Armstrong®
World Industries

Technical Guide

DynaMax®

Structural Aluminum Suspension System

Hang Tough

Meet DynaMax® Structural Grid

DynaMax® 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.

For years, the typical construction method for data centers was to have a structural system, like slotted strut, to suspend heavy loads, then an acoustical ceiling to contain air flow and protect the equipment from debris. We have combined these two needs into one with the DynaMax suspension system. Our design provides strength, flexibility, construction efficiencies, and faster, easier installation.

DynaMax® Structural Grid Data Center Installation

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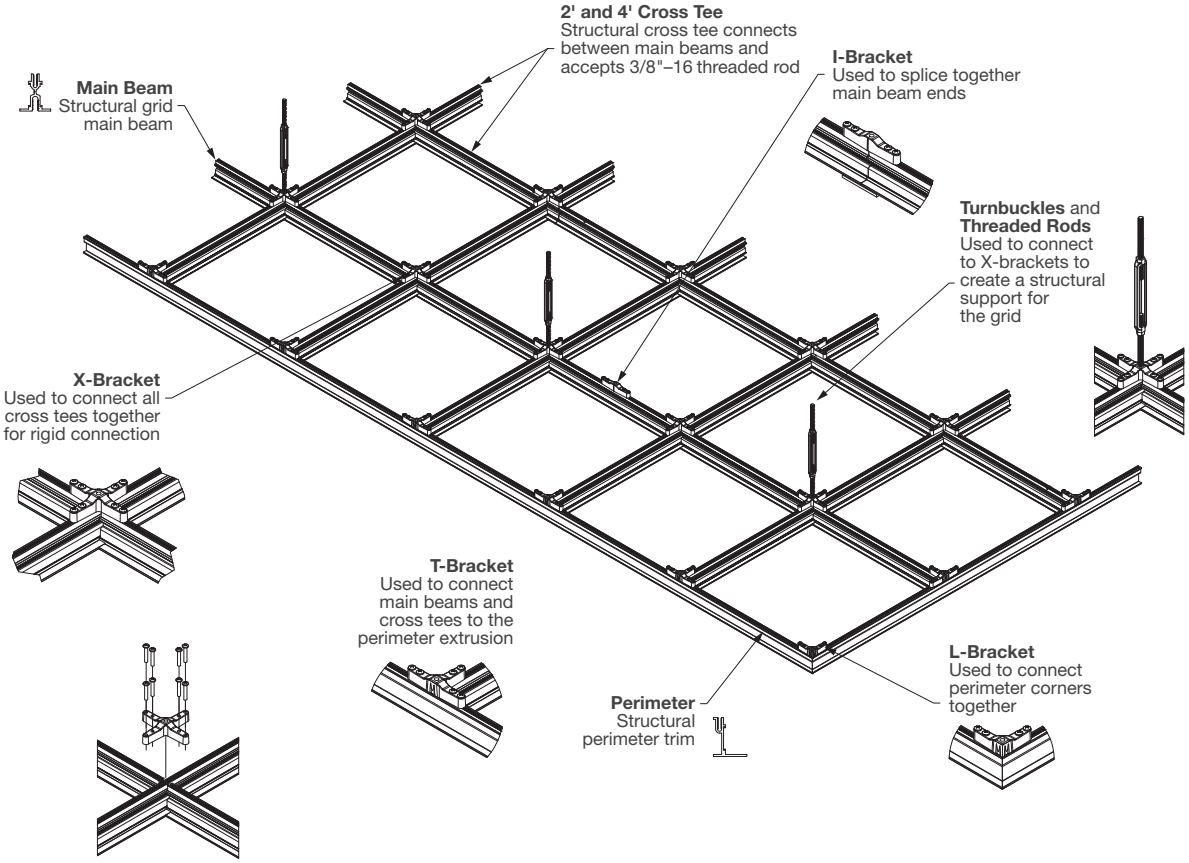
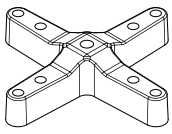
How the System Works

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



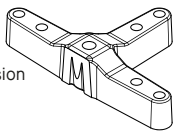
ACCESSORIES

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



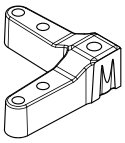
DMXB – 24 PCS

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



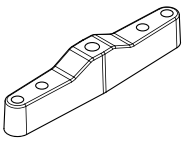
DMTB – 36 PCS

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



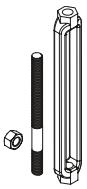
DMLB – 12 PCS

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



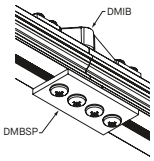
DMIB – 24 PCS

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. (1/2" hardware kit available upon request)



DMHWK – 12 PCS

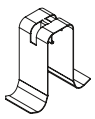
DMBSP – DynaMax® Main Beam Splice Plate –
Used with DMIB I-Bracket to splice together main beams that butt up against one another



DMBSP - 24 PCS

OPTIONAL ACCESSORIES

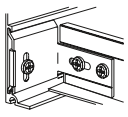
DMHDC – Hold-down Clip –
Attaches to the suspension system to hold Lay-in panels in place



DMHDC – 100 PCS

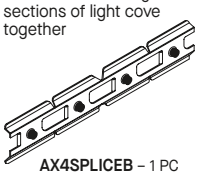
NON-STRUCTURAL CEILING ADAPTER ACCESSORIES

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

AX4SPLICEB – Axiom Splice Plate with Set Screws – Join straight sections of light cove together



AX4SPLICEB – 1 PC

Suspension System Components

This fully accessible and flexible system allows you to support heavy point loads to provide a solution for various ceiling applications and requirements.

Key Selection Attributes

- Ideal combination of a finished ceiling system with a structural solution
- 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
- Easy integration into a conventional grid system using AXTBC clip and DynaMax® boss channels
- DynaMax suspension systems can integrate seamlessly with select Armstrong® ceiling panels for a complete ceiling system solution
- Supports up to a 1200 lb. point load rating using 3/8"–16 threaded rod at 48" × 48" connection points
- Suspension system has continuous threaded boss channel, allowing 3/8"–16 threaded rod to be installed to the suspension system at any location
- Controls airflow by eliminating penetrations
- Available in 24" × 24", 24" × 48" and 48" × 48" suspension system layouts
- CNC override feature creates a tight fit minimizing air leakage between plenum and occupied space
- 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 Warranty; 30-Year Limited System Warranty
- X-Brackets installed on DynaMax grid provide attachment points for 48" × 48" suspension from building structure
- DynaMax 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
- Now available with MetalWorks™ ceiling panels
- Lighting, diffuser, and containment options are available from our Data Center lighting and MEP partners

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

For custom layout information and technical guidelines, contact TechLine customer support at 877 276-7876

DynaMax Structural Aluminum Data Center Suspension System

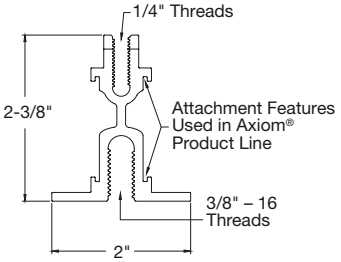
VISUAL SELECTION

PACKAGING

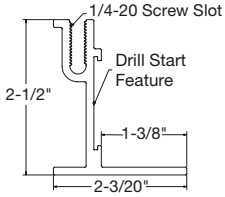
Item No.	Description	Dimensions (Inches)	PCS/ CTN	LF/ CTN
DynaMax Structural Aluminum Data Center Suspension System				
☐ DM4301	Main Beam	144 × 2 × 2-3/8"	4	48
☐ DM4340	4' Cross Tee	48 × 2 × 2-3/8"	12	48
☐ DM4320	2' Cross Tee	24 × 2 × 2-3/8"	12	24
☐ DM4800	Perimeter Molding	144 × 2-1/8 × 2-1/2"	4	48

NOTE: Contact local engineer for job specific load and/or seismic requirements
For Gasketed items, add a GS after the item number (i.e. DM4301GS)

DETAILS



DynaMax Main Beam



DM4800 Perimeter Molding

LOAD DATA FOR DYNAMAX SUSPENSION SYSTEMS

Member Span and Spacing (inches)	48"	60"	72"
Maximum Allowable Uniform Area Load (LBS/SF)	75	48	33.3
Mid-Span Point Load @ L/360 Deflection (LBS)	320	200	140
Maximum Static Point Load (LBS)	1200	1200	1200
Turnbuckle Maximum Load to Structure (LBS)	1200	1200	1200

For additional load-carrying capability, ask your Armstrong® Rep about DynaMax® Plus Structural Grid System.

Ceiling Panels for DynaMax®

Square Lay-In

Ceiling panels for DynaMax® are specifically designed for performance, reliability, and sustainability in data center and critical application environments.

DataZone™ panels with DynaMax® suspension system

KEY SELECTION ATTRIBUTES

DataZone™ and Ultima® AirAssure® for DynaMax®

- DataZone panels are part of the Sustain® portfolio, and meet the most stringent industry sustainability compliance standards today
- Get total noise control and floor plan versatility with Total Acoustics® ceiling panels: NRC + CAC = Total Acoustics performance
- Smooth, clean, durable finish – Washable, Impact-resistant, scratch-resistant, and soil-resistant
- Mold- and mildew-resistant surface
- 30-Year Limited System Warranty against visible sag, mold, and mildew
- Made in the U.S.A. of domestic and global content
- Build America, Buy America (BABA) Act compliant

Ultima® AirAssure® for DynaMax®

- Factory gasketed Ultima® AirAssure® panels for DynaMax®, DynaMax® LT, and DynaMax® Plus grid reduces air leakage and contributes to annual energy savings

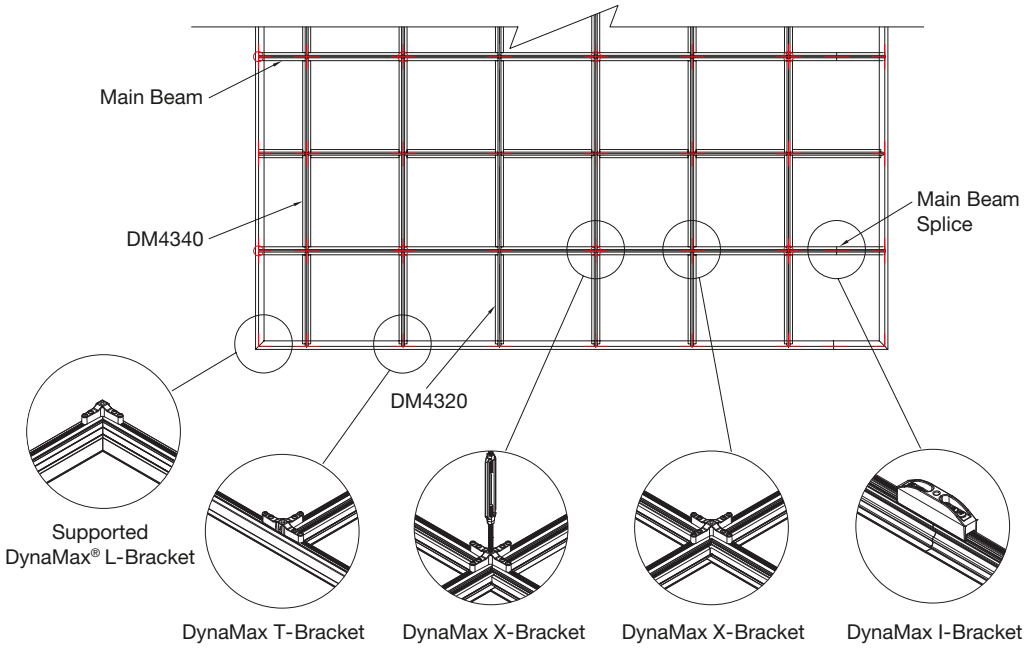
MetalWorks™ for DynaMax®

- CleanAssure™ family of products – includes disinfectable panels, suspension systems, and trim
- Perforated panel option available to enhance acoustical performance and design aesthetics
- Outstanding NRC with acoustical fleece or infill panel (0.70 – 0.85)
- Provides additional options when bidding data centers and structural applications
- Factory-fit ceiling panels eliminate the need to field modify panels in all standard suspension layouts

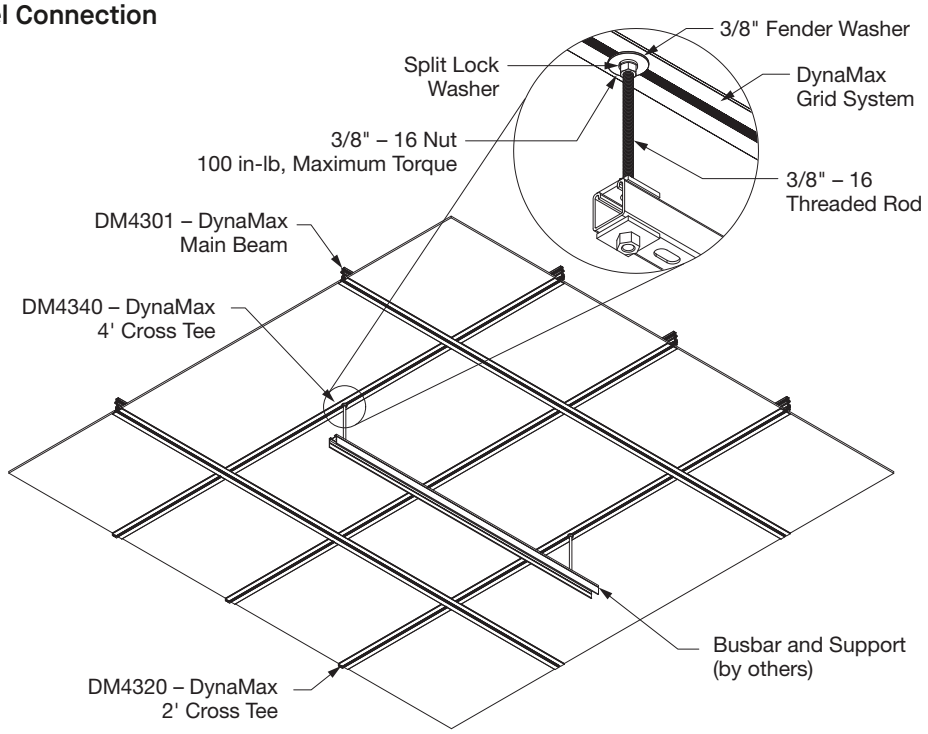
For more information about recommended ceiling panels, please visit armstrongceilings.com/structuralgrid

Ceiling panels are specially sized and engineered for the DynaMax® suspension systems and must be used with these systems. These panels do not fit in other suspension systems.

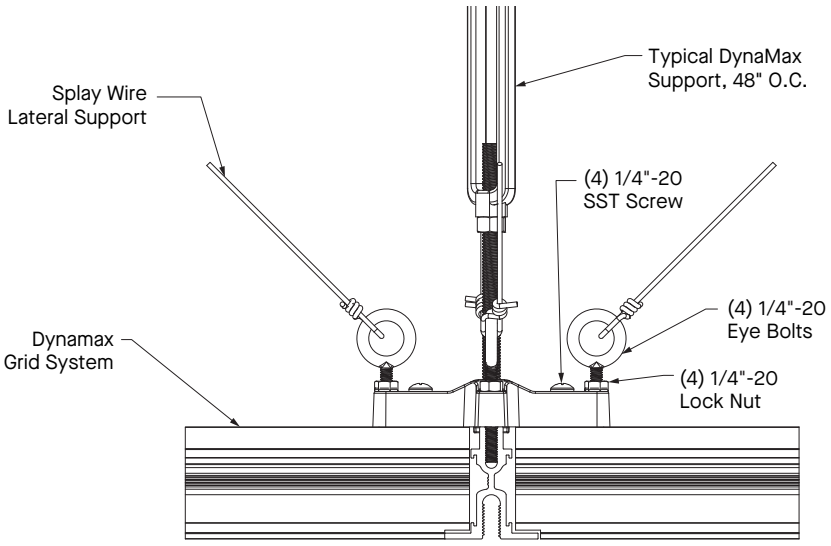
Installation

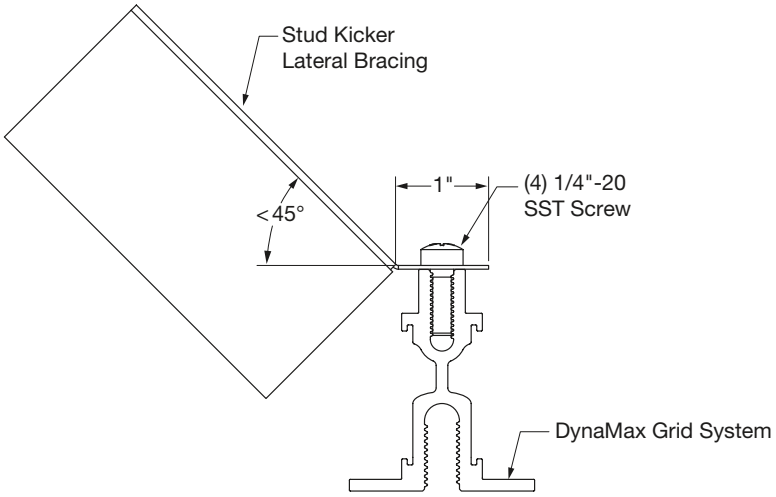


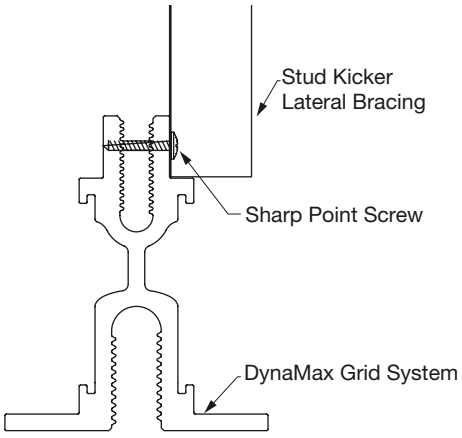
3/8" DynaMax® Threaded Channel Connection



Seismic Considerations







Section Properties

Find the full installation instructions **HERE**.

DynaMax® 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)
0.950	1.117	31.0	1.00E+07	0.5545	0.7641	0.1193	0.3544	0.3986	1029

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.

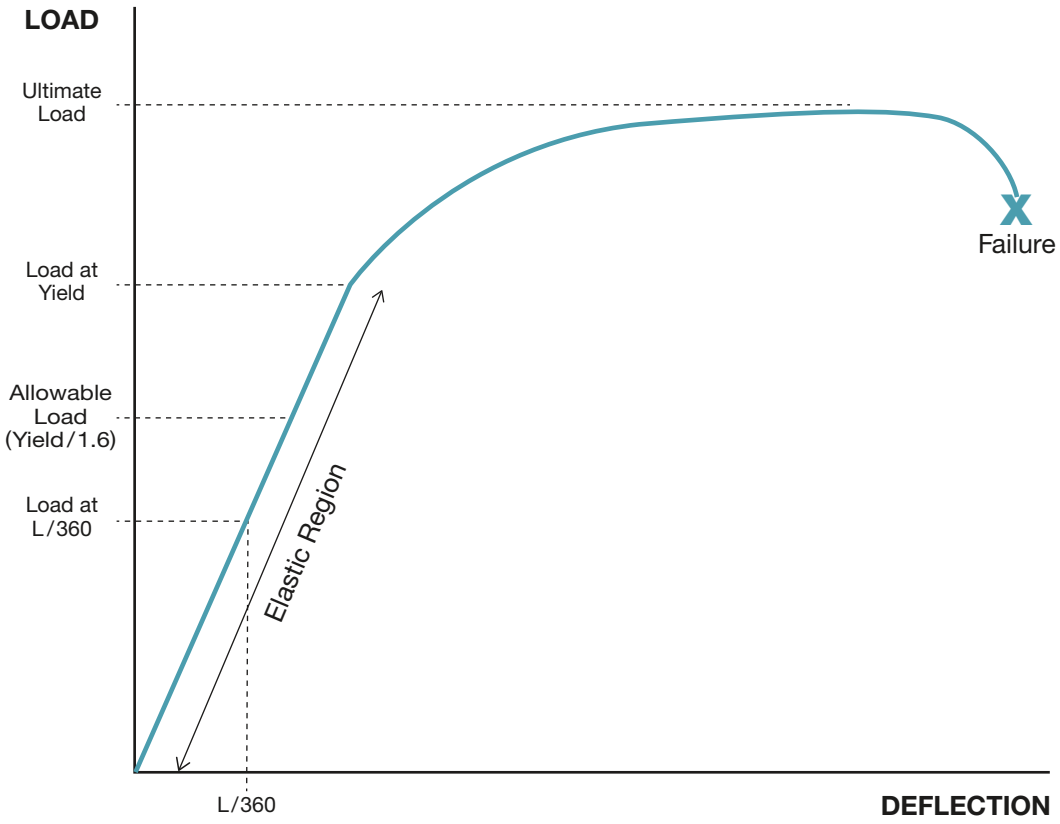
2 The load tables in this technical guide are calculated conservatively as single span (simple) beams supported at the ends.

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 system is designed to limit the deflection of loaded members to L/360 of the span.

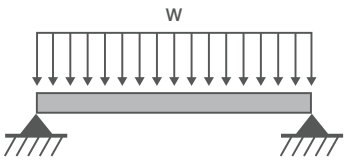
5 Load supported by DynaMax support brackets must not exceed the allowable load of 1200 lbs.

Load vs. Deflection Plot



Load Data

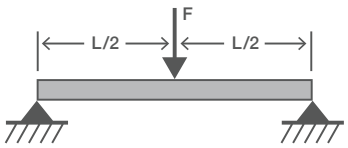
DynaMax® Structural Aluminum Suspension System supports up to a 1200 lb. single point load rating using 3/8" threaded rod at 4' × 4' connection points assuming loads applied under threaded rod support brackets. For even greater load-carrying capability, consider DynaMax® Plus Structural Grid System—a structural solution that can suspend mid-span loads of up to 1,090 lbs. at L/360 (up to 1800 lbs. for static point loads).



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

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

Span (in)	Uniform Load, W (lb/ft)				
	Load at Deflection Limit			Allowable Load	Load at Yield
	L/180	L/240	L/360		
24	—	—	1020	1200	2050
36	—	450	300	545	910
48	250	190	120	305	510
60	130	90	60	192	320
72	70	50	30	132	220
84	40	30	20	96	160
96	30	20	10	72	120



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

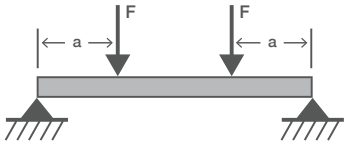
$M_{max} = F\ L / 4$

Span (in)	Mid-Span Point Load, F (lb)				
	Load at Deflection Limit			Allowable Load	Load at Yield
	L/180	L/240	L/360		
24	—	—	—	1200	2050
36	—	—	570	820	1370
48	—	480	320	611	1020
60	410	300	200	491	820
72	280	210	140	407	680
84	200	150	100	347	580
96	160	120	80	305	510

Main Beam Spacing (ft)	Span (in)	Uniform Area Load (lb/sq ft)			
		L/180	L/240	L/360	Allowable Load
2	48	125.0	95.0	60.0	152.6
	60	65.0	45.0	30.0	95.8
	72	35.0	25.0	15.0	65.8
	84	20.0	15.0	10.0	47.9
	96	15.0	10.0	5.0	35.9
4	48	62.5	47.5	30.0	76.3
	60	32.5	22.5	15.0	47.9
	72	17.5	12.5	7.5	32.9
	84	10.0	7.5	5.0	23.9
	96	7.5	5.0	2.5	17.9

Main Beam Spacing (ft)	Span (in)	Area (sq ft)	Uniform Area Load (lb/sq ft)			
			L/180	L/240	L/360	Allowable Load
2	48	8	—	60.0	40.0	76.3
	60	10	41.0	30.0	20.0	49.1
	72	12	23.3	17.5	11.6	33.9
	84	14	14.2	10.7	7.1	24.8
	96	16	10.0	7.5	5.0	19.0
4	48	16	—	30.0	20.0	38.1
	60	20	20.5	15.0	10.0	24.5
	72	24	11.6	8.7	5.8	16.9
	84	28	7.1	5.3	3.5	12.4
	96	32	5.0	3.7	2.5	9.5

Load Data

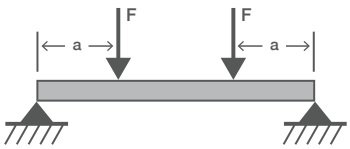


$\Delta_{max} = (F\ a\ /\ (24\ E\ I)) \cdot (3\ L^2 - 4\ a^2)$

$M_{max} = F\ a$

Span (in)	Point Loading Location, a (in)	Dual Point Load at 1/4 Points, F (lb)				
		Load at Deflection Limit			Allowable Load	Load at Yield
		L/180	L/240	L/360		
24	6	—	—	930	1200	2050
36	9	820	620	410	820	1370
48	12	460	350	230	611	1020
60	15	290	220	140	491	820
72	18	200	150	100	407	680
84	21	150	110	70	347	580
96	24	110	80	50	305	510

Main Beam Spacing (ft)	Span (in)	Area (sq ft)	Uniform Area Load, (lb/sq ft)			
			L/180	L/240	L/360	Allowable Load
2	48	8	115.0	87.4	57.4	152.6
	60	10	58.0	44.0	28.0	98.2
	72	12	33.2	25.0	16.6	67.8
	84	14	21.4	15.6	10.0	49.6
	96	16	13.6	10.0	6.2	38.0
4	48	16	57.4	43.6	28.6	76.2
	60	20	29.0	22.0	14.0	49.0
	72	24	16.6	12.4	8.2	33.8
	84	28	10.6	7.8	5.0	24.8
	96	32	6.8	5.0	3.0	19.0



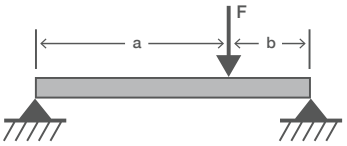
$\Delta_{max} = (F\ a\ /\ (24\ E\ I)) \cdot (3\ L^2 - 4\ a^2)$

$M_{max} = F\ a$

Span (in)	Point Loading Location, a (in)	Dual Point Load at 1/8 Points, F (lb)				
		Load at Deflection Limit			Allowable Load	Load at Yield
		L/180	L/240	L/360		
24	3	—	—	—	1200	4110
36	4.5	—	1160	770	1200	2740
48	6	870	650	430	1200	2050
60	7.5	550	410	270	982	1640
72	9	380	290	190	820	1370
84	10.5	280	210	140	701	1170
96	12	210	160	100	611	1020

Main Beam Spacing (ft)	Span (in)	Area (sq ft)	Uniform Area Load, (lb/sq ft)			
			L/180	L/240	L/360	Allowable Load
2	48	8	217.4	162.4	107.4	300.0
	60	10	110.0	82.0	54.0	196.4
	72	12	63.2	48.2	31.6	136.6
	84	14	40.0	30.0	20.0	100.0
	96	16	26.2	20.0	12.4	76.2
4	48	16	108.6	81.2	53.6	150.0
	60	20	55.0	41.0	27.0	98.2
	72	24	31.6	24.0	15.8	68.2
	84	28	20.0	15.0	10.0	50.0
	96	32	13.0	10.0	6.2	38.0

Load Data

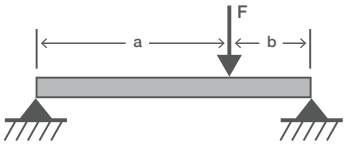


$\Delta_{max} = (F\ b\ (L^2 - b^2)^{(3/2)}) / (9 \cdot 3^{(1/2)}\ L\ E\ I)$

$M_{max} = F\ a\ b / L$

Span (in)	Point Loading Location, b (in)	Point Load within 3" of Support, F (lb)				
		Load at Deflection Limit			Allowable Load	Load at Yield
		L/180	L/240	L/360		
24	3	—	—	—	1200	4700
36	3	—	—	—	1200	4490
48	3	—	—	—	1200	4390
60	3	—	—	—	1200	4330
72	3	—	—	1110	1200	4290
84	3	—	—	950	1200	4270
96	3	—	—	830	1200	4250

Main Beam Spacing (ft)	Span (in)	Area (sq ft)	Uniform Area Load, (lb/sq ft)			
			L/180	L/240	L/360	Allowable Load
2	48	8	—	—	—	150.0
	60	10	—	—	—	120.0
	72	12	—	—	92.5	100.0
	84	14	—	—	67.8	85.7
	96	16	—	—	51.8	75.0
4	48	16	—	—	—	75.0
	60	20	—	—	—	60.0
	72	24	—	—	46.2	50.0
	84	28	—	—	33.9	42.8
	96	32	—	—	25.9	37.5



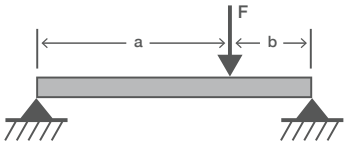
$\Delta_{max} = (F\ b\ (L^2 - b^2)^{(3/2)}) / (9 \cdot 3^{(1/2)}\ L\ E\ I)$

$M_{max} = F\ a\ b / L$

Span (in)	Point Loading Location, b (in)	Point Load within 6" of Support, F (lb)				
		Load at Deflection Limit			Allowable Load	Load at Yield
		L/180	L/240	L/360		
24	6	—	—	—	1200	2740
36	6	—	—	1150	1200	2470
48	6	—	—	850	1200	2350
60	6	—	1010	670	1200	2280
72	6	1120	840	560	1200	2240
84	6	960	720	480	1200	2210
96	6	830	620	410	1200	2190

Main Beam Spacing (ft)	Span (in)	Area (sq ft)	Uniform Area Load, (lb/sq ft)			
			L/180	L/240	L/360	Allowable Load
2	48	8	—	—	106.2	150.0
	60	10	—	101.0	67.0	120.0
	72	12	93.3	70.0	46.6	100.0
	84	14	68.5	51.4	34.2	85.7
	96	16	51.8	38.7	25.6	75.0
4	48	16	—	—	53.1	75.0
	60	20	—	50.5	33.5	60.0
	72	24	46.6	35.0	23.3	50.0
	84	28	34.2	25.7	17.1	42.8
	96	32	25.9	19.3	12.8	37.5

Load Data

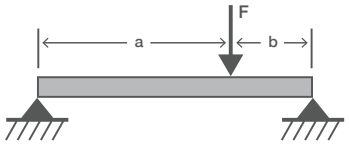


$\Delta_{max} = (F\ b\ (L^2 - b^2)^{(3/2)}) \ / \ (9 \cdot 3^{(1/2)}\ L\ E\ I)$

$M_{max} = F\ a\ b\ /\ L$

Span (in)	Point Loading Location, b (in)	Point Load within 12" of Support, F (lb)				
		Load at Deflection Limit			Allowable Load	Load at Yield
		L/180	L/240	L/360		
24	12	—	—	—	1200	2050
36	12	—	—	660	922	1540
48	12	—	680	450	820	1370
60	12	700	530	350	766	1280
72	12	570	430	280	737	1230
84	12	490	360	240	719	1200
96	12	420	320	210	701	1170

Main Beam Spacing (ft)	Span (in)	Area (sq ft)	Uniform Area Load, (lb/sq ft)			
			L/180	L/240	L/360	Allowable Load
2	48	8	—	85.0	56.2	102.5
	60	10	70.0	53.0	35.0	76.6
	72	12	47.5	35.8	23.3	61.3
	84	14	35.0	25.7	17.1	51.3
	96	16	26.2	20.0	13.1	43.7
4	48	16	—	42.5	28.1	51.2
	60	20	35.0	26.5	17.5	38.3
	72	24	23.7	17.9	11.6	30.6
	84	28	17.5	12.8	8.5	25.6
	96	32	13.1	10.0	6.5	21.8



$\Delta_{max} = (F\ b\ (L^2 - b^2)^{(3/2)}) \ / \ (9 \cdot 3^{(1/2)}\ L\ E\ I)$

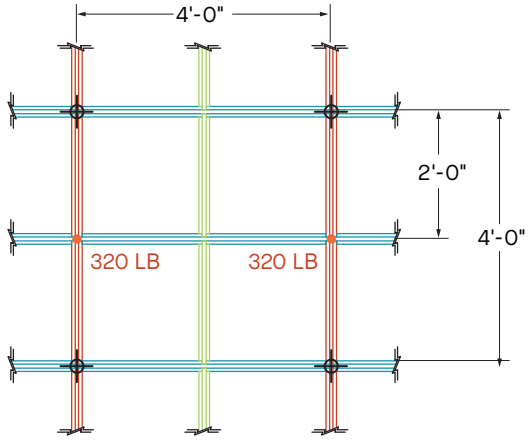
$M_{max} = F\ a\ b\ /\ L$

Span (in)	Point Loading Location, b (in)	Point Load within 18" of Support, F (lb)				
		Load at Deflection Limit			Allowable Load	Load at Yield
		L/180	L/240	L/360		
24	18	—	—	—	—	—
36	18	—	—	570	820	1370
48	18	—	520	340	653	1090
60	18	510	380	250	587	980
72	18	400	300	200	545	910
84	18	340	250	170	521	870
96	18	290	210	140	503	840

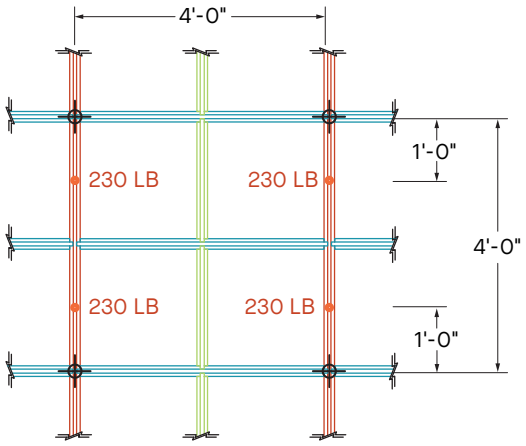
Main Beam Spacing (ft)	Span (in)	Area (sq ft)	Uniform Area Load, (lb/sq ft)			
			L/180	L/240	L/360	Allowable Load
2	48	8	—	65.0	42.5	81.5
	60	10	51.0	38.0	25.0	58.6
	72	12	33.3	25.0	16.6	45.4
	84	14	24.2	17.8	12.1	37.2
	96	16	18.1	13.1	8.7	31.4
4	48	16	—	32.5	21.2	40.7
	60	20	25.5	19.0	12.5	29.3
	72	24	16.6	12.5	8.3	22.7
	84	28	12.1	8.9	6.0	18.6
	96	32	9.0	6.5	4.3	15.7

Loading Condition Examples

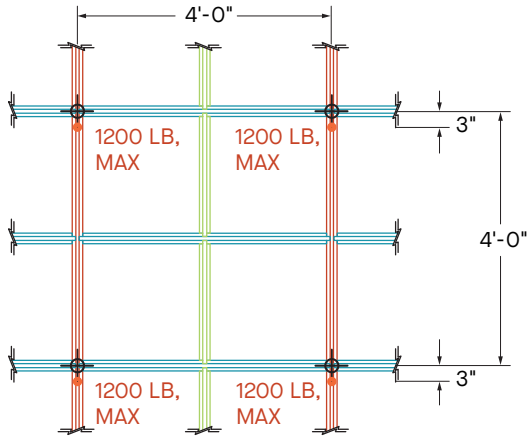
NOTE: Loading condition examples are shown with L/360 deflection.



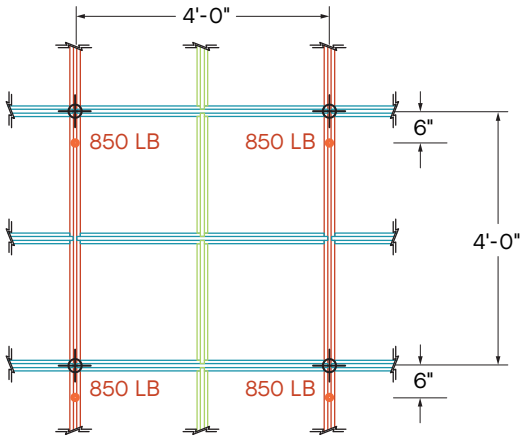
4' × 4' Support Spacing
Main Beam
Mid-Span Loading



4' × 4' Support Spacing
Main Beam Dual Point Loads
at 1/4 Points



4' × 4' Support Spacing
Main Beam Point Load
within 3" of Support



4' × 4' Support Spacing
Main Beam Point Load
within 6" of Support

Support Bracket

Main Beam

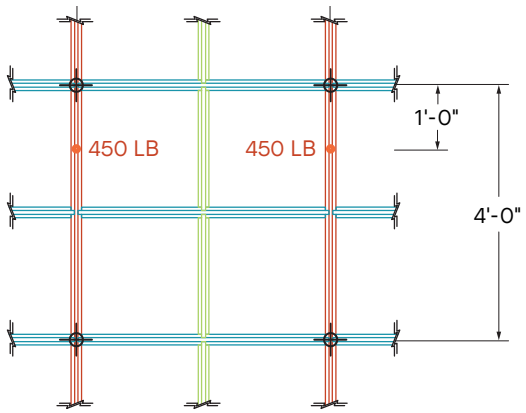
4-FT Cross Tee

2-FT Cross Tee

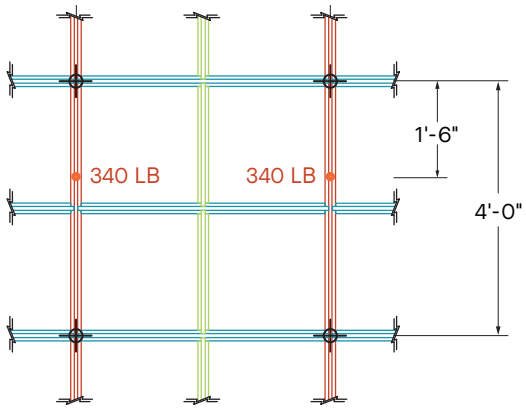
Point Load Location

Loading Condition Examples

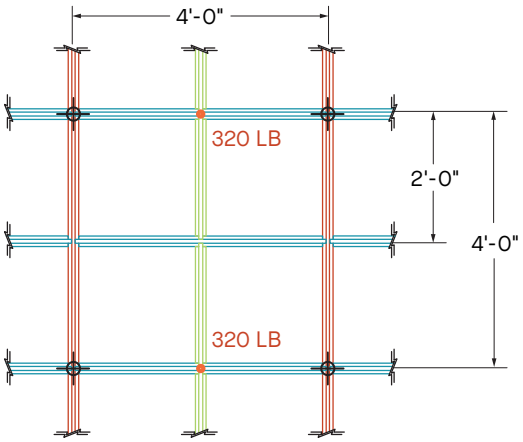
NOTE: Loading condition examples are shown with L/360 deflection.



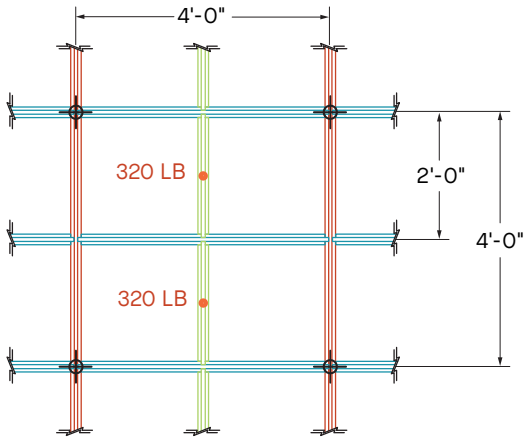
4' × 4' Support Spacing
Main Beam Point Load
within 12" of Support



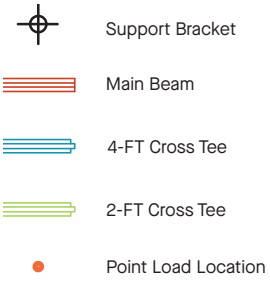
4' × 4' Support Spacing
Main Beam Point Load
within 18" of Support



4' × 4' Support Spacing
4' Cross Tee
Mid-Span Loading

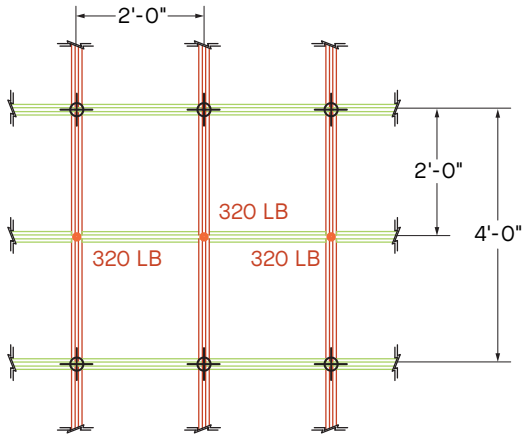


4' × 4' Support Spacing
2' Cross Tee
Mid-Span Loading

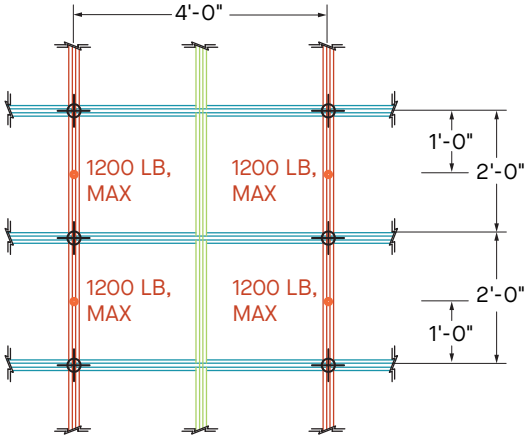


Loading Condition Examples

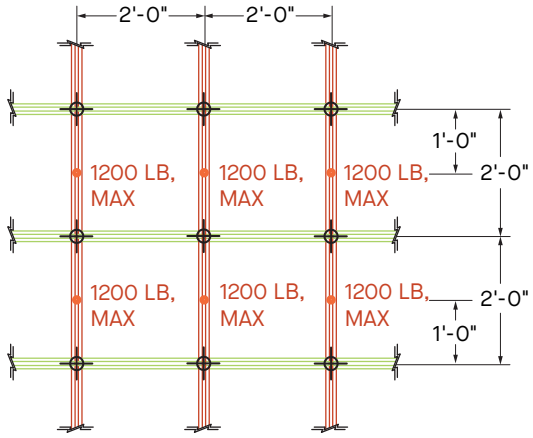
NOTE: Loading condition examples are shown with L/360 deflection.



4' × 2' Support Spacing
Main Beam
Mid-Span Loading



2' × 4' Support Spacing
Main Beam
Mid-Span Loading



2' × 2' Support Spacing
Main Beam
Mid-Span Loading

Support Bracket

Main Beam

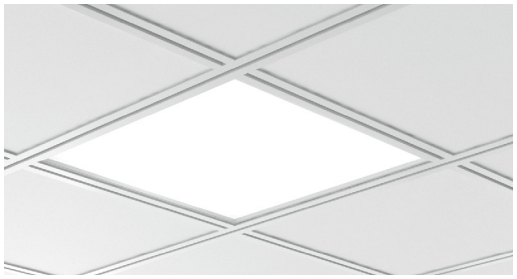
4-FT Cross Tee

2-FT Cross Tee

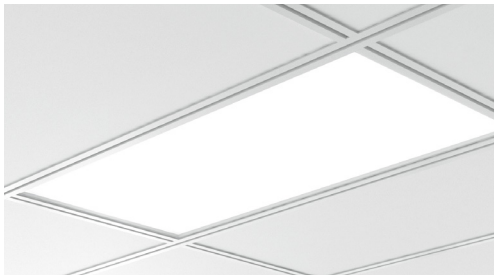
Point Load Location

Integrated Lighting Partners

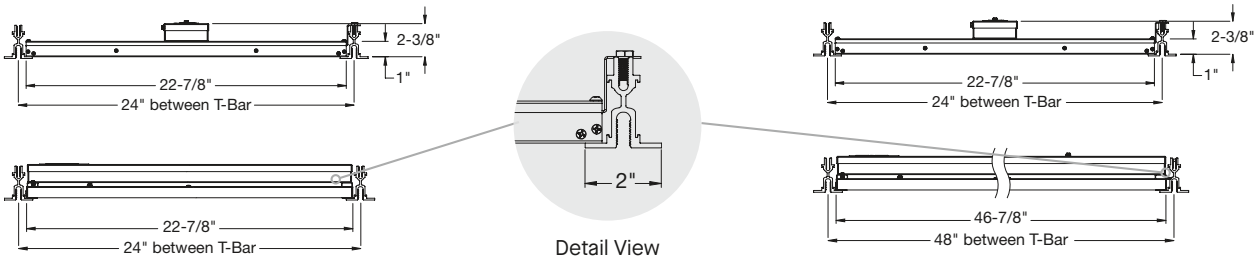
Lighting and diffuser solutions are available through partner companies.



TRAYFIT™ 2 × 2

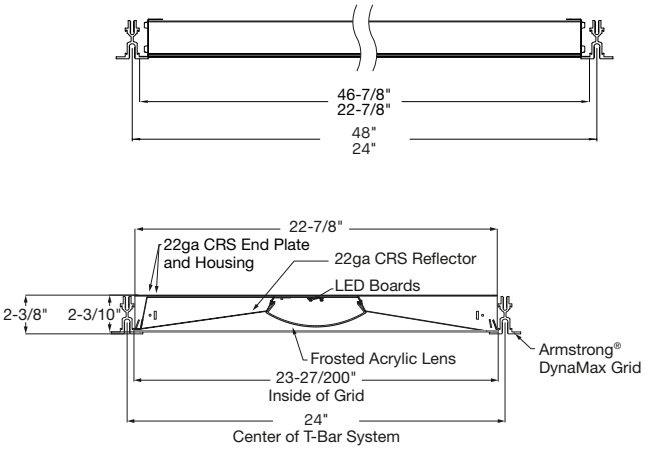


TRAYFIT™ 2 × 4



For compatible lighting details, visit axislighting.com

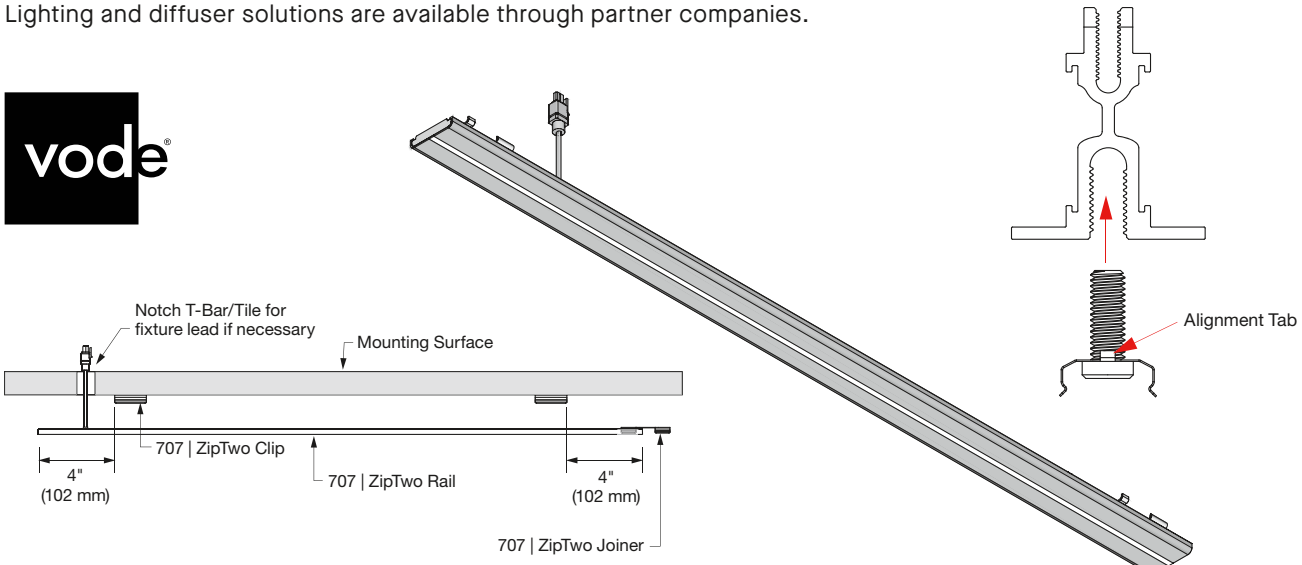
PTDC – Shallow Plenum LED Troffer for DynaMax System



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

Integrated Lighting Partners

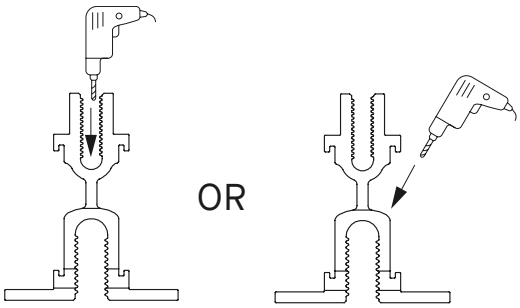
Lighting and diffuser solutions are available through partner companies.



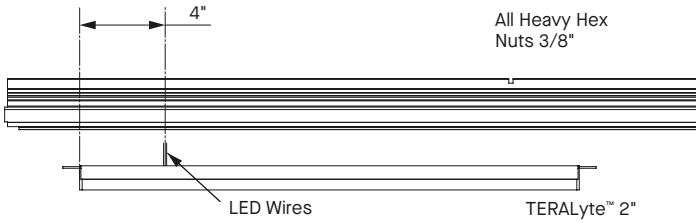
ZipTwo™ Data Center Solutions

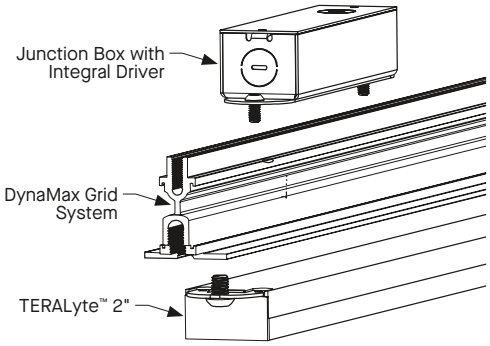
For compatible lighting details, visit vode.com/dynamax

JLC • tech



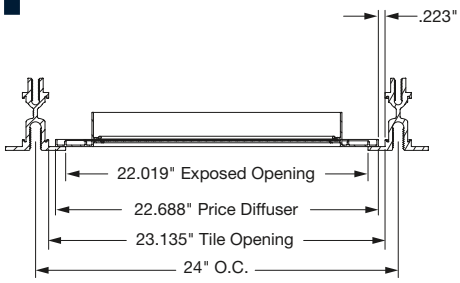
TERALyte™ 2" for the DynaMax® grid system

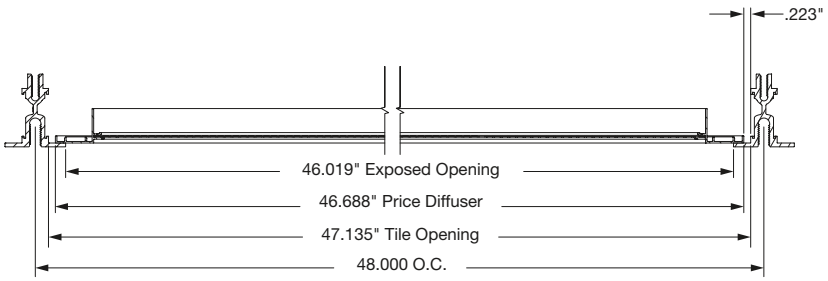


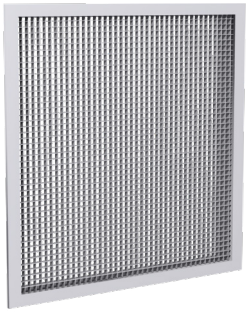


For compatible lighting details, visit jlc-tech.com

Integrated MEP Partners







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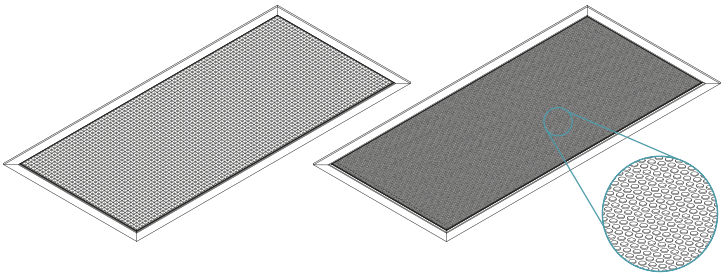
Price Model 80

Perforated Air Device –
Price Model 10



Eggcrate Air Device –
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Perforated Air Device –
Price Model 10

For compatible diffuser details, visit priceindustries.com/diffusers

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