T.D.S.
- Thermal Expansion -

(CTI-S65001_A01)

Thermal Expansion and Contraction of Cable Tray

All materials expand and contract due to temperature changes. It is important that cable tray installations incorporate features which provide adequate compensation for their thermal contraction and expansion. The length of the continuous cable tray straight run, and the temperature differential govern the quantity of expansion splice plates required. For step-by-step method on how to determine the maximum spacing between expansion joints and splice gap settings, refer to the following steps:

Step 1: Identify the maximum and minimum temperature at the project site and calculate the (Δ) temperature differential. Once the temperature differential is calculated, determine the maximum spacing between expansion joints using Table 3-2 below per NEMA VE-2 Section 3.4.2. Based on 70°C temperature differential, the maximum spacing between expansion joints for steel is 102ft while 52ft when using aluminum and 133ft when using fiberglass material.
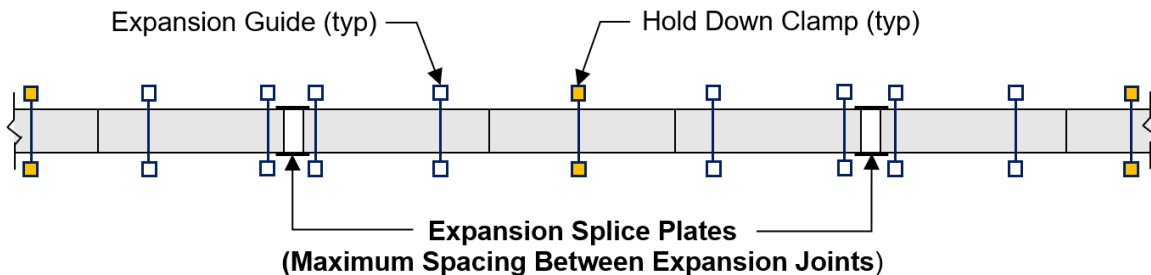
Example:

Max Temp: +38°C Δ = Max Temp - Min Temp
Min Temp: -32°C Δ = 38 - (-32) = 70°C

Table 3-2: Maximum Spacing Between Expansion Joints That Provide for 1" (25mm) Movement

Temperature Differential*		Steel		Aluminum		Fiberglass	
°C	(°F)	m	(ft)	m	(ft)	m	(ft)
14	(25)	156	(512)	79	(260)	203	(667)
28	(50)	78	(256)	40	(130)	102	(333)
42	(75)	52	(171)	27	(87)	68	(222)
56	(100)	39	(128)	20	(65)	51	(167)
70	**(125)**	**31**	**(102)**	**16**	**(52)**	**41**	**(133)**
83	(150)	26	(85)	13	(43)	34	(111)
97	(175)	22	(73)	11	(37)	29	(95)

*Temperature differential is the difference in temperature between the hottest and coldest days of the year.

Expansion Guide (typ)   Hold Down Clamp (typ)

Expansion Splice Plates
**(Maximum Spacing Between Expansion Joints)**

FIGURE 65-1

Note: 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 to allow longitudinal movement in both directions from that fixed point (See Figure 65-1).

CT INNOVATIONS
www.toughinnovations.com

21 Waterway Avenue, Ste 300,
The Woodlands, TX 77380, USA

CT INNOVATIONS
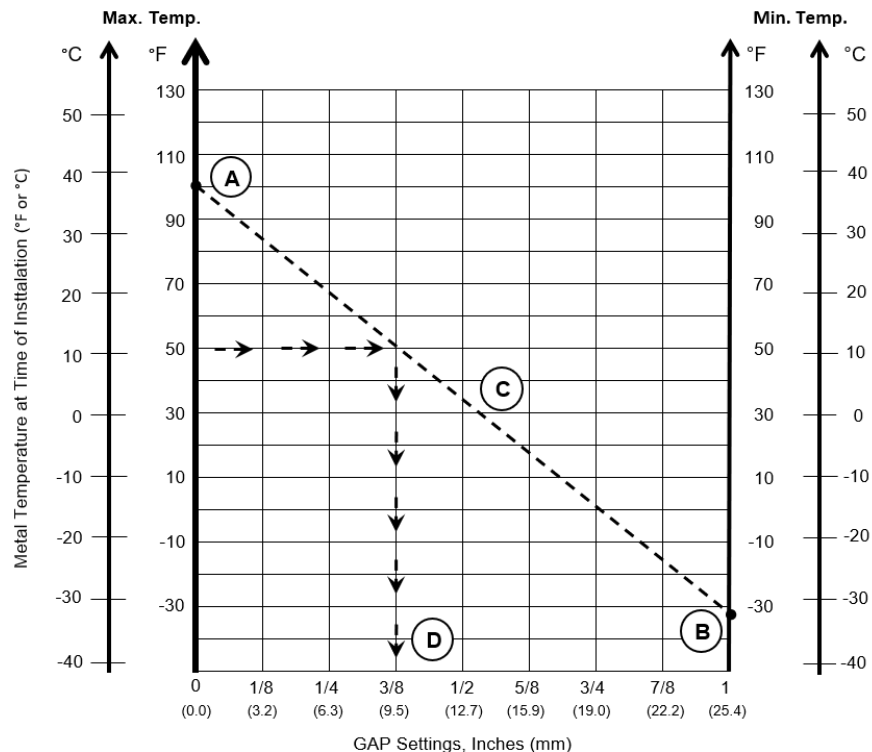M: support@toughinnovations.com

Step 2: Determine the gap setting between the cable tray expansion splice joints at the time of the installation to account properly the movement due to thermal expansion/contraction (See Figure 65-2).
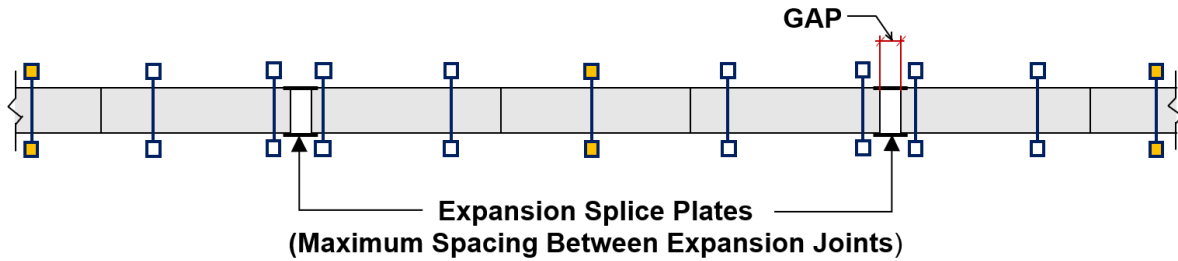
FIGURE 65-2

Accurate gap setting at the time of installation is necessary for proper operation of the expansion splice plates. The following procedure per the example indicated in NEMA VE-2 Section 3.4.2 should assist the installer in determining the correct gap:

A. Plot the highest expected temperature on the maximum temperature line. Example Value = +38°C
B. Plot the lowest expected temperature on the minimum temperature line. Example Value = -32°C
C. Draw a line connecting the maximum and minimum points identified in Step A & B.
D. To determine the gap setting, plot the temperature at the time of installation (Example Value = 10°C) and draw a horizontal line. Once the horizontal line intersects the diagonal line between the maximum and minimum temperature points, draw a vertical line projected downward to determine the required gap setting. In this example, the required gap between cable tray at expansion splice joints is 3/8" (9.5mm).

FIGURE 65-3: Gap Setting of Expansion Splice Plate, 1in (25.4mm) Gap Maximum

CT INNOVATIONS
www.toughinnovations.com

21 Waterway Avenue, Ste 300,
The Woodlands, TX 77380, USA

CT INNOVATIONS
M: support@toughinnovations.com

For CTI TOUGHMesh Basket Tray, and TOUGHTray Cable Ladder thermal expansion and contraction splice installation instructions, refer to the following documents:

- TOUGHMesh Basket Tray: **Document No. CTI-S50006**
- TOUGHTray Cable Ladder: **Document No. CTI-S5200X**

CT INNOVATIONS
www.toughinnovations.com

21 Waterway Avenue, Ste 300,
The Woodlands, TX 77380, USA

CT INNOVATIONS
M: support@toughinnovations.com