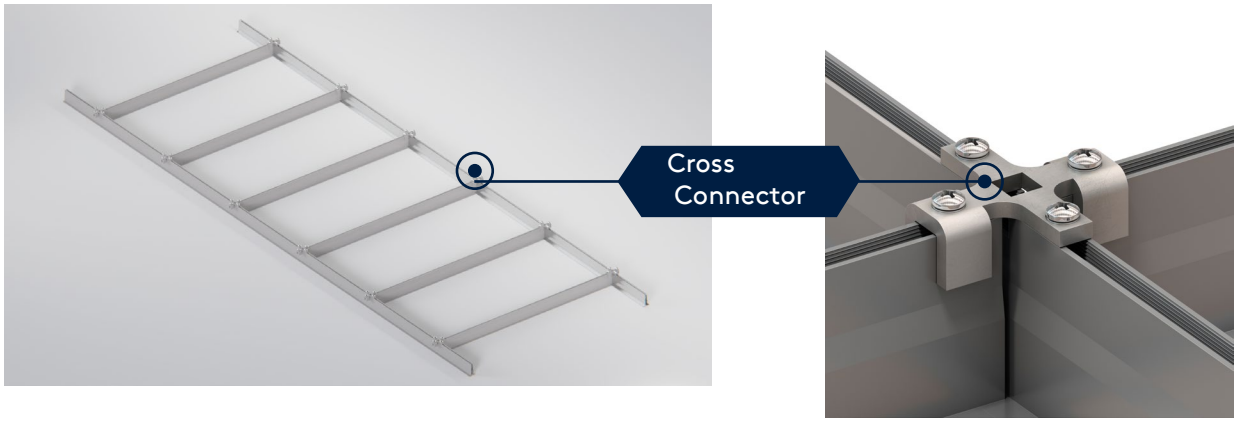
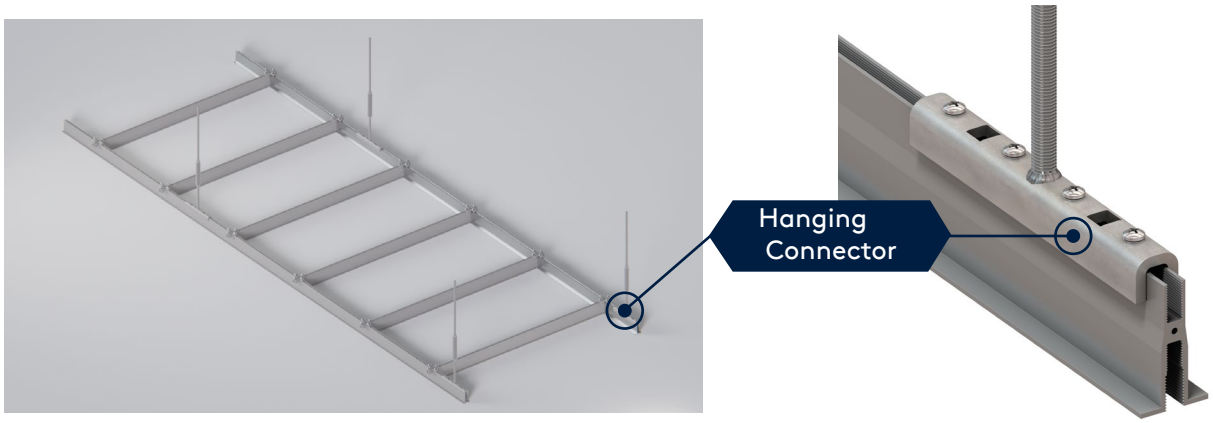
Step 2: Assemble 12 ft x 4 ft Sections

- Attach 2 Main Runners with 6 Cross Tees using 12 Cross Connectors
- Align the connectors to the notches on the Main Runners using the Alignment Tool
- Use fasteners and lock-washers tightened upto 30 in-lb to attach Main Runners and Cross Tees
- Do not fully tighten Cross Connectors as they will be used to attach consecutive subassemblies

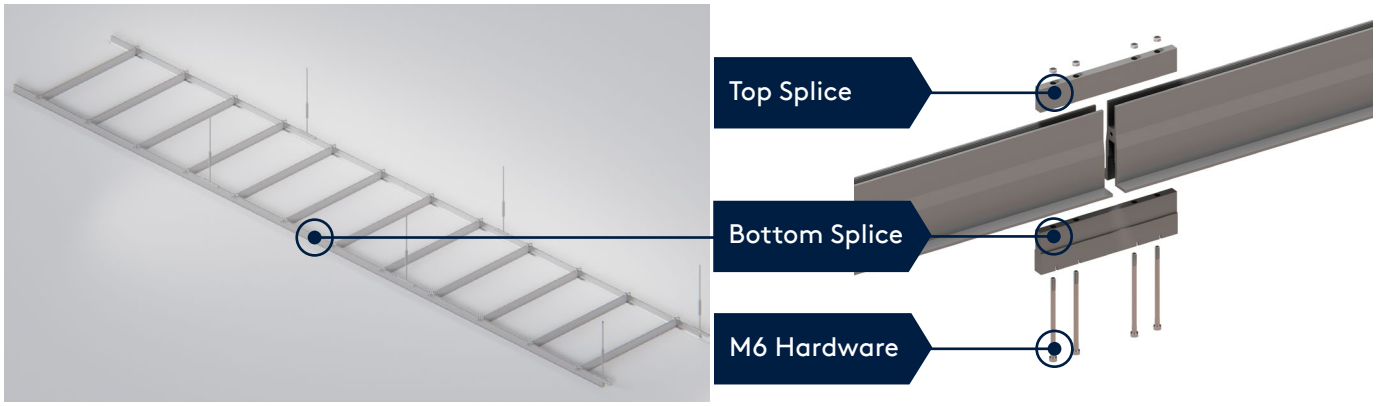


Step 3: Lift 12 ft x 4 ft Sections

- Lift Section
- use fasteners and lockwashers and tighten up to 30 in-lb to attach hanging connector to the main runners

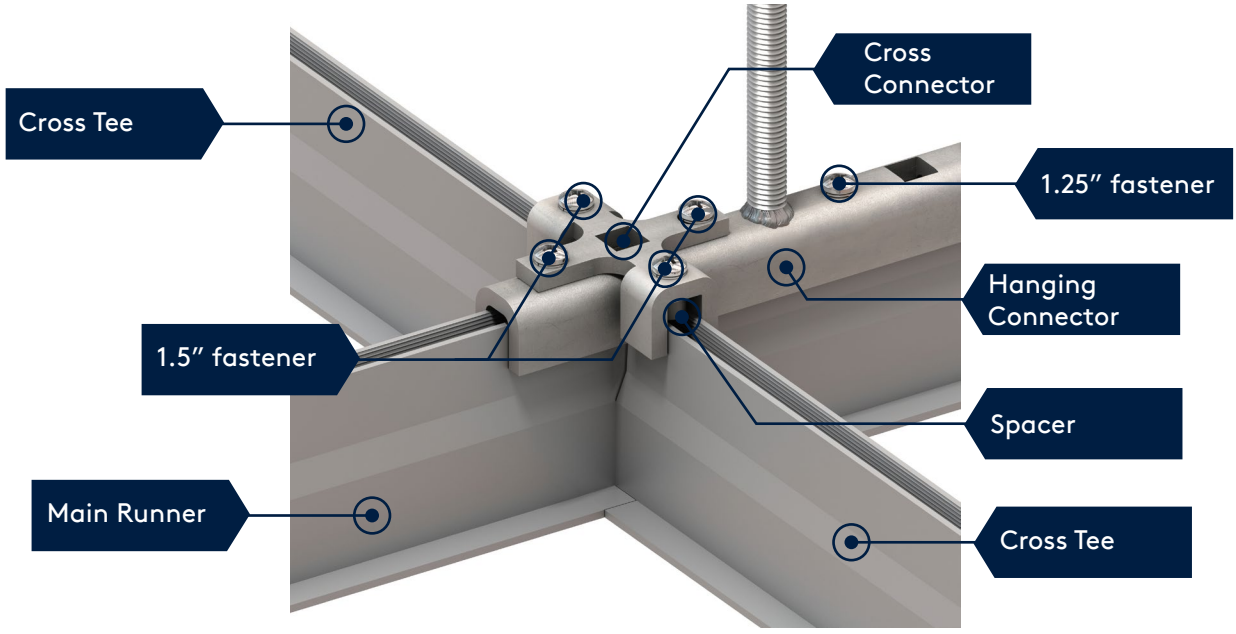


Step 4: Lift and Attach Another Section



- Lift another section
- Use fasteners and lock-washers tightened upto 30 in-lb to attach Hanging Connectors to Main Runners
- Align co-linear Main Runners, insert Splice Connector components and align with predrilled holes in Main Runners, use 3/8″ hardware tightened upto 30 in-lb to secure connection
- Continue to add sections to build out the grid

Note: If a hanging connector falls at an intersection with a tee, the cross connector should be placed on top of the hanger and longer screws (1.5 in.) should be used to fasten it in place. Spacers are provided to be placed below the connector to prevent the tees from being pulled up when the longer screws are tightened:



7. Service Conditions

Connecting to the bottom slot of the Duo

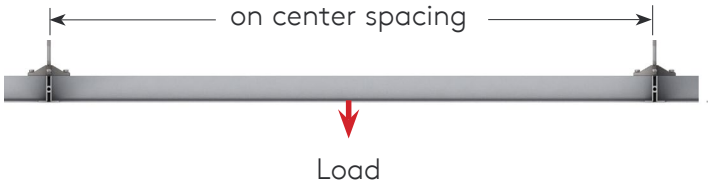
A standard ³/₈″-16 or ½″-13 threaded rod can be used to suspend services from the bottom slot of the Duo. Fixings to the bottom slot of the Duo must be at least 0.67 in. thread length into the ½″ slot or 1.4 in. thread length into the ³/₈″ slot as measured from the bottom to the flange. Anti-splay washer must be used for ½″-13 slot.

Bottom Slot Torque:

30 in-lb max

Hot Aisle Containment components supplied by Tate can easily be secured to the bottom slot of the Grid.

Structural Tee Deflection (Midspan Beam)

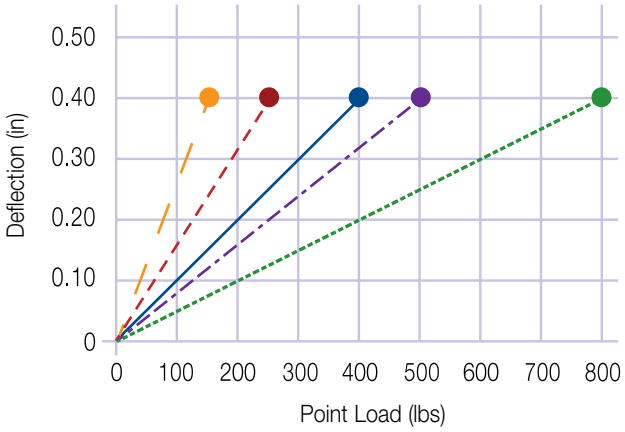


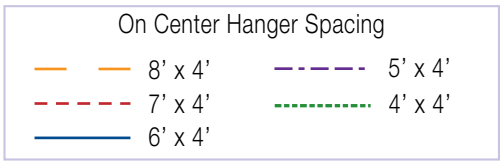
Calculate midspan beam deflection at any point below yield

$$S = \frac{WL^3}{48EI}$$

S = Deflection
W = load
L = 48in

$E = 10x10^6$ lbs/in²
$I = .67$ in⁴





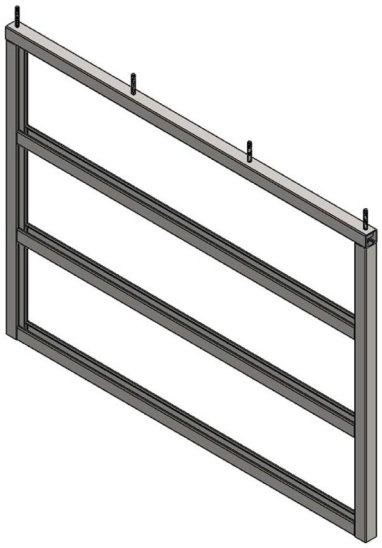
On Center Hanger Spacing	Max. Uniform Load (lbs)	Max. Safe Working Load (Point Load) (lbs)	Midspan Deflection at Max. Safe Working Load	Safety Factor
4′ x 4′	112	800	0.22″	2x
5′ x 4′	90	500	0.24″	2x
6′ x 4′	75	400	0.36″	2x
7′ x 4′	64	250	0.37″	2x
8′ x 4′	56	150	0.34″	2x

Max safe working load based hanging points no less than 4′ apart in any direction.

Cable Installation & Bracing Drops:

Do not pull cables or expose the Duo to any dynamic loading. Dynamic loads and dragging cables across the Duo may exceed the Ultimate Load of the Duo.

To distribute a load that would otherwise exceed the stated 800 lb point load, cable ladders can be employed to achieve up to the rated uniform load based on the hanger spacing (see Section 7). The example to the right shows the recommended method to distribute load to ensure no single stud exceeds the 800 lb point load.



Please note: Bracing is required during cable pull. The installer should use a bracing method to hold the ladder racks in position so when cables are pulled during install the ladder does not swing back or forth. Bracing must be strictly adhered to to avoid exceeding the stated system load tolerances.

8. Maintenance

Cleaning:

To clean Tate Duo components please use a common non-abrasive mild detergent containing less than 0.5% phosphate and water, applied using a sponge. The components should be dried using a soft towel. If solvents are required to remove materials not soluble in water such as petroleum products, the following solvents can be used: Isopropyl alcohol, denatured alcohol, mineral spirits or methanol. Paint scratches can be touched up. Contact the factory for matching paint.

Maintenance of above ceiling services:
The Tate Duo system should not be walked on under any circumstances. This may expose the system to excess dynamic loads and cause a failure.

Ceiling tiles may be removed to build a scaffold like structure that rises through the Duo and can allow walk-on access above the Duo without exposing the Duo system to extra loads.

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