



Armstrong®
World Industries



Technical Guide

DynaMax® Plus

Structural Aluminum
Suspension System

Hang Tough(er)

Introducing DynaMax® Plus

Like the DynaMax® structural grid system, DynaMax® Plus is a structural aluminum suspension system that serves as both a ceiling system and structural component by providing a suspension or attachment platform for cable trays, equipment, partitions, and containment barriers while eliminating penetrations in the ceiling system.

Previously, the typical construction method for data centers was to have a structural system, like slotted strut, to suspend heavy items, then an acoustical ceiling to contain air flow and protect the equipment from debris. We have combined these two needs into one with DynaMax grid, and now, the DynaMax Plus suspension system. DynaMax Plus grid provides the accessibility and flexibility of the existing DynaMax system but with enhanced load-carrying capacity for 6-ft. and 8-ft. rod drops.

Code Compliance You Can Trust

Meets:

- ASTM C635
 - ASTM C636
 - ASTM E580
 - ICC-ES AC156
- Seismic D, E, F configurations available





DynaMax® Plus Structural Grid Data Center Installation

Table of Contents

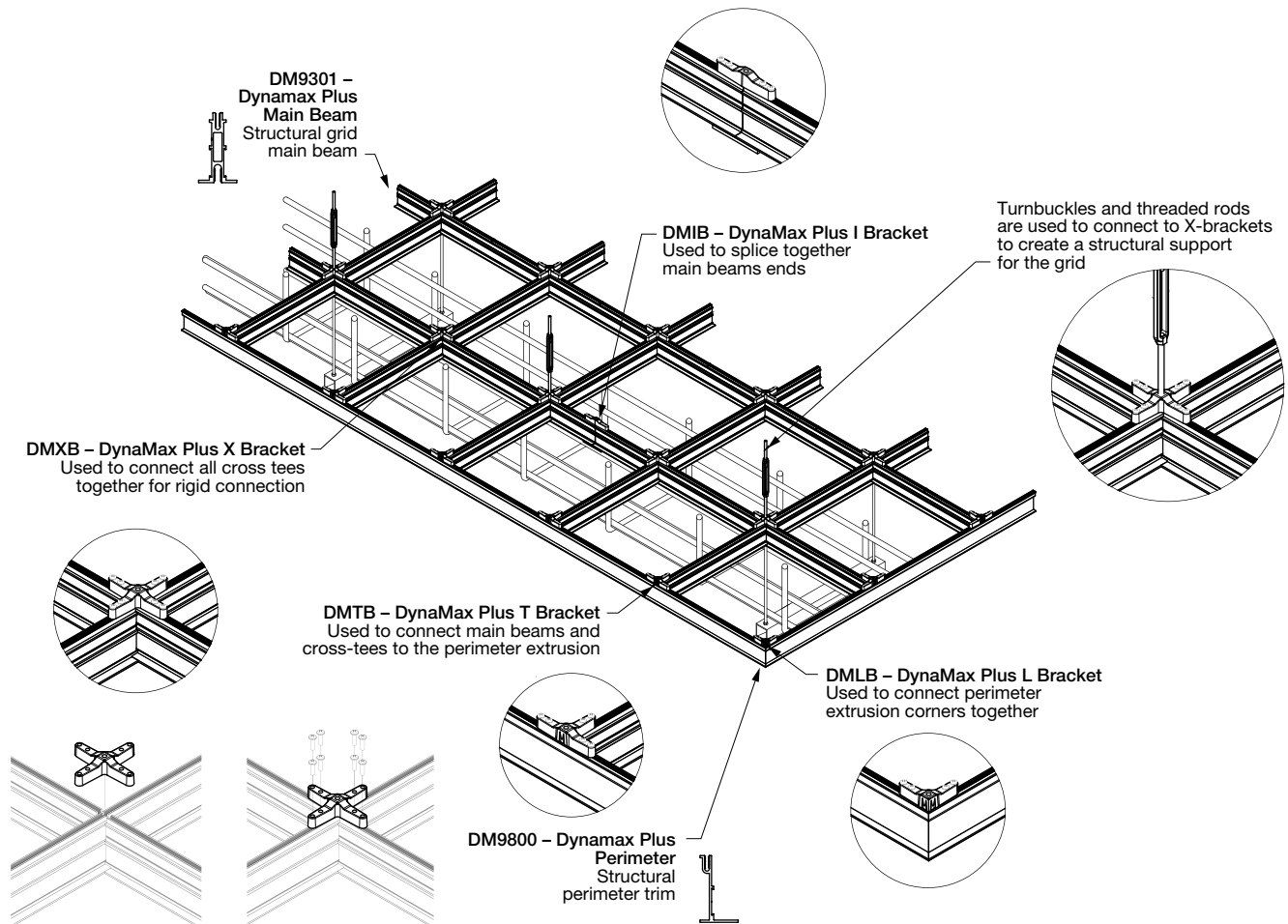
- 4** How the System Works
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Partners/MEP Partner/
Air Containment Partner



About the System

How the System Works

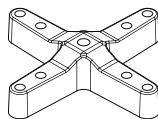
For additional information and technical guidelines, contact TechLine at 877 276-7876 and select prompts 1-2-3.



ACCESSORIES

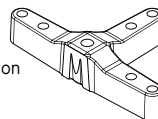
DMXB – X-Bracket
Used to connect all cross tees together for rigid connection

DMXB – 24 PCS



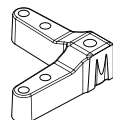
DMTB – T-Bracket
Used to connect main beams and cross tees to the perimeter extrusion

DMTB – 36 PCS



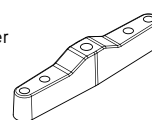
DMLB – L-Bracket
Used to connect perimeter extrusion corners together

DMLB – 12 PCS



DMIB – I-Bracket
Used to splice together main beam ends

DMIB – 24 PCS



DMHWK – Hardware Kit
Turnbuckles and threaded rods are used to connect the X-brackets to the threaded rod to create a structural support for the grid*

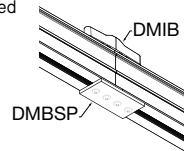
DMHWK – 12 PCS

*1/2" hardware kit available upon request)



DMBSP – DynaMax Main Beam Splice Plate – Used with DMIB I-Bracket to splice together main beams that butt up against one another

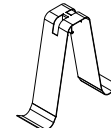
DMBSP – 24 PCS



OPTIONAL ACCESSORIES

DMPHDC – Hold-down Clip for DynaMax Plus – Attaches to the suspension system to hold Lay-in panels in place

DMHDC – 100 PCS



DM3FGSKT – Main Beam and Cross Tee Field Gasket for DynaMax Plus – Field Gasket option for DynaMax Plus Main Beams and Cross Tees

DM3FGSKT – 108 LF/roll

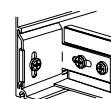
DM8FGSKT – Perimeter Molding Field Gasket for DynaMax Plus – Field Gasket option for DynaMax Plus Perimeter Molding

DM8FGSKT – 10LF/roll

NON-STRUCTURAL CEILING ADAPTER ACCESSORIES

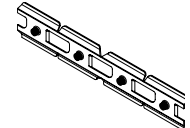
AXTBC – Axiom® T-Bar Connector Clip – Provides positive mechanical lock with factory-installed screw. Screw-fastened connection to suspension members that intersect the trim channel

AXTBC – 1 PC



AX4SPICEB – Axiom Splice Plate with Set Screws – Join straight sections of light cove together

AX4SPICEB – 1 PC



Suspension System Components

This system provides the accessibility and flexibility of DynaMax® grid but with enhanced load-carrying capacity for 6' and 8' rod drops.

Key Selection Attributes

- Allows for longer spans (6' and 8') while also providing greater load-carrying capacity
- 6' spacing allows for direct attachment to steel joists or pre-cast concrete tees
- Spanning 6' or more eliminates the need for slotted strut channel at deck/roof level and creates more space for critical MEP components
- Eliminate up to 1/2 of threaded rods/accessories utilized today for typical 48" hanging spans
- Ideal combination of a finished ceiling system with a structural solution
- Easy integration into a conventional grid system using AXTBC clip and DynaMax® Plus boss channels
- Can integrate seamlessly with select Armstrong® ceiling panels for a complete ceiling system solution
- Suspension system has continuous threaded boss channel, allowing 3/8"-16 threaded rod to be installed to the suspension system at any location
- Available in 24" x 24", 24" x 48", and 48" x 48" suspension system layouts
- Allows for 96" x 96" (or similar) structural pods/bays with acoustical grid infill using AXTBC clips
- Fully accessible system allows for future expansion and upgrades

- Non-progressive installation gives the ability to remove or replace a section of the system without the need to dismantle those components around it
- Cross tees not bearing any load are removable for plenum access without compromising the structural integrity of the system
- 10-Year Limited Suspension System Warranty; 30-Year Limited Ceiling System Warranty
- For custom layout information and technical guidelines, contact TechLine customer support at 877 276-7876

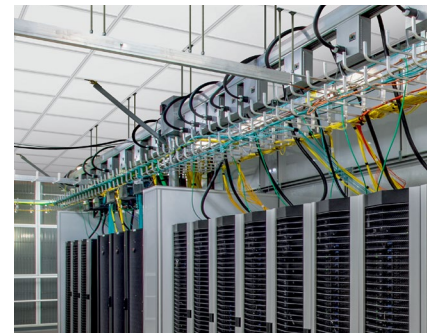
For Data Center Applications

- Provides a suspension platform or attachment for data center cable trays, equipment, partitions, and hot and cold aisle containment barriers from building structure to below the ceiling plane
- Finished ceiling system offers a containment barrier to protect servers from debris
- Controls airflow by eliminating penetrations
- Grid provides increased temperature and pressure management, reduced leakage, and enables the best hot and cold air containment at the ceiling plane when compared to other ceiling types
- Available with Ultima® AirAssure® panels with factory-gasketed edges to provide even greater temperature and pressure management

- Lighting, diffuser, and containment options are available from our Data Center lighting and MEP partners

Typical Applications

- Data Centers
- Laboratories
- Hospitals
- Industrial Warehouses/
Distribution Centers
- Retail/Convenience Store



DynaMax Plus Structural Aluminum Suspension System

VISUAL SELECTION

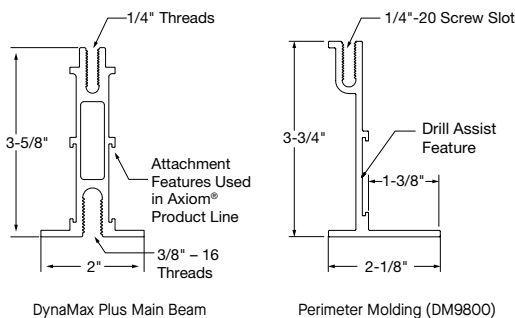
| | Item No. | Description | Dimensions (Inches) |
|--|----------|-------------------|----------------------|
| DynaMax Plus Structural Aluminum Suspension System | DM9301 | Main Beam | 144 x 2 x 3-5/8" |
| | DM9320 | 2' Cross Tee | 24 x 2 x 3-5/8" |
| | DM9340 | 4' Cross Tee | 48 x 2 x 3-5/8" |
| | DM9360 | 6' Cross Tee | 72 x 2 x 3-5/8" |
| | DM9380 | 8' Cross Tee | 96 x 2 x 3-5/8" |
| | DM9800 | Perimeter Molding | 144 x 2-1/8 x 3-3/4" |

NOTE: Contact local engineer for job specific load and/or seismic requirements

PACKAGING

| PCS/CTN | LF/CTN |
|---------|--------|
| 2 | 24 |
| 6 | 12 |
| 6 | 24 |
| 2 | 12 |
| 2 | 16 |
| 2 | 24 |

DETAILS



LOAD DATA FOR DYNAMAX PLUS SUSPENSION SYSTEMS

| Member Span and Spacing (inches) | 48" | 60" | 72" | 96" |
|---|-------|-------|-------|-------|
| Maximum Allowable Uniform Area Load (LBS/SF) | 113 | 72 | 50 | 28 |
| Mid-Span Point Load @ L/360 Deflection (LBS) | 1,090 | 690 | 480 | 270 |
| Maximum Static Point Load (LBS) | 1,800 | 1,800 | 1,800 | 1,800 |
| 3/8" Turnbuckle Maximum Load to Structure (LBS) | 1,200 | 1,200 | 1,200 | 1,200 |
| 1/2" Turnbuckle Maximum Load to Structure (LBS) | 2,200 | 2,200 | 2,200 | 2,200 |

NOTE: The above values are based on use with 1/2" threaded rod







About the System

Recommended Ceiling Panels

VISUAL SELECTION

PERFORMANCE SELECTION

Dots represent high level of performance

| Edge Profile | Item No. | Dimensions (Inches) | Sound Absorption NRC | Sound Blocking CAC | Total Acoustics ¹ NRC + CAC | Articulation Class AC | Fire Performance Fire | Light Reflect Light | Bio-Block Mold & Mildew Protection | Humi-Guard+ Sag Resistant | Certified Low VOC Emissions | Durability | Recycled Content | Recycle Program | 30-Yr Warranty |
|--|----------------|------------------------|-------------------------|-----------------------|---|--------------------------|--------------------------|------------------------|---------------------------------------|------------------------------|-----------------------------|------------|------------------|-----------------|----------------|
| FINE FISSURED™ for DynaMax® Plus | 4126 | 23-1/4 × 23-1/4 × 5/8" | 0.55 | 35 | N/A | N/A | Class A | 0.82 | • | • | • | Std | Std | • | • |
| Square Lay-in  | 4126BL (Black) | 23-1/4 × 23-1/4 × 5/8" | 0.55 | 35 | N/A | N/A | Class A | N/A | • | • | • | Std | Std | • | • |
| | 4127 | 23-1/4 × 47-1/4 × 5/8" | 0.55 | 35 | N/A | N/A | Class A | 0.82 | • | • | • | Std | Std | • | • |
| | 4127BL (Black) | 23-1/4 × 47-1/4 × 5/8" | 0.55 | 35 | N/A | N/A | Class A | N/A | • | • | • | Std | • | • | • |
| CALLA® for DynaMax® Plus | 2896 | 23-1/4 × 23-1/4 × 1" | 0.85 | 35 | BEST | 170 • | Class A | 0.85 | • | • | • | • | • | • | • |
| Square Lay-in  | 2896BK (Black) | 23-1/4 × 23-1/4 × 1" | 0.85 | 35 | BEST | 170 • | Class A | N/A | • | • | • | • | • | • | • |
| | 2897 | 23-1/4 × 47-1/4 × 1" | 0.85 | 35 | BEST | 170 • | Class A | 0.85 | • | • | • | • | • | • | • |
| | 2897BK (Black) | 23-1/4 × 47-1/4 × 1" | 0.85 | 35 | BEST | 170 • | Class A | N/A | • | • | • | • | • | • | • |
| DUNE® for DynaMax® Plus | 4270 | 23-1/4 × 23-1/4 × 5/8" | 0.50 | 35 | N/A | N/A | Class A | 0.81 | • | • | • | • | • | • | • |
| Square Lay-in  | 4271 | 23-1/4 × 47-1/4 × 5/8" | 0.50 | 35 | N/A | N/A | Class A | 0.81 | • | • | • | • | • | • | • |
| ULTIMA® for DynaMax® Plus | 1807 | 23-1/4 × 23-1/4 × 3/4" | 0.75 | 35 | BETTER | 170 • | Class A | 0.88 | • | • | • | • | • | • | • |
| Square Lay-in  | 1808 | 23-1/4 × 47-1/4 × 3/4" | 0.75 | 35 | BETTER | 170 • | Class A | 0.88 | • | • | • | • | • | • | • |
| ULTIMA® AirAssure® for DynaMax® Plus | 1599 | 23-1/4 × 23-1/4 × 3/4" | 0.75 | 35 | BETTER | N/A | Class A | 0.88 | • | • | • | • | • | • | • |
| Square Lay-in  | 1638 | 23-1/4 × 47-1/4 × 3/4" | 0.75 | 35 | BETTER | N/A | Class A | 0.88 | • | • | • | • | • | • | • |
| OPTIMA® PB for DynaMax® Plus | 3210PB | 47-5/16 × 47-5/16 × 1" | 0.95 | N/A | N/A | 190 • | Class A | 0.88 | • | • | • | • | • | • | • |
| Square Lay-in  | | | | | | | | | | | | | | | |

NOTE: These panels are specially sized and engineered for the DynaMax Plus suspension system and must be used with the system. These panels do not fit in other suspension systems.








¹ Total Acoustics® ceiling panels have an ideal combination of noise reduction and sound-blocking performance in one product.

MetalWorks™ Lay-in for DynaMax® Plus

VISUAL SELECTION

PERFORMANCE SELECTION

Dots represent high level of performance

| Edge Profile | Perforation | Item No. | Dimensions (Inches) | Sound Absorption (NRC) | Sound Absorption (with infill panel) (NRC) | Fire Performance | Light Reflect | Bio-Block Mold & Mildew Protection | Certified Low VOC Emissions | Durability | Recycled Content |
|--|--|--|---------------------|------------------------|--|------------------|---------------|------------------------------------|-----------------------------|------------|------------------|
| METALWORKS™ for DynaMax® Plus Square Lay-in  |  M1 (Unperforated) |  6345W24L48M1WHA | 23" x 47" | N/A | N/A | Class A | 0.75 | • | • | • | • |
| | |  6345W48L48M1WHA | 47" x 47" | N/A | N/A | Class A | 0.75 | • | • | • | • |
| |  M19 |  6345W24L48M19WHA | 23" x 47" | 0.70 • | 0.85 • | Class A | 0.75 | • | • | • | • |
| | |  6345W48L48M19WHA | 47" x 47" | 0.70 • | 0.85 • | Class A | 0.75 | • | • | • | • |

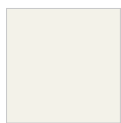
NOTE: Ceiling panels are specially sized and engineered for the DynaMax Plus suspension system and must be used with the system.

These panels do not fit in other suspension systems.

* NRC achieved with acoustical infill (Item 8200T10).

COLORS Due to printing limitations, shade may vary from actual product.

Painted



Whitelume (WHA)



Custom Colors Available

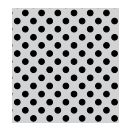
For custom options contact ASQuote,
ASQuote@armstrongceilings.com

PERFORATION OPTIONS

(1:2 SCALE SHOWN)



M1 (Unperforated)



M19 (Microperforated)

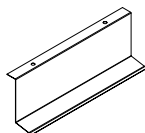
ACCESSORIES FOR METALWORKS LAY-IN CEILING PANELS

6483H35 – MetalWorks Lay-In Perimeter Hold-down Clip for DynaMax Plus – Screw attaches to perimeter molding to hold the perimeter cut metalworks panels in place. 2 clips required per cup panel.

6483H35 – 10 PCS

8200T10 – 1" Fiberglass Infill Bag – 24 x 24 x 1" Color – Black (gloss)

8200T10 – 12 PCS



PHYSICAL DATA FOR METALWORKS LAY-IN CEILING PANELS

Design Considerations

MetalWorks panels and DynaMax and DynaMax Plus grid are manufactured at separate facilities that use different paint systems. Colors i.e. White and Whitelume will coordinate but are not exact color matches.

Material

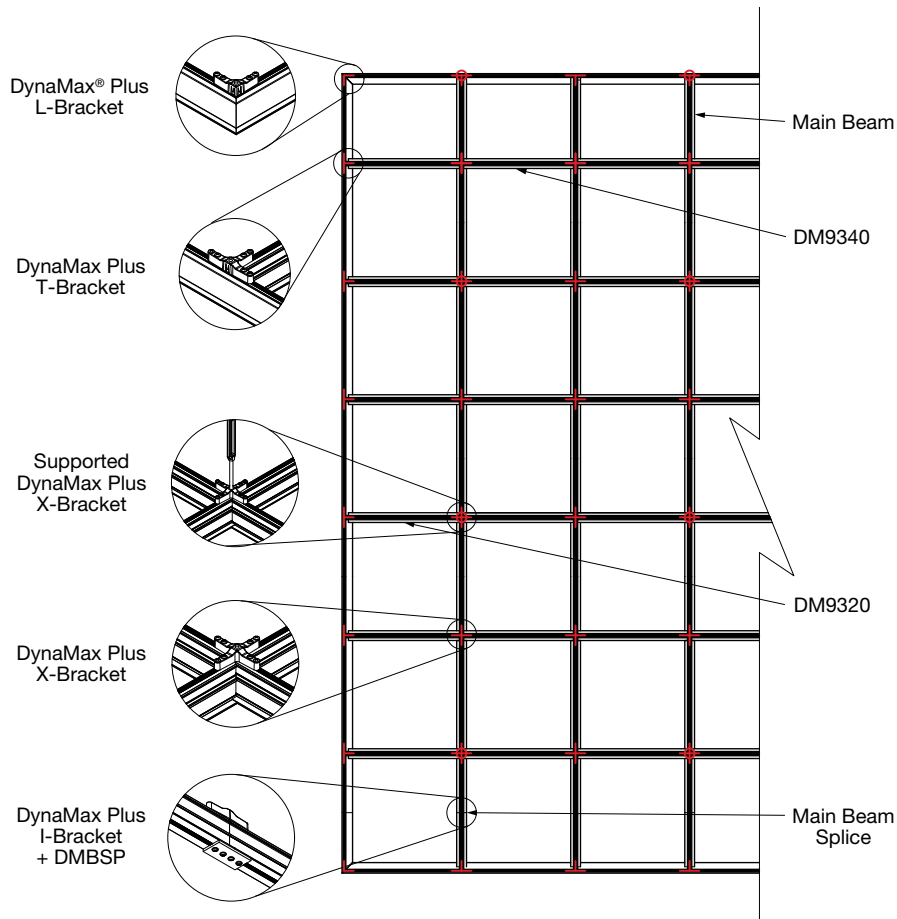
All MetalWorks panels: Aluminum – 0.064"

Warranty

One (1) year limited warranty for MetalWorks items. Details at armstrongceilings.com/warranty.

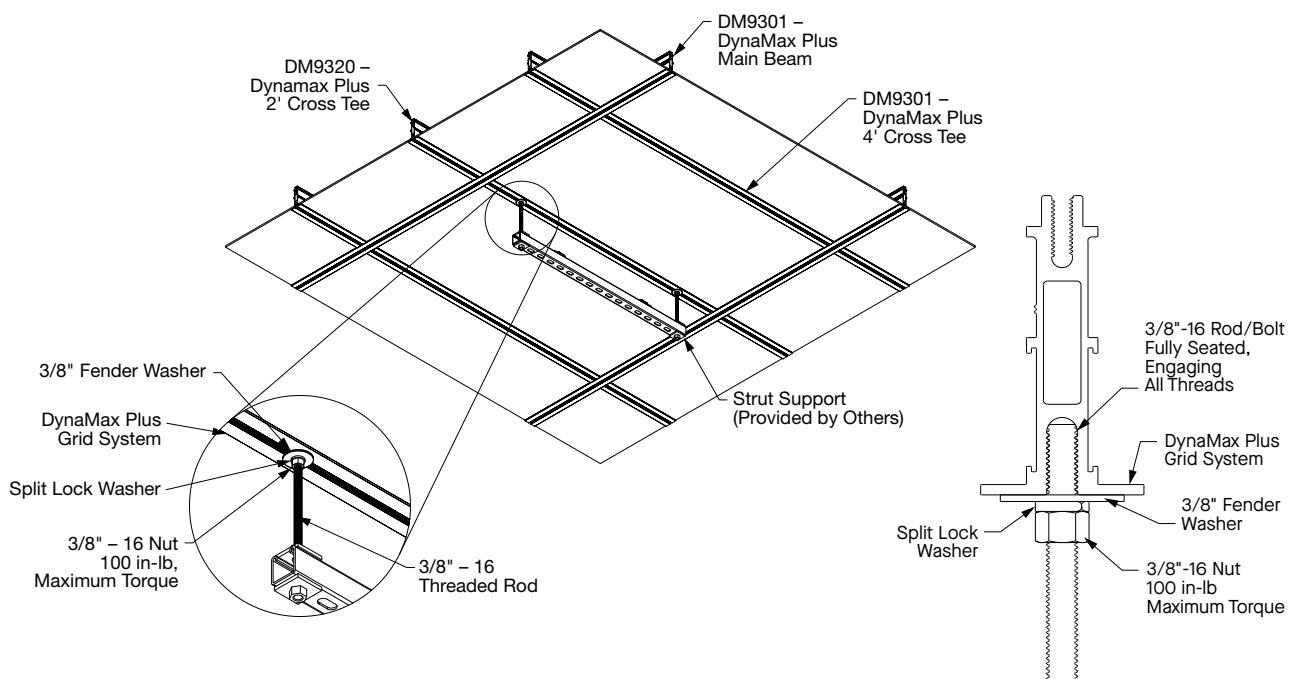
Installation & Layout Overview

Installation



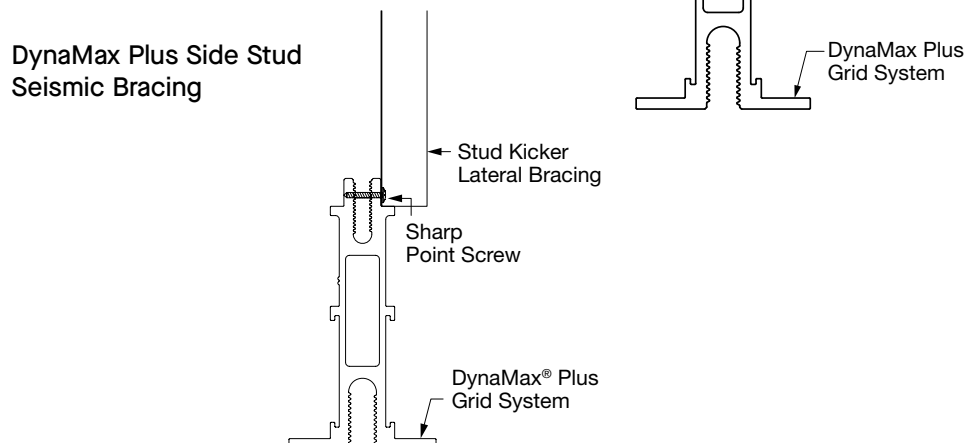
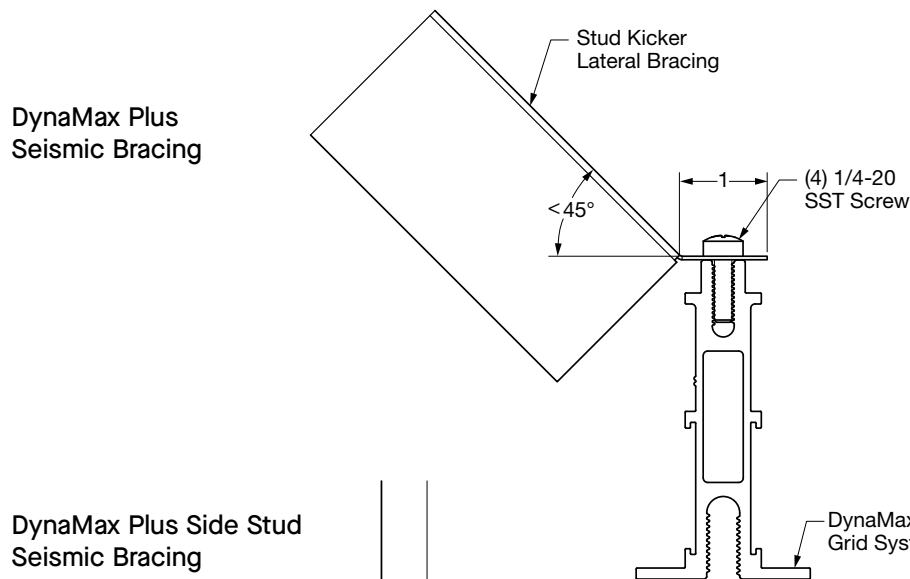
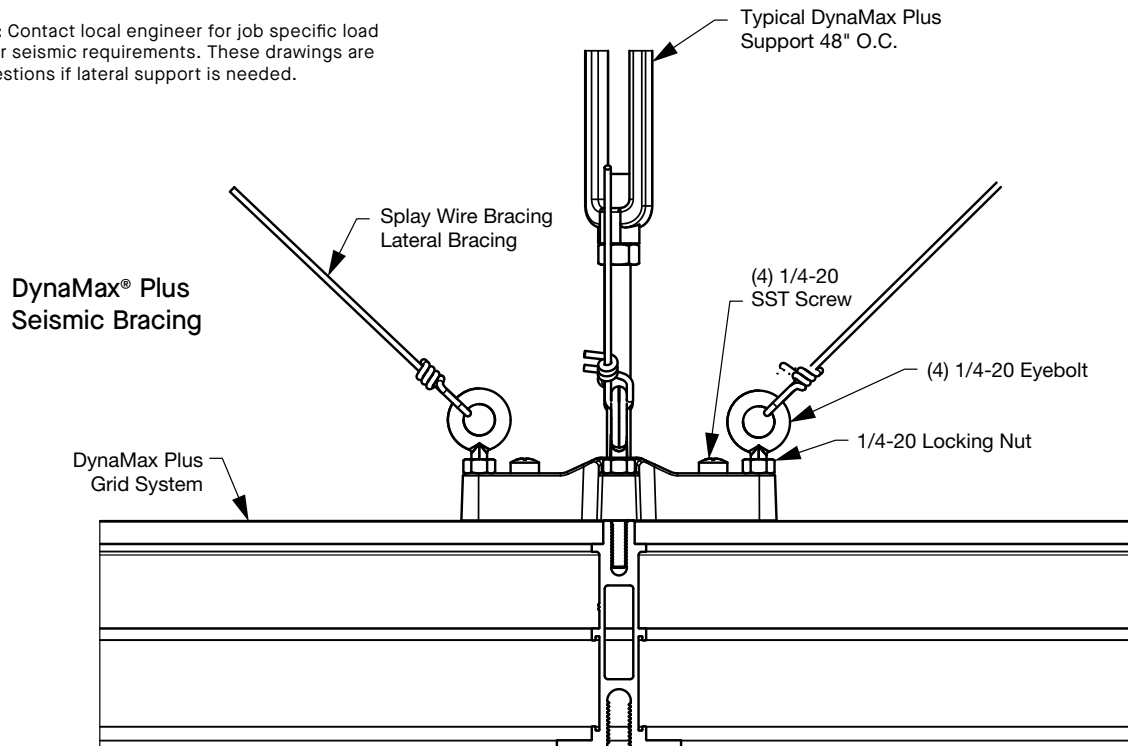
NOTE: DynaMax Plus threaded rod drops can be spaced at increased spans of 5', 6' or 8' due to the system's greater load-carrying capability.

3/8" DynaMax® Plus Threaded Channel Connection



Seismic Installation

NOTE: Contact local engineer for job specific load and/or seismic requirements. These drawings are suggestions if lateral support is needed.



Design Guide

Section Properties

Find the full installation instructions [HERE](#).

DynaMax® Plus Section Properties

| Area | Weight | Yield Strength | Modulus of Elasticity | Moment of Inertia | Radius of Gyration | Moment of Inertia | Radius of Gyration | Section Modulus | Maximum Bending Moment |
|--------------------|----------|----------------|------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|------------------------|
| Ab | Wb | Fy | E | Ix | Rx | Iy | Ry | Scx | [M] |
| (IN ²) | (LBS/FT) | (ksi) | (LBS/IN ²) | (IN ⁴) | (IN) | (IN ⁴) | (IN) | (IN ³) | (FT/LB) |
| 1.315 | 1.547 | 35.0 | 1.00E+07 | 1.8837 | 1.1967 | 0.1487 | 0.3362 | 0.9386 | 2,737 |

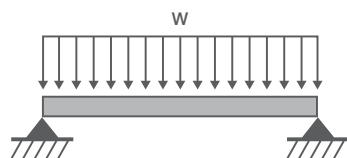
General Notes:

1. The data contained in this technical guide is intended to be used as a general guideline only and does not replace the design of a qualified engineer.
2. The load tables in this technical guide are calculated conservatively as single span (simple) beams supported at the ends.
3. The "Load at Yield" is calculated as the maximum bending moment for each loading condition. The "Allowable Load" is calculated by dividing the maximum bending moment by a safety factor of 1.67.
4. It is recommended that the DynaMax Plus system is designed to limit the deflection of loaded members to L/360 of the span.
5. Load supported by DynaMax Plus support brackets must not exceed the allowable load of 1,800 lbs when utilizing 1/2" threaded rod.

DynaMax® Plus Structural Aluminum Suspension System supports maximum static point loads of up to 1,800 lbs. This system is also capable of supporting a point load of 1,800 lbs. with L/360 deflection.

Load Data

Uniform Load

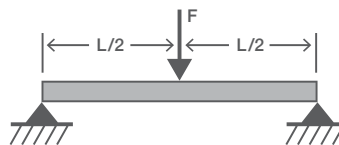


$$\Delta_{\max} = 5 W L^3 / (384 E I)$$

$$M_{\max} = W L^2 / 8$$

| Uniform Load, W (LB/FT) | | | | | |
|-------------------------|--------------------------|-------|-------|---------------------|---------------|
| Span (IN) | Load at Deflection Limit | | | Max. Allowable Load | Load at Yield |
| | L/180 | L/240 | L/360 | | |
| 48 | — | 650 | 430 | 778 | 1,300 |
| 60 | 440 | 330 | 220 | 497 | 830 |
| 72 | 250 | 190 | 120 | 341 | 570 |
| 96 | 100 | 80 | 50 | 192 | 320 |

Mid-span Point Load



$$\Delta_{\max} = F L^3 / (48 E I)$$

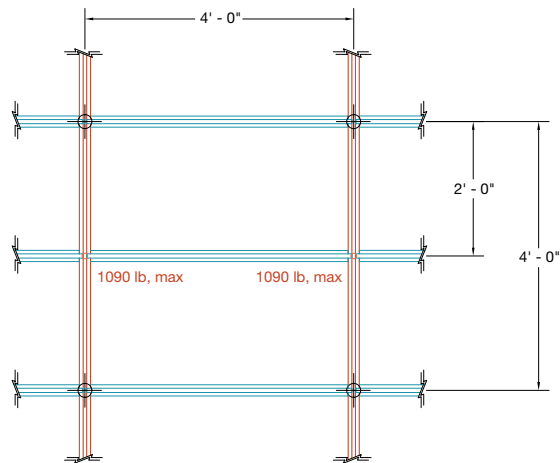
$$M_{\max} = F L / 4$$

| Mid-Span Point Load, F (LB) | | | | | |
|-----------------------------|--------------------------|-------|-------|---------------------|---------------|
| Span (IN) | Load at Deflection Limit | | | Max. Allowable Load | Load at Yield |
| | L/180 | L/240 | L/360 | | |
| 4 | — | — | 1,090 | 1,557 | 2,600 |
| 5 | — | 1,040 | 690 | 1,246 | 2,080 |
| 6 | 960 | 720 | 480 | 1,036 | 1,730 |
| 8 | 540 | 400 | 270 | 778 | 1,300 |

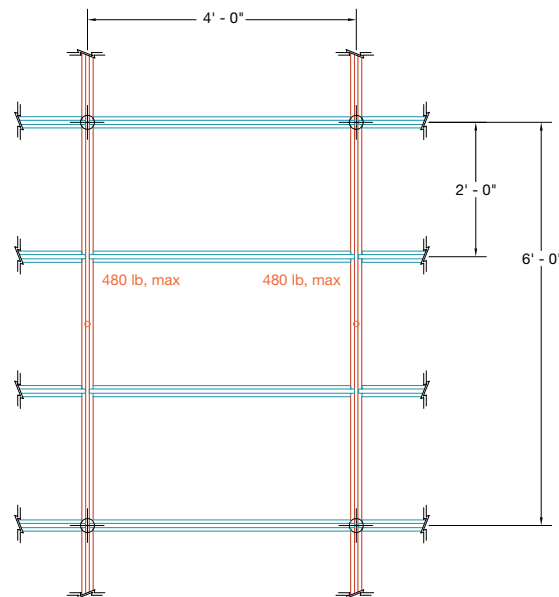
| Main Beam Spacing (IN) | | Uniform Area Load (LB/SF) | | | | | |
|------------------------|----|---------------------------|-----------|-------|-------|-------|---------------------|
| | | Span (IN) | Area (SF) | L/180 | L/240 | L/360 | Max. Allowable Load |
| 48 | 48 | 16 | — | — | 68.1 | 97.3 | 162.5 |
| | 72 | 24 | 40.0 | 30.0 | 20.0 | 43.1 | 72.0 |
| | 96 | 32 | 16.8 | 12.5 | 8.4 | 24.3 | 40.6 |
| 60 | 60 | 25 | — | 41.6 | 27.6 | 49.8 | 83.2 |
| | 72 | 36 | 26.6 | 20.0 | 13.3 | 28.7 | 48.0 |
| | 96 | 64 | 8.4 | 6.2 | 4.2 | 12.1 | 20.3 |

Loading Condition Examples

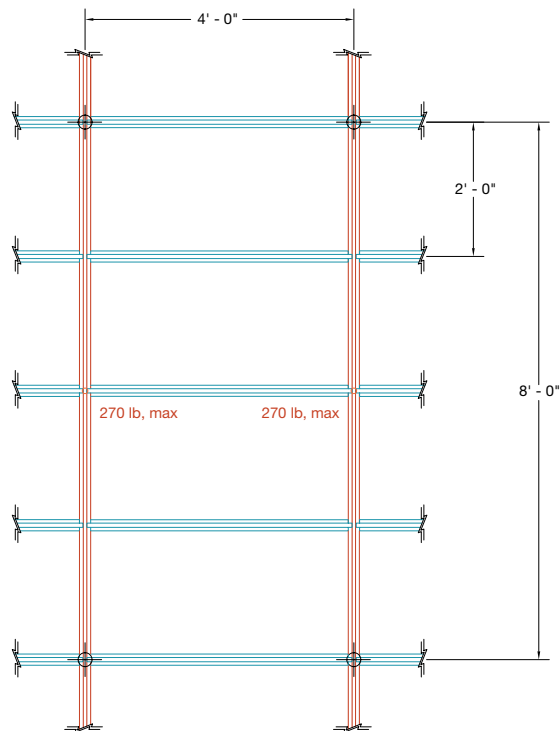
NOTE: Loading condition examples are shown with L/360 deflection







4' x 4' Support Spacing
Main Beam Mid-span Loading



4' x 6' Support Spacing
Main Beam Mid-span Loading



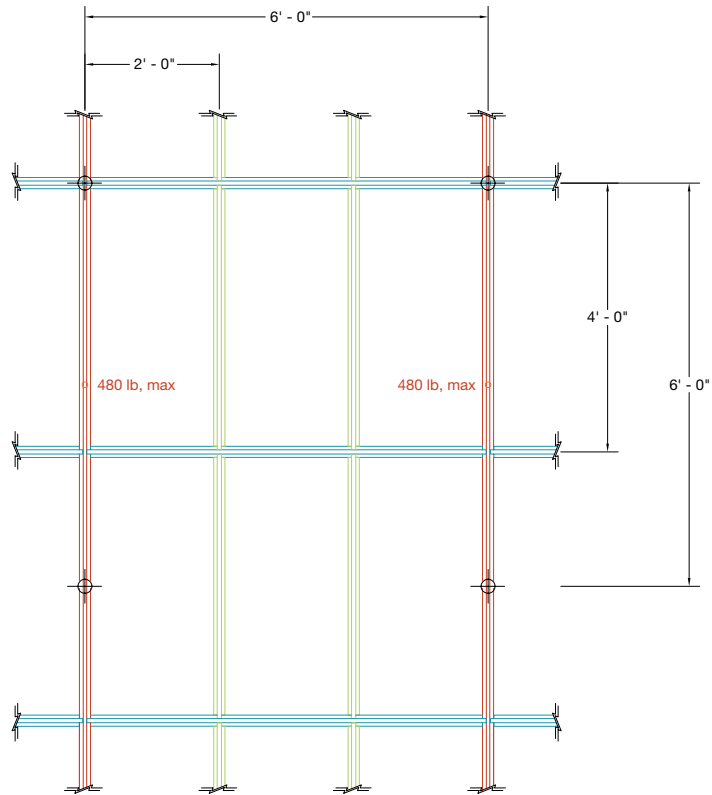
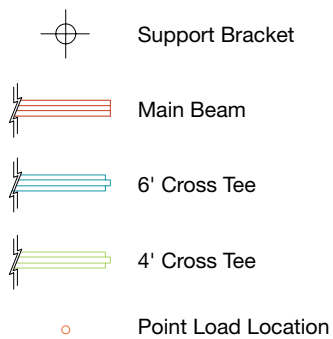
4' x 8' Support Spacing
Main Beam Mid-span Loading

-  Support Bracket
-  Main Beam
-  4' Cross Tee
-  Point Load Location

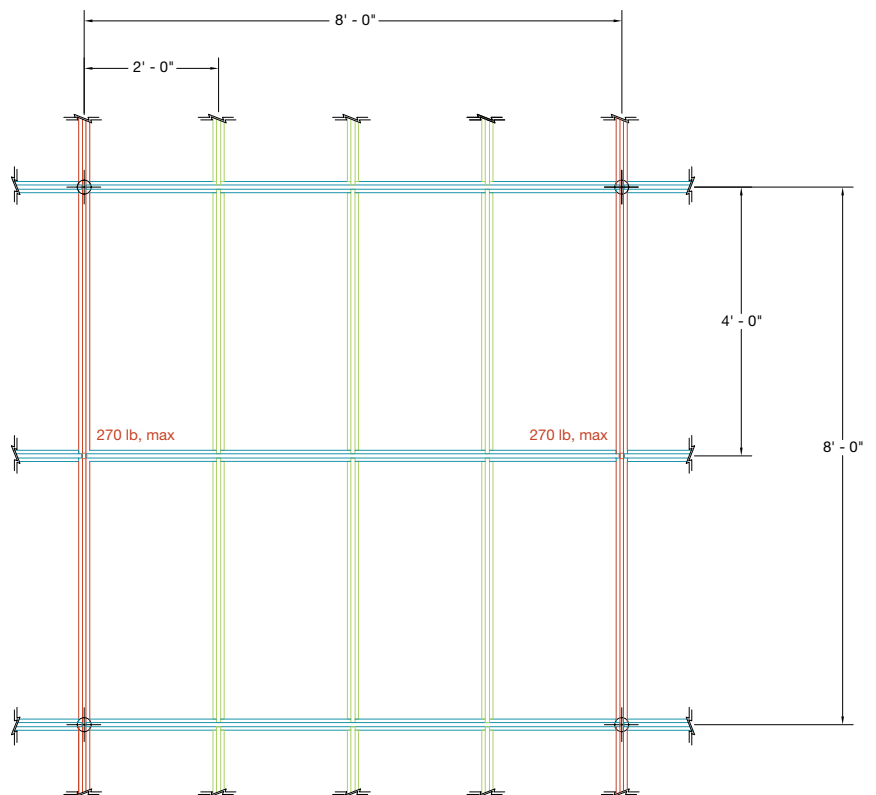
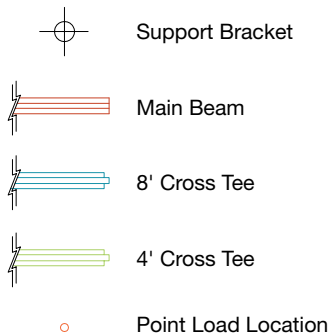
Design Guide

Loading Condition Examples

NOTE: Loading condition examples are shown with L/360 deflection



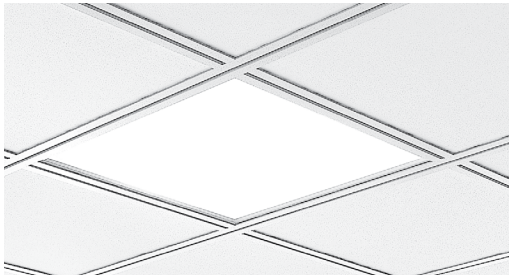
6' x 6' Support Spacing
Main Beam Mid-span Loading



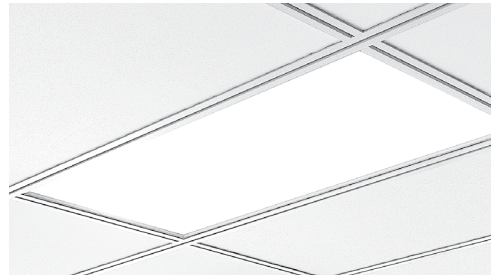
8' x 8' Support Spacing
Main Beam Mid-span Loading

Integrated Lighting Partners

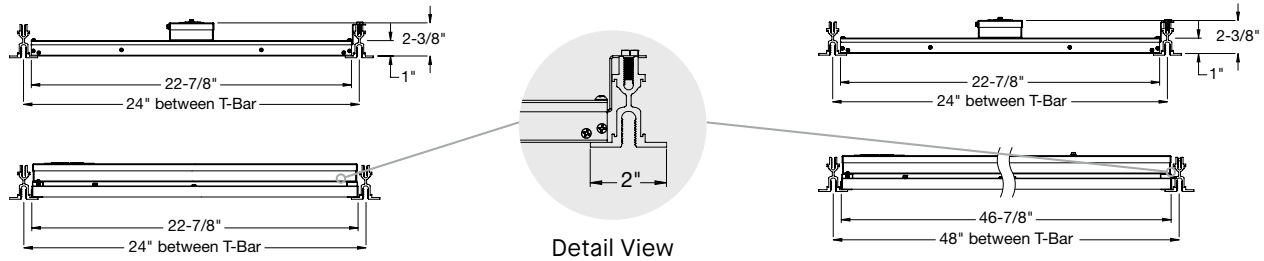
Lighting and diffuser solutions are available through partner companies.



TRAYFIT™ 2' × 2'



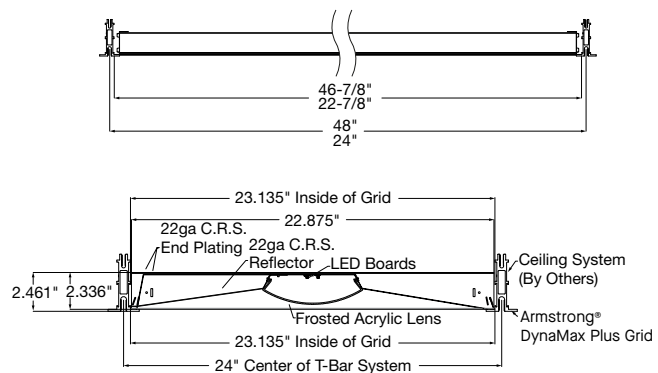
TRAYFIT™ 2' × 4'



NOTE: Details in this section show standard DynaMax; however, Axis TRAYFIT 2' × 2' and 2' × 4' are also compatible with DynaMax Plus. For compatible lighting details, visit axislighting.com.



PTDC – Shallow Plenum LED Troffer for DynaMax® Plus System

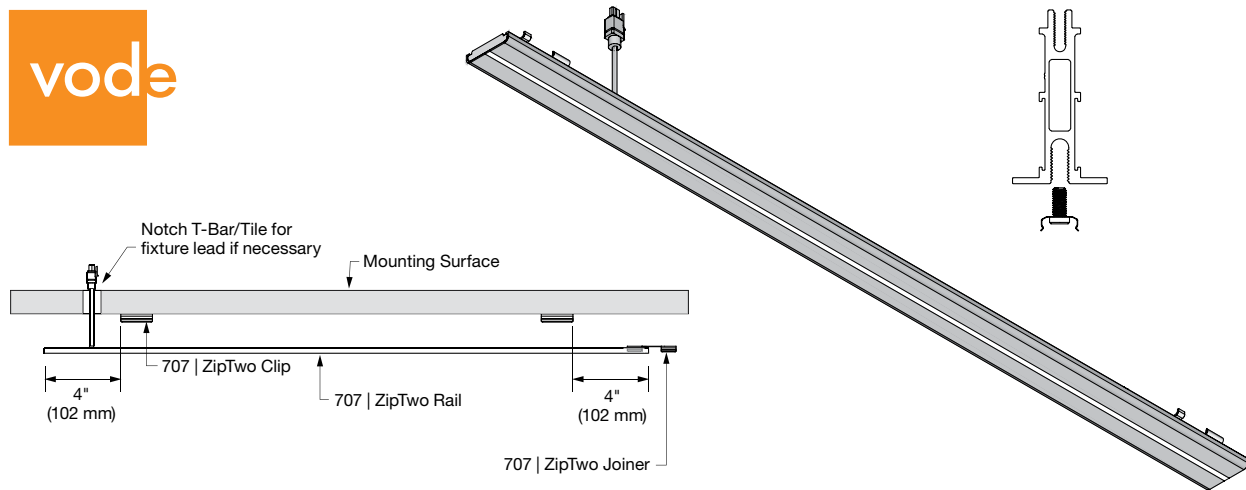


For compatible lighting details, visit hew.com/products/PTDC

Partner Solutions for DynaMax® Plus

Integrated Lighting Partners

Lighting and diffuser solutions are available through partner companies.

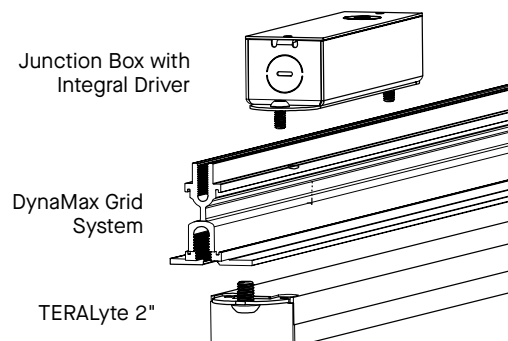
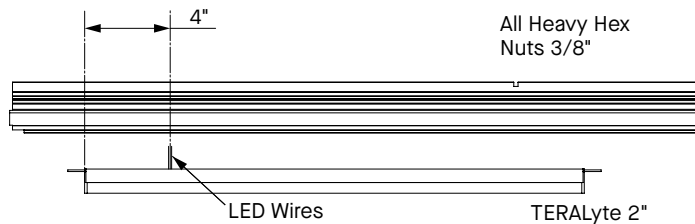
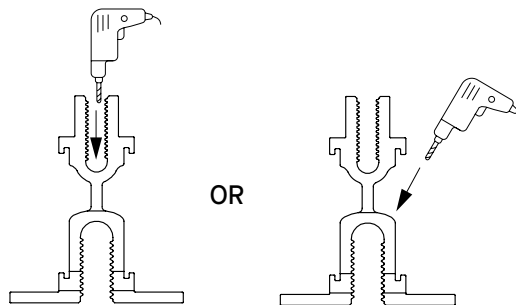


ZipTwo® Data Center Solutions

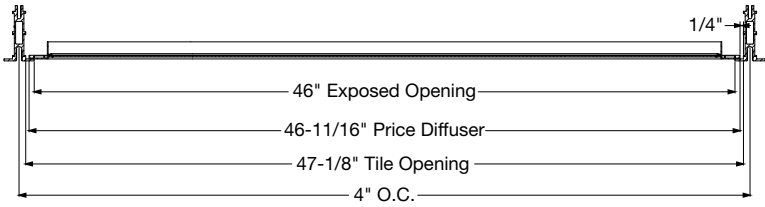
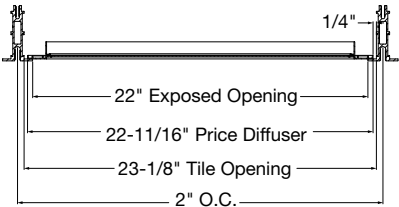
For compatible lighting details, visit vode.com/dynamax



TERAlyte™ 2" for the DynaMax Plus grid system.



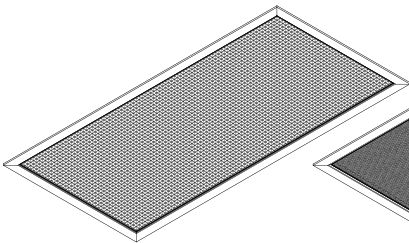
NOTE: Details in this section show standard DynaMax grid; however, this TERAlyte lighting system is compatible with DynaMax® Plus grid. For compatible lighting details, visit jlc-tech.com



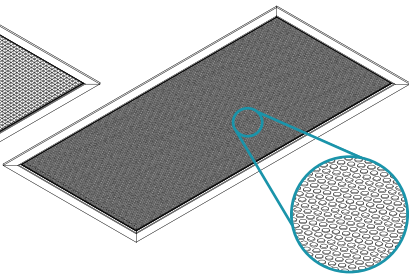
Eggcrate Air Device –
Price Model 80



Perforated Air Device –
Price Model 10



Eggcrate Air Device –
Price Model 80



Perforated Air Device –
Price Model 10

For compatible diffuser details, visit priceindustries.com/diffusers

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