



CSA & NEMA LOADING CLASSES

NON-METALLIC CABLE TRAY & STRUT SYSTEMS

LOADING

Select the Tray Class / Load Capacity

The standard classes of cable trays, as related to their maximum design loads and to the associated design support spacing based on a simple beam span requirement, shall be designated in accordance with Table 1.

Please note the load ratings in Table 1 are those most commonly used. Other load ratings are acceptable.

TABLE 1 LOAD / SPAN CLASS DESIGNATIONS

Load kg/m (lb/ft)	Span, m (ft)				
	2.4 (8)	3.0 (10)	3.7 (12)	4.9 (16)	6.0 (20)
37 (25)	-	A	-	-	-
67 (45)	-	-	-	-	D
74 (50)	8A	-	12A	16A	20A
97 (65)	-	C	-	-	-
112 (75)	8B	-	12B	16B	E or 20B
149 (100)	8C	-	12C	16C	20C
179 (120)	-	D	-	-	-
299 (200)	-	E	-	-	-

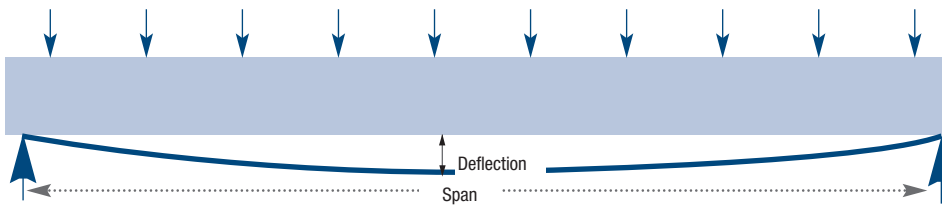


TABLE 2 CONVENTIONAL CSA LOAD DESIGNATIONS

Designation	kg/m (lb/ft)
A	37 (25)
C	97 (65)
D	179 (120)
E	299 (200)

TABLE 3 TRADITIONAL NEMA DESIGNATIONS

Designation	kg/m (lb/ft)	Designation	kg/m (lb/ft)	Designation	kg/m (lb/ft)	Designation	kg/m (lb/ft)
8A	64 (50)	12A	74 (50)	16A	74 (50)	20A	74 (50)
8B	112 (75)	12B	112 (75)	16B	112 (75)	20B	112 (75)
8C	149 (100)	12C	149 (100)	16C	149 (100)	20C	149 (100)



LOADING CAPACITY

Strength properties of reinforced plastics are reduced when continuously exposed to elevated temperatures. Working loads shall be reduced based on the following:

- Cable Loads** The cable load is the total weight, expressed in lbs./ft., of all the cables that will be placed in the cable tray.
- Snow Loads** Depending on the area, snowfall could indicate an additional design load. If snowfall is a factor and the tray has a solid cover in outdoor installations, a minimum load of 5 lbs. per square foot should be used.
- Ice Loads** If a cable tray system is subject to icing conditions, usually only the top surface or cover and the windward side will be coated with any significant amount. It is generally assumed that ice weighs 57 lbs. per cubic foot.
- Wind Loads** All outdoor cable tray installations should factor in wind loads, especially the pressure exerted on siderails of ladder trays. There have also been instances of strong winds lifting covers off trays, which can be minimized with the use of wraparound cover clamps.

CONCENTRATED LOADS

A concentrated static load is not included in Table 1 (page 8). Some user applications may require that a given concentrated static load be imposed over and above the working load.

Such a concentrated static load represents a static weight applied on the centerline of the tray at midspan. When so specified, the concentrated static load may be converted to an equivalent uniform load (W_e) in kilograms/metre (pounds/linear foot), using the following formula, and added to the static weight of cable in the tray:

$$W_e = \frac{2 \times (\text{concentrated static load, kg (lb.)})}{\text{Span length, m (ft.)}}$$

This combined load may be used to select a suitable load/span designation. If the combined load exceeds the working load shown on pages 18-22, the manufacturer should be consulted.

EFFECT OF TEMPERATURE

Strength properties of reinforced plastics are reduced when continuously exposed to elevated temperatures. Working loads shall be reduced based on the following:

Temperature		Approximate Percent of Strength
°C	(°F)	
23.8	(75)	100
37.7	(100)	90
51.6	(125)	78
65.5	(150)	68
79.4	(175)	60
93.3	(200)	52

NEMA Standard 8-10-1986
If unusual temperature conditions exist, the manufacturer should be consulted.



THERMAL CONTRACTION AND EXPANSION

It is important that thermal contraction and expansion be considered when installing cable tray systems. The length of the straight cable tray runs and the temperature differential govern the number of expansion splice plates required (see Figure 1 below). The cable tray should be anchored at the support nearest to its midpoint between the expansion splice plates and secured by expansion guides at all other support locations (see Figure 2). The cable tray should be permitted longitudinal movement in both directions from that fixed point.

Accurate gap setting at the time of installation is necessary for the proper operation of the expansion splice plates. The following procedure should assist the installer in determining the correct gap: (see Figure 3)

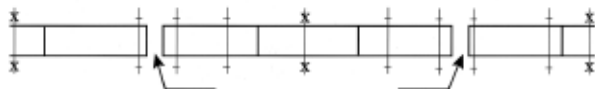
- 1 Plot the highest expected tray temperature on the maximum temperature line.
- 2 Plot the lowest expected tray temperature on the minimum temperature line.
- 3 Draw a line between the maximum and minimum points.
- 4 Plot the tray temperature at the time of installation to determine the gap setting.

FIGURE 1 EXPANSION OR CONTRACTION FOR VARIOUS TEMPERATURE DIFFERENCES

Temperature °C	Temperature (°F)	Max. distance between expansion connector* for 1" expansion		Max. distance between expansion connector for 5/8" expansion	
		metres	(feet)	metres	(feet)
-3,9	(25)	203,3	(667)	127,1	(417)
10,0	(50)	101,5	(333)	63,3	(208)
23,8	(75)	67,6	(222)	42,3	(139)
37,7	(100)	50,9	(167)	31,7	(104)
51,6	(125)	40,5	(133)	25,2	(83)
65,5	(150)	33,8	(111)	21,0	(69)
79,4	(175)	28,9	(95)	17,9	(59)

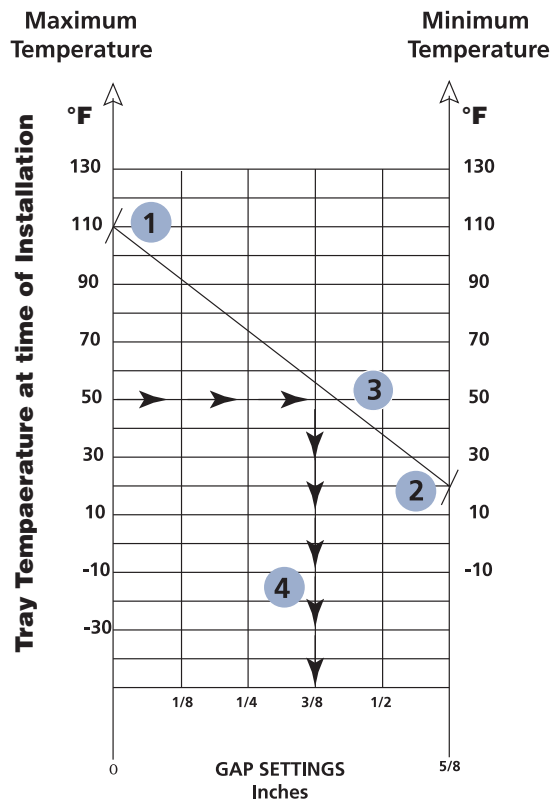
Gap set and hold down/guide location, see installation instruction above.
 *1 slotted hole in each expansion connector allow 5/8 total expansion or contraction.

FIGURE 2 TYPICAL CABLE TRAY INSTALLATION



X : Denotes hold-down clamp (anchor) at support.
 - : Denotes expansion guide/clamp at support.

FIGURE 3 PROPER GAP SETTINGS





NON-METALLIC CABLE TRAY & STRUT SYSTEMS

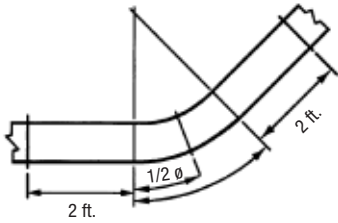
INSTALLATION GUIDELINES

Installation of Thomas & Betts Non-Metallic Cable Tray should be made in accordance with the standards set by NEMA VE2-2000 Publication and CSA Standards.

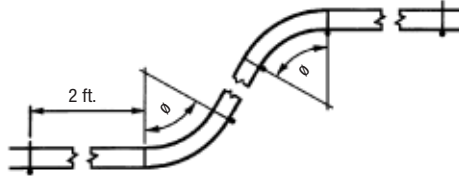
- Always observe common safety practices when assembling tray and fittings. Installations generally require some field cutting. Dust created during fabrication presents no serious health hazard, but skin irritation may be experienced by some workers.
- Operators of saws and drills should wear masks, long-sleeve shirts or coveralls.
- Fabrication with Non-metallic Cable Tray is relatively easy and comparable to working with wood. Ordinary hand tools may be used in most cases.
- Avoid excessive pressure when sawing or drilling. Too much force can rapidly dull tools and also produce excessive heat which softens the bonding resin in the Non-metallic Cable Tray resulting in a ragged edge rather than a cleancut edge.
- Field cutting is simple and can be accomplished with a circular power saw with an abrasive cut-off wheel (masonry type) or hack saw (24 to 32 teeth per inch).
- Drill non-metallic as you would drill hardwood. Standard twist drills are more than adequate.
- Any surface that has been drilled, cut, sanded or otherwise broken, **must be sealed** with a compatible resin.
- Carbide tipped saw blades and drill bits are recommended when cutting large quantities.
- Support the Non-metallic Cable Tray material firmly during cutting operations to keep material from shifting which may cause chipping at the cut edge.
- Each tray section length should be equal to or greater than the support span.
- When possible, the splice should be located at quarter span.
- Fittings should be supported as per NEMA VE2-2000 Section 4.4.



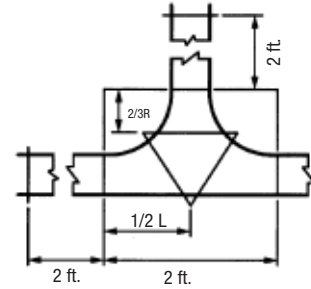
CABLE TRAY SUPPORT LOCATIONS FOR FITTINGS



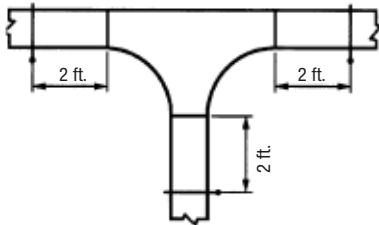
Horizontal Elbows



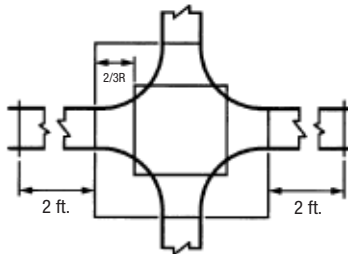
Vertical Elbows



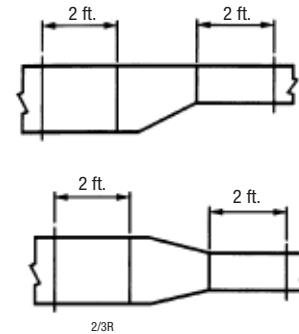
Horizontal Tee



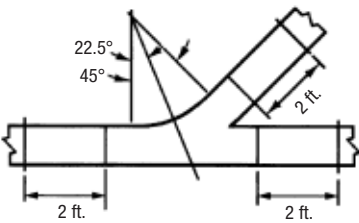
Horizontal Tee



Horizontal Cross



Horizontal Reducers



Horizontal Wye

Note: $\phi = 30^\circ, 45^\circ, 60^\circ, 90^\circ$ (degree of fitting)



SAMPLE RECOMMENDED SPECIFICA-

NON-METALLIC CABLE TRAY & STRUT SYSTEMS

CABLE TRAY SYSTEM

- Cable Tray System shall be made of straight sections, fittings and accessories as defined in the latest CSA/NEMA standards publication.

CABLE TRAY DESIGN

- Straight section structural elements; side rails, rungs and splice plates shall be pultruded from glass fiber reinforced polyester or vinyl ester resin.
- Pultruded shapes shall be constructed with a surface veil to insure a resin-rich and ultraviolet resistant surface.
- Pultruded shapes shall meet ASTM E-84, Class 1 flame rating and self-extinguishing requirements of ASTM D-635.

CONSTRUCTION

- Straight section lengths will be 120 inches (10 ft.) or 240 inches (20 ft.) standard.
- Side rails will be inward "C" configuration and be predrilled to accept splice plates.
- Overall heights shall be 6", 4" or 3" respectively.
- Loading depths for cable tray systems shall be 5", 3" or 2" as per CSA/NEMA tolerances
- Loading classifications and test specimens shall be per CSA/NEMA.

FITTINGS

- Molded fittings shall be formed with a minimum 3" tangent following the radius.
- 3" or 5" loading depth systems shall have 90° and 45° molded fittings in 12" or 24" radius.
- All fittings not included in above statement should be of mitered construction.
- Width (usable inside tray width) shall be 6", 9", 12", 18", 24", 30", 36".
- Outside width shall not exceed inside by more than a total of 2".
- Straight and expansion splice plates will be of stainless steel or fiberglass design with an eight-bolt pattern in 5" fill systems and four-bolt pattern in 3" and 2" fill systems.
- Dimension tolerances will be per CSA/NEMA.
- Cable tray must have integral connection between side rails and rungs consisting of non-metallic mechanical fasteners and adhesive bonding.

MANUFACTURE

- All manufacturing practices will be in accordance with CSA/NEMA.
- Cable trays shall be by Thomas & Betts, or approved CSA/NEMA member.



NON-METALLIC CABLE TRAY & STRUT SYSTEMS

APPLICATIONS PHOTOS

NON-METALLIC CABLE TRAY SYSTEMS have been tested and proven in the harsh environment of the offshore oil and gas industry. Subject to the corrosive conditions inherent in petroleum products, plus the daily punishment of exposure to wind, weather and saltwater –

NON-METALLIC CABLE TRAY SYSTEMS HAS STOOD UP!



Horizontal and vertical drops, exterior installation.



Horizontal (suspended) tray, with vertical drop to machinery below



Vertical cable dropout from horizontal run



Horizontal bends change direction of tray suspended from deck above