



CT
Innovations

TOUGH SUPPORT SAVINGS

CTI-TSS-TM-S0001



Engineered solutions designed and tested to surpass industry standards generating greater project ROI





TOUGH SUPPORT SAVINGS for TOUGHMesh cable tray systems

We share our knowledge and expertise, to better support and partner with our customers. By optimizing what you do need, we reduce design complexity, engineering hours and the cable tray systems total material content. Better by design, safe and simple to work with. TOUGHMesh.

TOUGH Support Savings is a range of recommendations that help the designer optimize a TOUGHMesh cable tray systems structural supports. TOUGH Support Savings reduce design complexity and support quantity while alleviating many engineering and construction challenges.

CT Innovations in-house team of global design engineers is available to help customers engineer a design optimized support system. From technical support and troubleshooting to providing the cable tray support design and construction details, we are here to help.



What does Optimization mean? *"The action of making the best or most effective use of a situation or resource"*
How does this apply to TOUGH Support Savings? The use of proven recommendations that deliver the most efficient support design. Better in using less material and resources, from support design to support installation.



TSS EQUATION = Save Design Time + Save Material + Save Installation Time = OPTIMIZATION

Total Optimization Value is a sum of design + material + installation savings. To better identify the value of each recommendation, the below **Red to Green** savings value is given for each of the **DS - MS - IS**.

- = Lowest Savings Value
- = Some Savings Value
- = Highest Savings Value

- = Design Savings
- = Material Savings
- = Installation Savings



TOUGH Support Savings detailed within this document are to help engineers implement an optimized design. If at any time you have a question and need assistance, please contact CT Innovations.

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SAFETY 1st

The installation of TOUGHMesh cable tray and tray supports will require manual labor.

OSHA 2022 statistics show hand injuries accounted for 8.7% of all injuries resulting in days away from work.

To minimize the risk of personnel hand injuries during installation, we recommend the installer wear PPE, install less supports and utilize the available TOUGHMesh toolless installation recommendations.

Reduce the Risk of Injury with TSS solutions. Innovation that delivers safer installation.



Section 1.

TOUGHMesh Cable Tray STRAIGHT SECTIONS



1.1 Longer Span Support Solutions

The longer the straight section support span (distance between supports) the fewer supports need be designed and installed to support the cable tray. Maximum optimization is achieved by designed the maximum tray support span for the available TOUGHMesh cable design load.

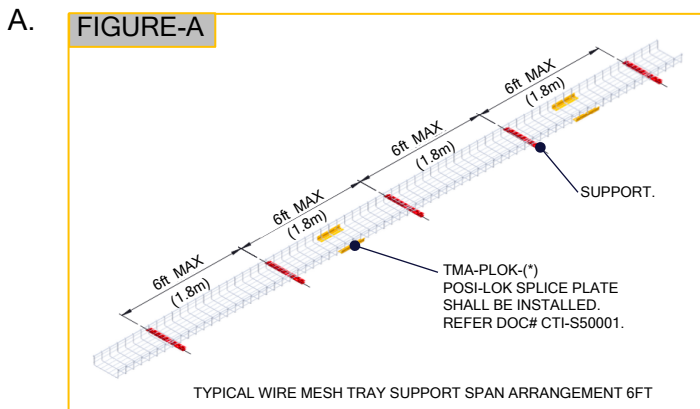


FIGURE-A

Shows a NEMA-6 arrangement, the 6-being a 6ft span (distance between each support).

Support Qty for 300ft tray run = 50 supports

Select 6ft span when the cable tray design load is certified to 6ft span for the specified cable design load. TMA-PLOK splice plates allowed.

SAVINGS VALUE = **DS** **MS** **IS**

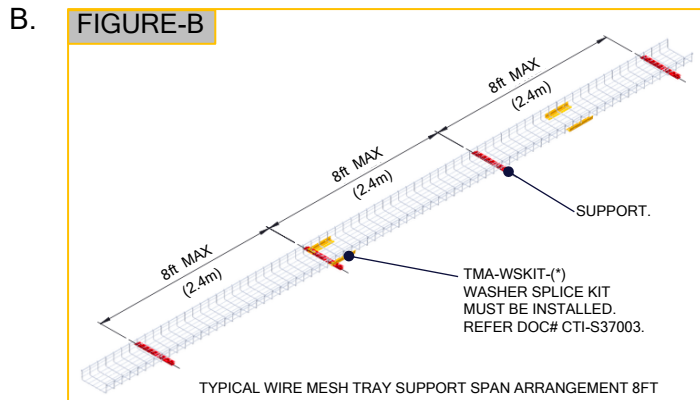


FIGURE-B

Shows a NEMA-8 arrangement, the 8-being a 8ft span (distance between each support).

Support Qty for 300ft tray run = 38 supports

Select 8ft span when the cable tray design load is certified to 8ft span for the specified cable design load.

SAVINGS VALUE = **DS** **MS** **IS**

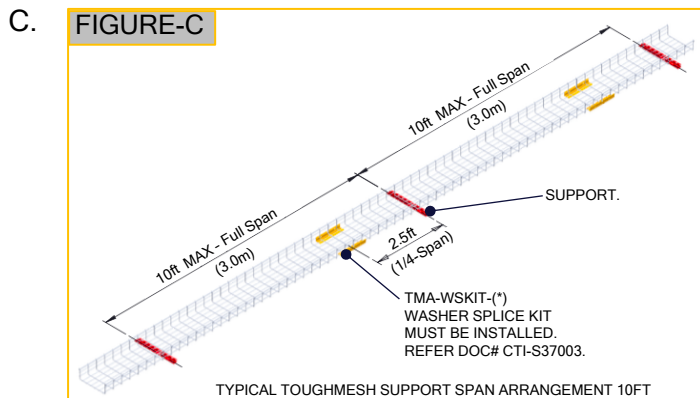


FIGURE-C

Shows a NEMA-10 arrangement, the 10-being a 10ft span (distance between each support).

Support Qty for 300ft tray run = 30 supports

Select 10ft span when the cable tray design load allows 10ft for the specified cable design load. TMA-PLOK splice plates must be used.

SAVINGS VALUE = **DS** **MS** **IS**



1.2 Splice Joint Location

1.2.1 The location of the splice plates within the cable tray straight section layout (run) does not affect the support span design.



1.2.2. Splice plate location does, however, affect the performance of the installed cable tray straight sections by increasing or decreasing the tray system bending stress.

1.2.3. Bending stress (+/-) will in turn, increase or decrease the half-span (center point between supports) deflection of both the cable tray and the cables within the tray.

It is recommended that the splice joints within the tray continuous straight runs be located to minimize bending stress and the resultant mid-span deflection.

A. SIMPLE-SPAN Splice Plate Location

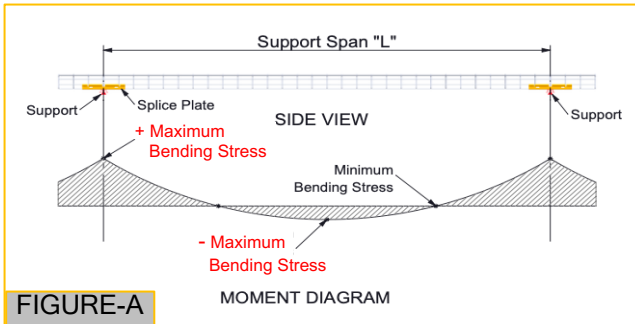


FIGURE-A

Shows the splice plates located on the supports, it creates a Simple-Span tray splice arrangement.

Simple-Span results in **+Maximum Bending Stress** at the splice plate location. Splice joints subjected to this stress result in **maximum** mid-span deflection.

PERFORMANCE VALUE = **MAX DEFLECTION**



B. MID-SPAN Splice Plate Location

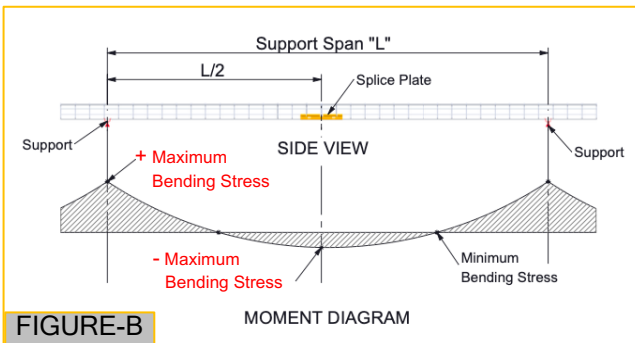


FIGURE-B

Shows the splice plates located between the supports at the mid-point (L/2), it creates a Mid-Span tray splice arrangement.

Mid-Span results in **reduced -Maximum Bending Stress** at the splice plate location. Splice joints when subjected to reduced stress, result in reduced mid-span deflection

PERFORMANCE VALUE = **REDUCED DEFLECTION**



C. QUARTER-SPAN Splice Plate Location

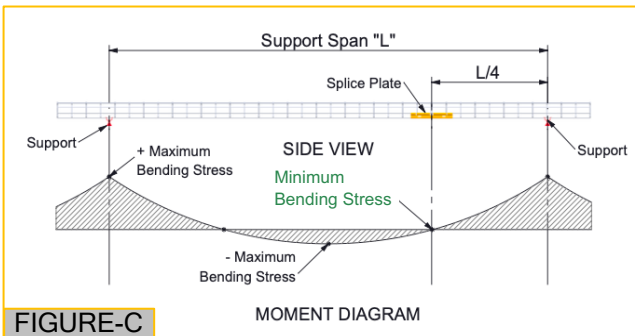


FIGURE-C

Shows the splice plates located between the supports at the quarter-point (L/4), it creates a Quarter-Span tray splice arrangement.

Quarter-Span results in **Minimum Bending Stress** at the splice plate location. Splice joints when subjected to minimal stress, result in minimized mid-span deflection.

PERFORMANCE VALUE = **MINIMUM DEFLECTION**





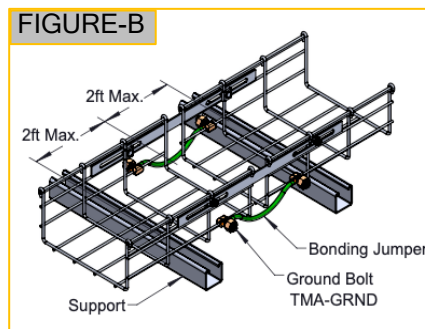
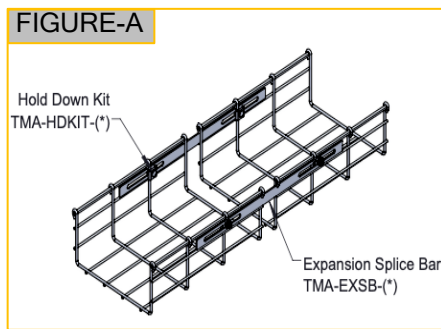
1.3 Expansion Joint Support Location

The cable tray system will thermally expand and contract due to change in the ambient temperature. Expansion joints should be designed by calculating the expansion gap dimension and the maximum spacing between expansion joints. To calculate these, refer to Technical Data Sheet CTI-S65001_A01.

A. Support Locations for Mechanically Continuous Expansion Joints

In accordance with manufacturers recommendation the expansion joints should be mechanically continuous by using the manufacturers recommended expansion splice plate as detailed in the below Figure-A, and supported as Figure-B.

Support locations should be in accordance with NEMA VE 2, Section 3.4.2. Supports should be located within 2ft (600mm) of each side of the expansion splice plates.



Technical Note:
Mechanically continuous expansion joint bonding and grounding instruction are given in Section-4, Technical Data Sheet # CTI-S50006

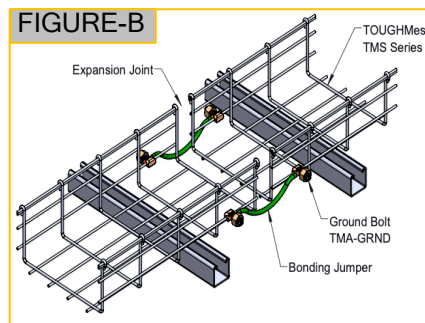
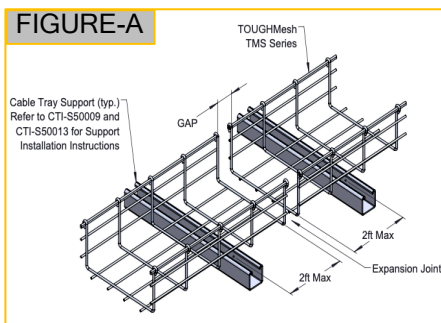
SAVINGS VALUE:



B. Support Locations for Mechanically Discontinuous Expansion Joints

A mechanically discontinuous expansion joint is not recommended (refer 1.3 A) but is technically acceptable subject to the following manufacturer recommendations. Cable tray is electrically bonded in accordance with NEC and supports are located as detailed in below Figure-B.

Support locations should be in accordance with NEMA VE 2, Section 3.4.2. Supports should be located within 2ft (600mm) of each side of the expansion splice plates.



Technical Note:
Mechanically discontinuous expansion joint bonding and grounding instruction are given in Section-4, Technical Data Sheet # CTI-S50033

SAVINGS VALUE:





Section 2.

TOUGHMesh Cable Tray FITTINGS

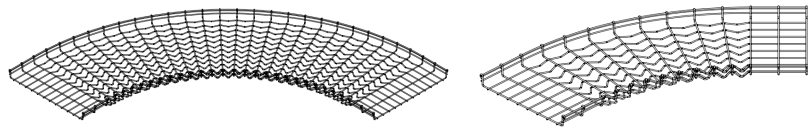
At the very beginning of this section let us first clarify and review two important matters; what are TOUGHMesh fittings? what are the industry standard practices for fitting support locations?

TOUGHMesh fittings?

Are horizontal and vertical bends (e.g., horizontal 45° bend, vertical 90° bend, tee, cross). The bends can be supplied Engineered Pre-Formed at the factory or bends can be Site-Fabricated.

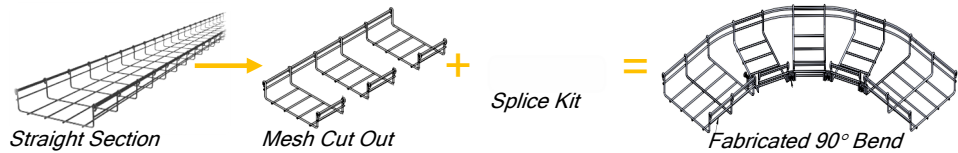
Engineered Pre-formed Fitting:

(only available in 45°/90° horizontal bend)



Site-Fabricated Fitting:

(straight section mesh is cut out, bent and spliced to form a bend)



Industry Standard Practices for fitting support locations are given by NEMA VE 2-2018 and Section 3.5 Fitting Installation, sub-Section 3.5.1 and sub-Section 3.5.3

The designer should note that:

- 3.5 Fitting Installation (see section 3.5.3 for wire mesh cable trays): **does not reference** Section 3.5.1
- 3.5.1 Recommended Support Locations for Fittings: **does not/does not have to be applied** to Wire Mesh Cable Trays.
- 3.5.1 Recommended Support Locations for Fittings: states, Quote **“(or as recommended by the manufacturer)”** Unquote.
- 3.5.3 Recommended Support Locations for Mesh Cable Trays: states, Quote: **“wire mesh cable trays have alternate support configurations. Consult the manufacturer for details.”** Unquote.



TOUGH Support Savings from CT Innovations are proven support recommendations for fittings in full compliance with NEMA VE 2, sub-Section 3.5.1 **“(unless otherwise recommended by the manufacturer)”** and sub-Section 3.5.3 **“consult manufacturer for details”**

For each TOUGHMesh cable tray fitting type, both engineered and fabricated, TOUGH Support Solutions will provide detailed **manufacturer recommended** support locations.

Optimized Saving Value = **DS** Design Savings + **MS** Material Savings + **IS** Installation Savings

Remember that to optimize the design is to design less supports. If you cannot design less, follow the recommended industry standard practice.



2.1 Engineered C2G Horizontal Bend

Engineered Crimped-To-Go (C2G) bends are pre-formed at the factory. Available in both 45° and 90° horizontal bends. Engineered C2G eliminate all traditional site-fabrication and assembly methods. This optimizes performance, build quality, installation time and support locations.

A. Engineered C2G 90° Horizontal Bend: **TRADITIONAL VE 2 SUPPORT**

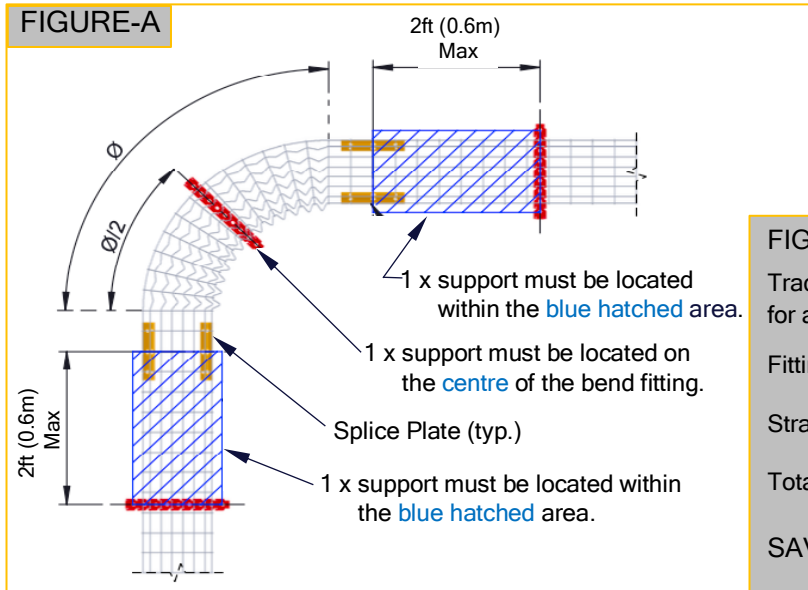


FIGURE-A
 Traditional NEMA VE-2 support locations for a 90° engineered horizontal bend fitting.
 Fitting 90° Bend = 1 x support located on the **centre** of the bend.
 Straight Section = 1 x support located within each **2ft hatched** area.
 Total Support Qty = 3
 SAVINGS VALUE = **DS** **MS** **IS**

B. Engineered C2G 90° Horizontal Bend: **NO SUPPORT UNDER FITTING**

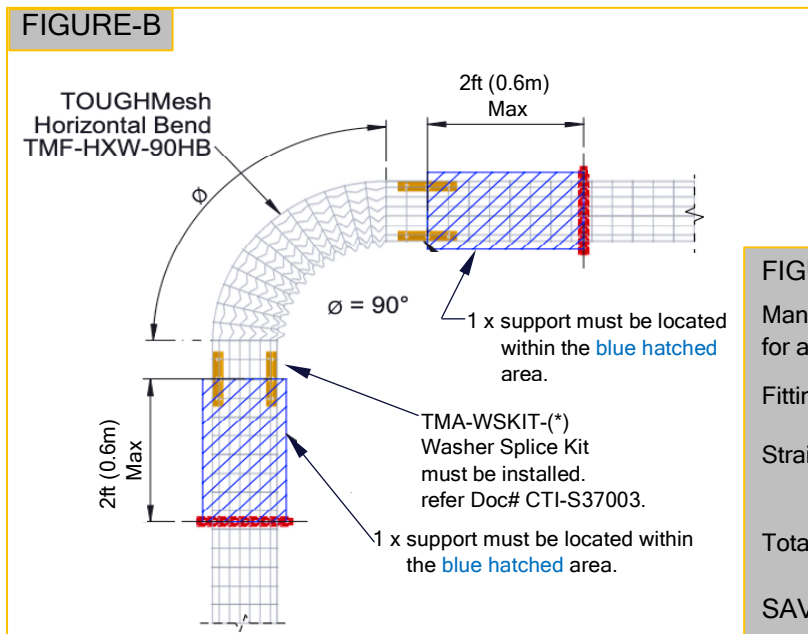


FIGURE-B
 Manufacturer Recommended support locations for a 90° engineered horizontal bend fitting.
 Fitting 90° Bend = 0 x support located on the centre of the bend.
 Straight Section = 1 x support located within each **2ft hatched** area.
 Total Support Qty = 2
 SAVINGS VALUE = **DS** **MS** **IS**



C. Engineered C2G 90° Horizontal Bend: 1/2-SPAN

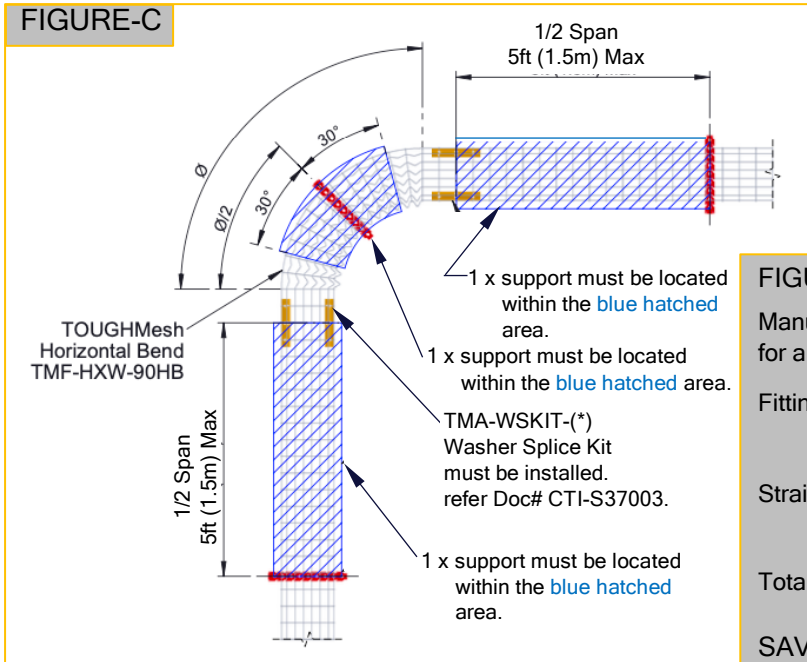


FIGURE-C
 Manufacturer Recommended support locations for a 90° engineered horizontal bend fitting.
 Fitting 90° Bend = 1 x support located in the **centre hatched** area on the 90° bend fitting.
 Straight Section = 1 x support located within each **5ft hatched** area.
 Total Support Qty = 1
 SAVINGS VALUE =

D. Engineered C2G 90° Horizontal Bend: FULL-SPAN

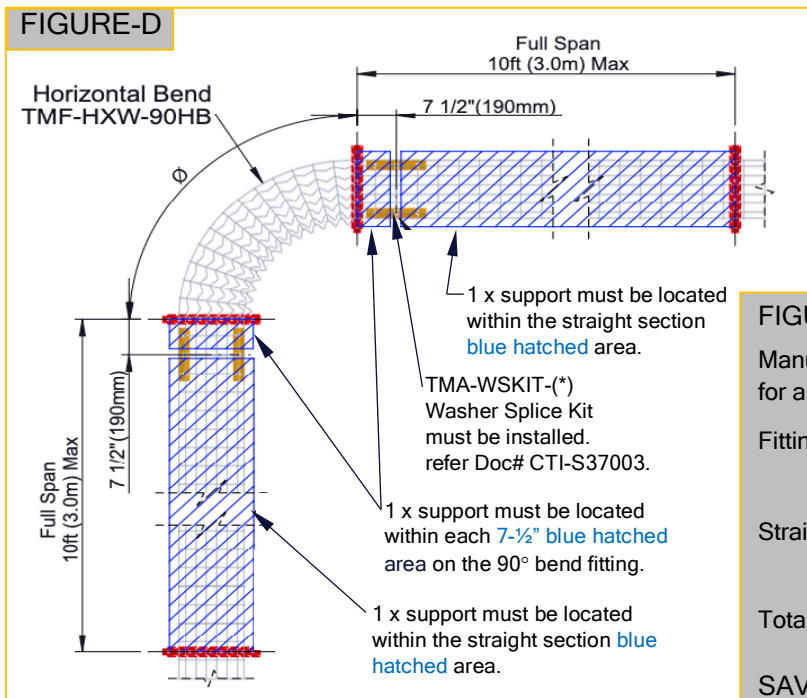


FIGURE-D
 Manufacturer Recommended support locations for a 90° engineered horizontal bend fitting.
 Fitting 90° Bend = 1 x support located in each **7-1/2 inch hatched** area on the 90° bend fitting.
 Straight Section = 1 x support located within each **10ft hatched** area.
 Total Support Qty = 2
 SAVINGS VALUE =



A. Engineered C2G 45° Horizontal Bend: TRADITIONAL VE 2 SUPPORT

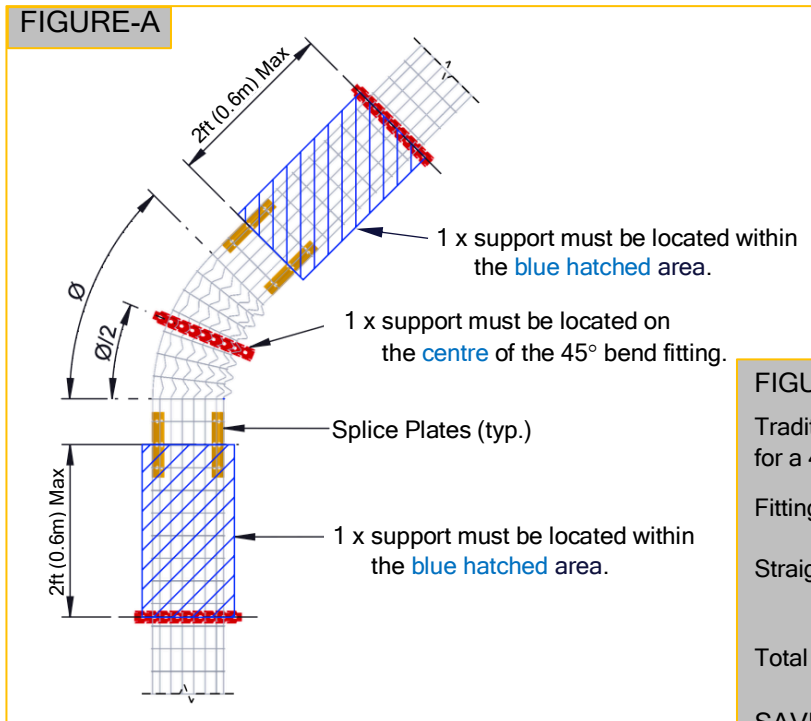


FIGURE-A

Traditional NEMA VE-2 support locations for a 45° engineered horizontal bend fitting.

Fitting 45° Bend = 1 x support located on the **centre** of the 45° bend.
 Straight Section = 1 x support located within each **2ft hatched** area.

Total Support Qty = 3

SAVINGS VALUE = **DS** **MS** **IS**

B. Engineered C2G 45° Horizontal Bend: NO SUPPORT UNDER FITTING

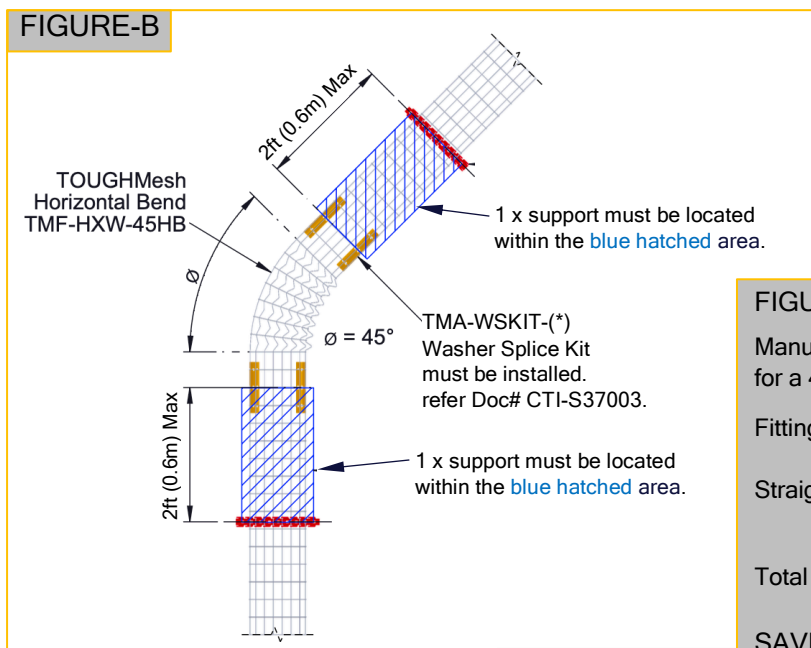


FIGURE-B

Manufacturer Recommended support locations for a 45° engineered horizontal bend fitting.

Fitting 45° Bend = 0 x support located on the **centre** of the 45° bend.
 Straight Section = 1 x support located within each **2ft hatched** area.

Total Support Qty = 2

SAVINGS VALUE = **DS** **MS** **IS**



C. Engineered C2G 45° Horizontal Bend: 1/2-SPAN

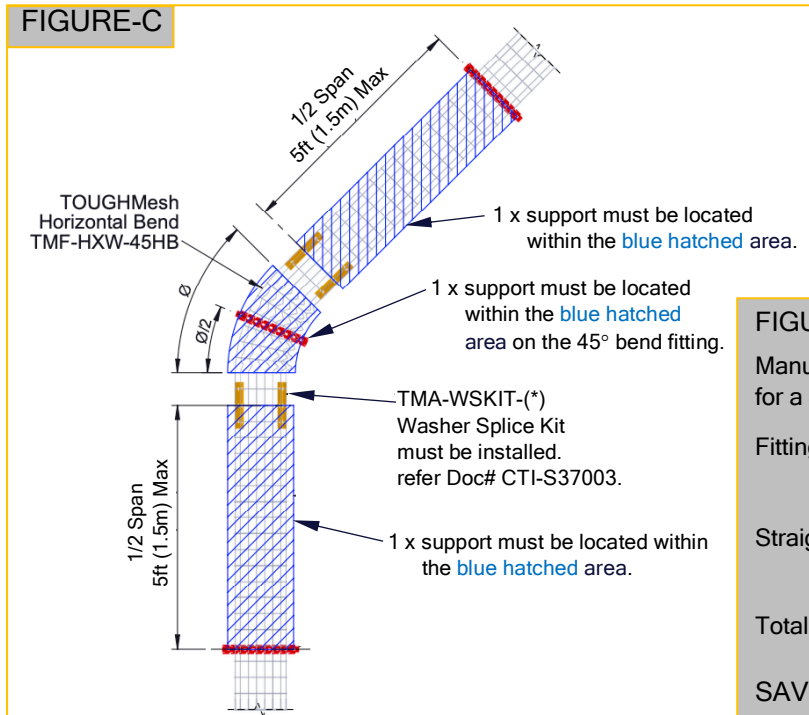


FIGURE-C

Manufacturer Recommended support locations for a 45° engineered horizontal bend fitting.

Fitting 45° Bend = 1 x support located in the **blue hatched area** on the 45° bend fitting.

Straight Section = 1 x support located within each **5ft hatched area**.

Total Support Qty = 1

SAVINGS VALUE =

D. Engineered C2G 45° Horizontal Bend: FULL-SPAN

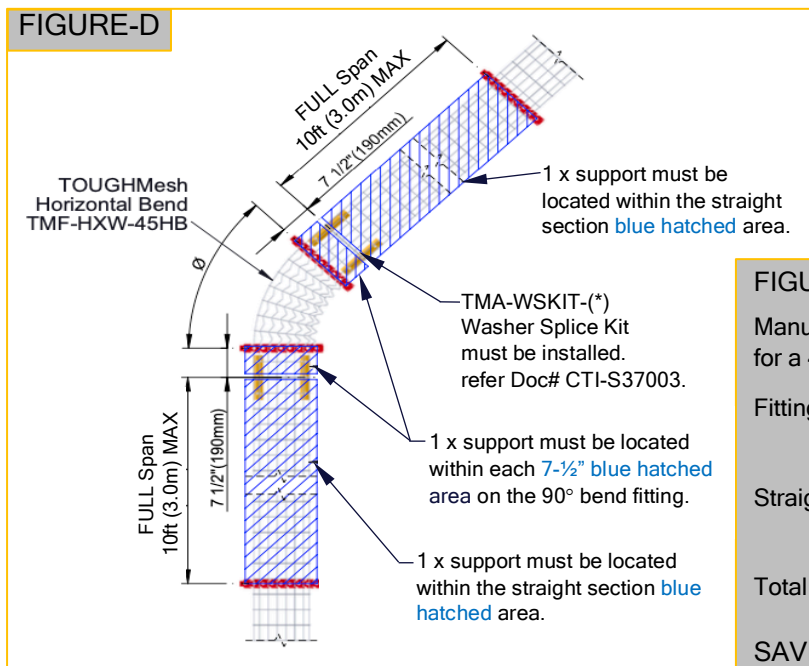


FIGURE-D

Manufacturer Recommended support locations for a 45° engineered horizontal bend fitting.

Fitting 45° Bend = 1 x support located in each **7-1/2" hatched area** on the 45° bend fitting.

Straight Section = 1 x support located within each **10ft hatched area**.

Total Support Qty = 2

SAVINGS VALUE =



2.1 Fabricated Bend Support Locations

TOUGHMesh cable tray is designed to allow for site fabrication of all types of horizontal and vertical bends. TOUGHMesh straight section mesh will be cut, the section bent to shape, and the cut mesh sections spliced together to form a fabricated bend. Cutting mesh tray should follow NEMA VE 2-2018, Section 3.6.2, Fabrication should follow NEMA VE 2-2018, Section 3.6.5

A. Fabricated 60° and 90° Radiused Horizontal Bend

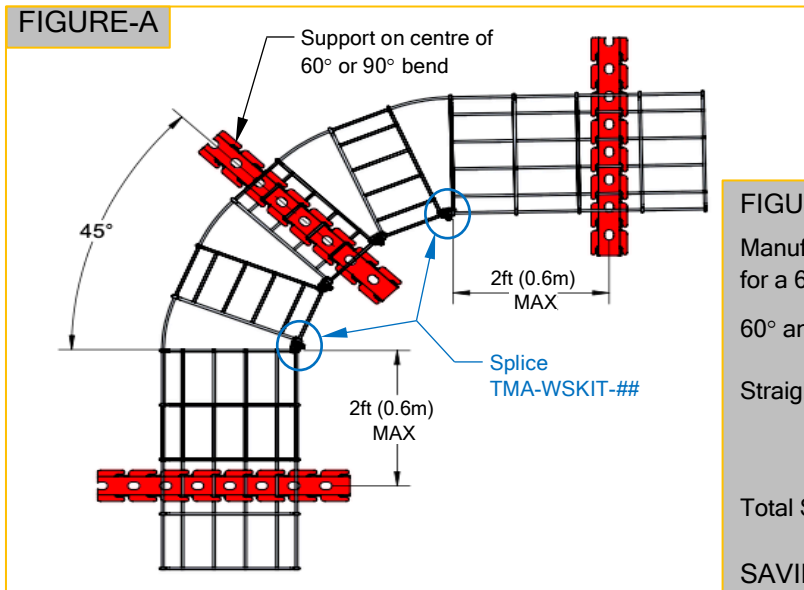


FIGURE-A

Manufacturer Recommended support locations for a 60° and 90° Fabricated Horizontal Bend.
 60° and 90° Bend = 1 x support located on the **centre** of 60° & 90° Bend.
 Straight Section = 1 x support located **each side** within 2ft (0.6m) of splice.

Total Support Qty = 3

SAVINGS VALUE = **DS** **MS** **IS**

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B. Fabricated 30° and 45° Radiused Horizontal Bend

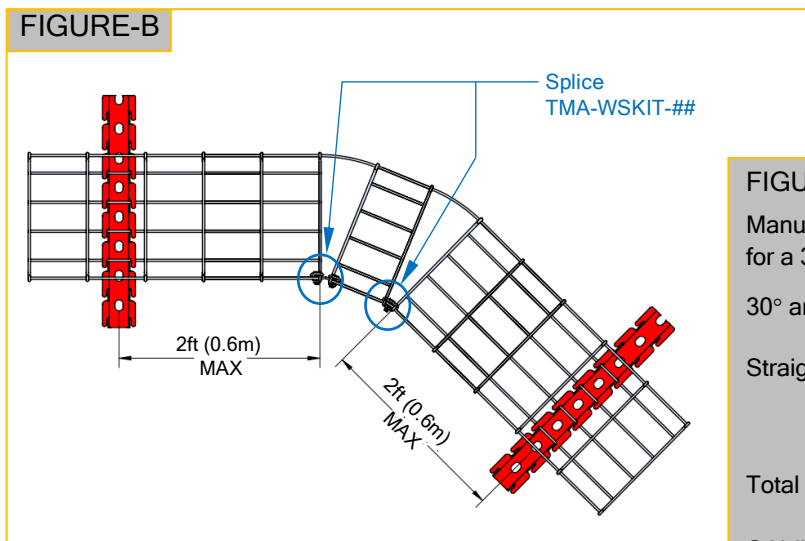


FIGURE-B

Manufacturer Recommended support locations for a 30° and 45° Fabricated Horizontal Bend.
 30° and 45° Bend = 0 x support located on the **centre** of 30° & 45° Bend.
 Straight Section = 1 x support located **each side** within 2ft (0.6m) of splice.

Total Support Qty = 2

SAVINGS VALUE = **DS** **MS** **IS**



C. Fabricated 90° Non-Radiused Horizontal Bend

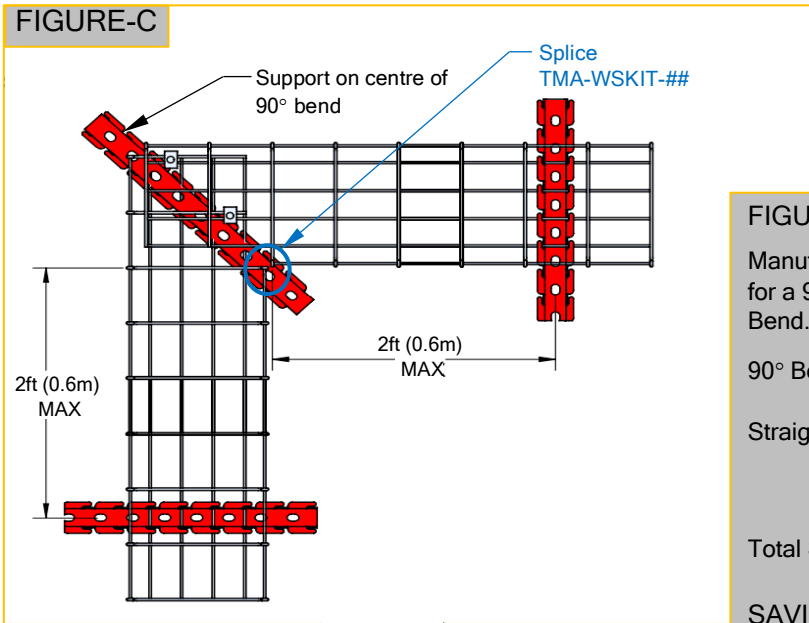


FIGURE-C

Manufacturer Recommended support locations for a 90° Fabricated non-Radiused Horizontal Bend.

- 90° Bend = 1 x support located on the **centre** of the 90° Bend.
- Straight Section = 1 x support located **each side** within **2ft (0.6m)** of splice.

Total Support Qty = 3

SAVINGS VALUE = **DS** **MS** **IS**

INDUSTRY STANDARD PRACTICE

D. Fabricated Horizontal Tee

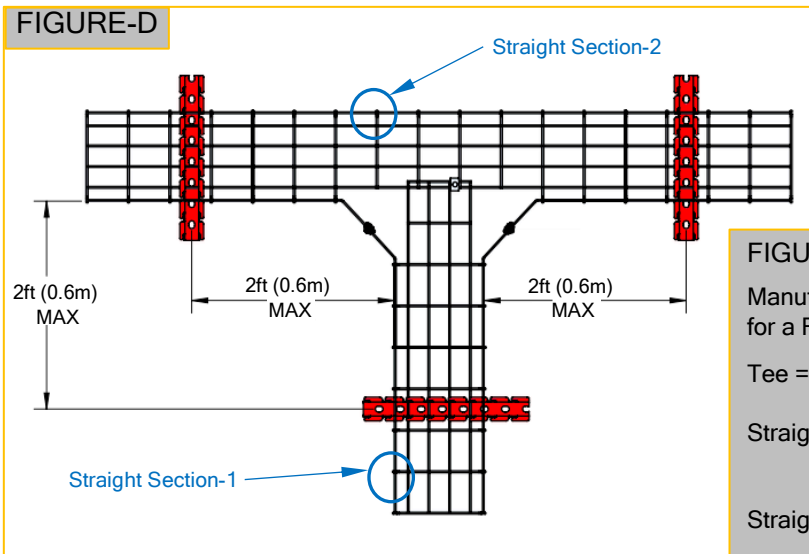


FIGURE-D

Manufacturer Recommended support locations for a Fabricated Horizontal Tee.

- Tee = 0 x support located on the **centre** of the Tee.
- Straight Section-1 = 1 x support located within **2ft (0.6m)** of nearest **side rail** of Section-2.
- Straight Section-2 = 1 x support located each side within **2ft (0.6m)** of nearest **side rail** of Section-1.

Total Support Qty = 3

SAVINGS VALUE = **DS** **MS** **IS**



E. Support Locations for Fabricated Horizontal Cross

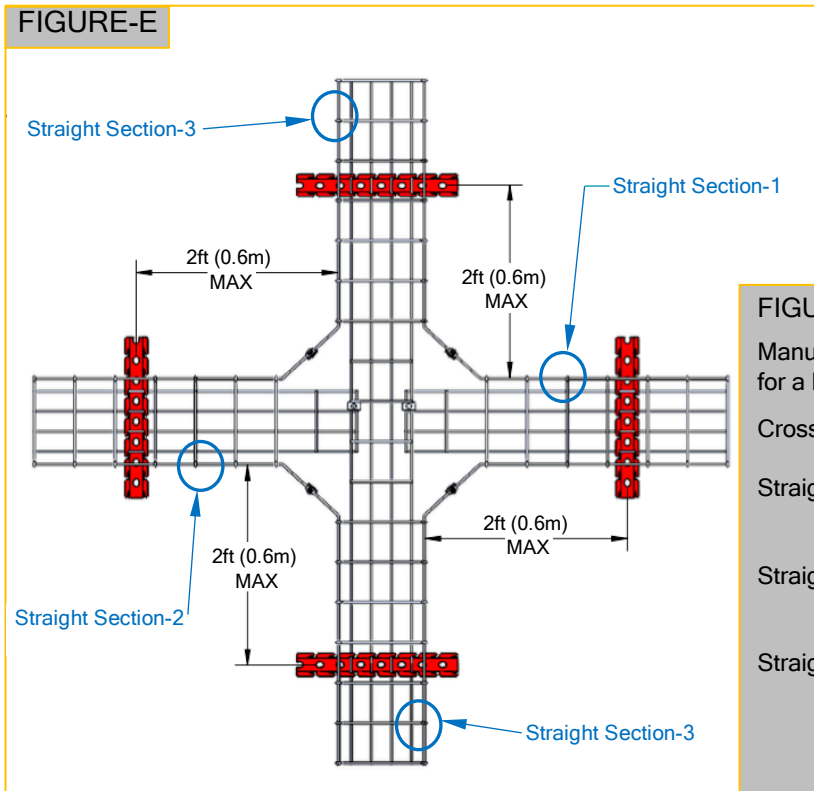


FIGURE-E
 Manufacturer Recommended support locations for a Fabricated Horizontal Cross.

Cross = 0 x support located on the **centre** of the Cross.

Straight Section-1 = 1 x support located within **2ft (0.6m)** of nearest **side rail** of Section-3.

Straight Section-2 = 1 x support located within **2ft (0.6m)** of nearest **side rail** of Section-3.

Straight Section-3 = 1 x support located each side within **2ft (0.6m)** of nearest **side rail** of Section-1 & Section-2.

Total Support Qty = 4

SAVINGS VALUE = **DS** **MS** **IS**

F. Support Locations for Fabricated Horizontal Reducer

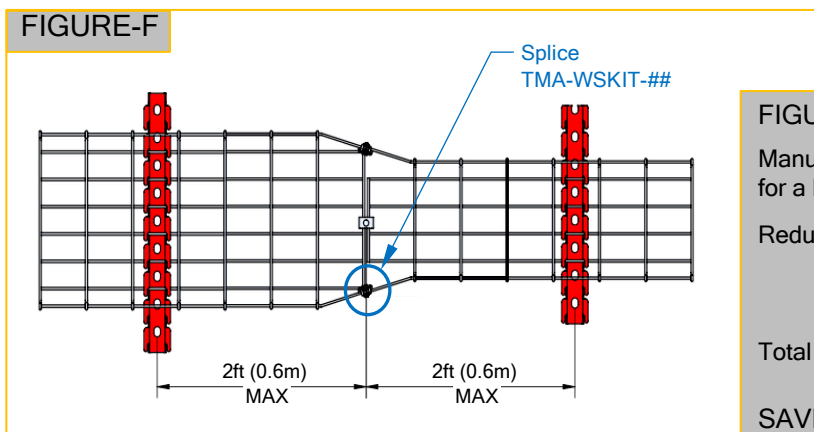


FIGURE-F
 Manufacturer Recommended support locations for a Fabricated Horizontal Reducer.

Reducer = 1 x support located **each side** of the **splice** within **2ft (0.6m)** of the splice.

Total Support Qty = 2

SAVINGS VALUE = **DS** **MS** **IS**

INDUSTRY STANDARD PRACTICE



G. Support Locations for Fabricated 5° to 90° Vertical Outside Bend

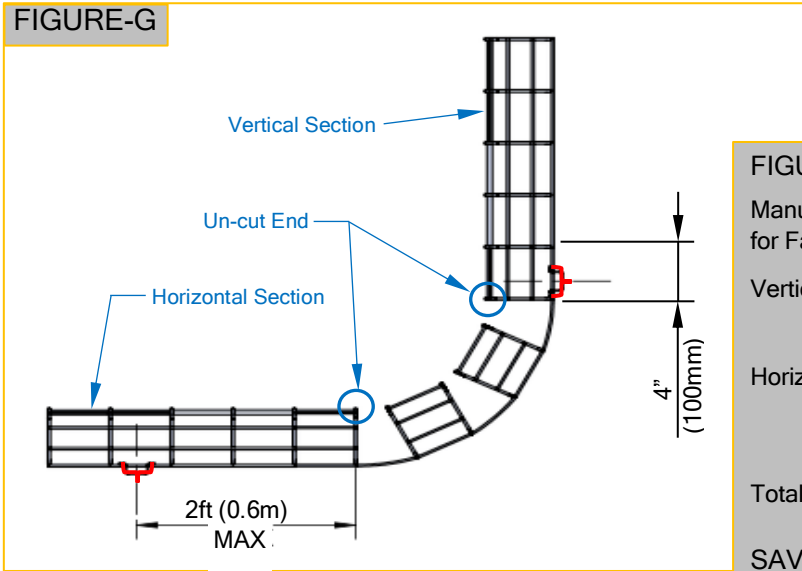


FIGURE-G

Manufacturer Recommended support locations for Fabricated 5° to 90° Vertical Inside Bend.

Vertical Section = 1 x support located within the first 4" (100mm) of mesh tray un-cut end.

Horizontal Section = 1 x support located within 2ft (0.6m) of the mesh tray un-cut end.

Total Support Qty = 2

SAVINGS VALUE = **DS** **MS** **IS**

INDUSTRY STANDARD PRACTICE

H. Support Locations for Fabricated 5° to 90° Vertical Outside Bend

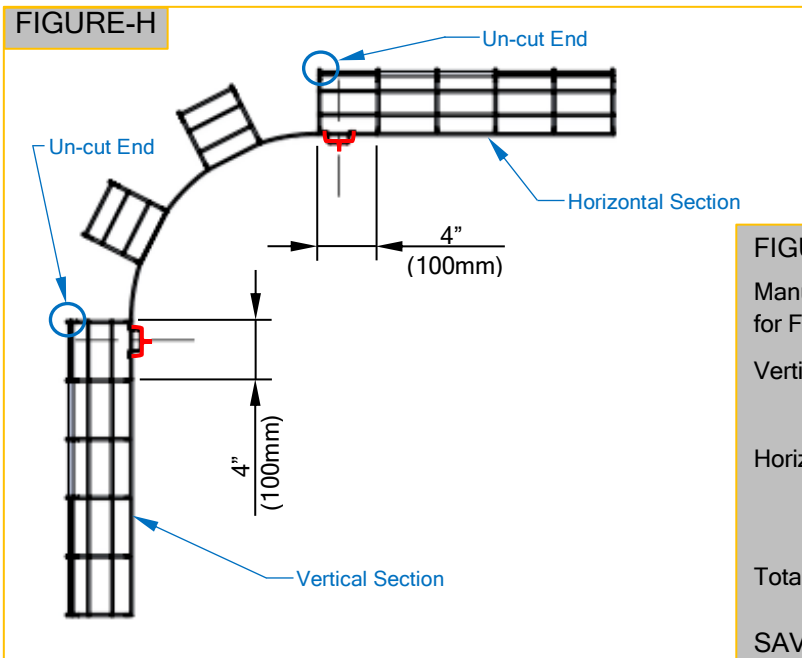


FIGURE-H

Manufacturer Recommended support locations for Fabricated 5° to 90° Vertical Outside Bend.

Vertical Section = 1 x support located within the first 4" (100mm) of un-cut tray mesh.

Horizontal Section = 1 x support located within the first 4" (100mm) of un-cut tray mesh.

Total Support Qty = 2

SAVINGS VALUE = **DS** **MS** **IS**

INDUSTRY STANDARD PRACTICE



Section 3.

TOUGHMesh Cable Tray SUPPORT ASSEMBLIES

TOUGHMesh cable tray supports will themselves need to be connected to the building structure. This could require connection to steelwork or concrete, to the floor, a ceiling or wall. The applications are varied; we therefore provide the following recommendations to aid standardizing the support design.

3.1 OVERHEAD Support for Horizontal Tray Installation: TRAPEZE UNIVERSAL RAPID HANGER

<p>Part# TMA-URH-(W)-(*)</p> <p>TOUGHMesh TMS Series</p>	<p>3/8 All Threaded Rod TA38ATR-(*)</p> <p>3/8 Hex Nut TA38NHX-(*)</p> <p>3/8 Hex Nut TA38NHX-(*)</p> <p>Rapid Hanger TMA-URH-(W)-(*)</p>	<p>SAVINGS VALUE</p> <p>DS</p> <p>MS</p> <p>IS</p>
<p><i>Manufacturer recommended support for installation instructions refer CTI-S50013</i></p>		

3.2 OVERHEAD Support for Horizontal Tray Installation: TRAPEZE TOUGH STRUT CHANNEL

<p>Part# TS2158-(L)-(*)</p> <p>TOUGHMesh TMS Series</p>	<p>3/8 All Threaded Rod TA38ATR-(*)</p> <p>3/8 Hex Nut TA38NHX-(*)</p> <p>3/8 Square Washer TF38WSQ-(*)</p> <p>TOUGHStrut TS2158-(L)-(*)</p>	<p>SAVINGS VALUE</p> <p>DS</p> <p>MS</p> <p>IS</p>
<p><i>Industry standard support method for installation instructions refer CTI-S50042</i></p>		

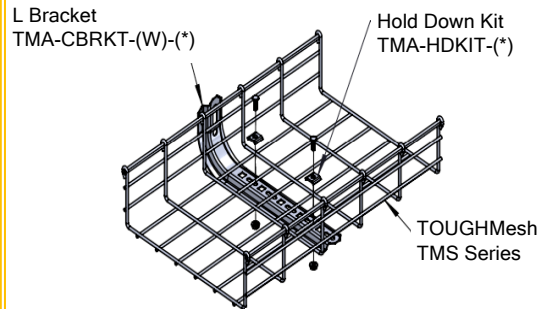
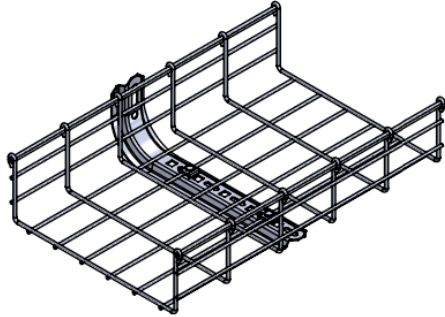
3.3 OVERHEAD Support for Horizontal Tray Installation: UNIVERSAL SUSPENSION CLIP

<p>Part# TMA-USC-(*)</p> <p>Universal Suspension Clip</p> <p>TOUGHMesh TMS Series</p>	<p>1/4 All Threaded Rod TA25ATR-(*)</p> <p>1/4 Hex Nut TA25NHX-(*)</p> <p>1/4 Hex Nut TA25NHX-(*)</p> <p>Suspension Clip TMA-USC-(*)</p>	<p>SAVINGS VALUE</p> <p>DS</p> <p>MS</p> <p>IS</p>
<p><i>Manufacturer recommended support for installation instructions refer CTI-S50015</i></p>		



3.4 WALL Support for Horizontal Tray Installation: L-BRACKET SUPPORT

Part# TMA-LBRKT-(W)-(*)



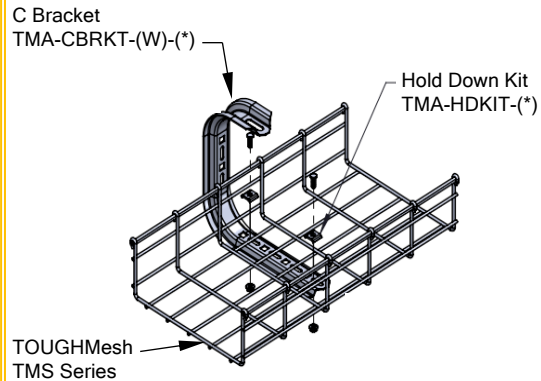
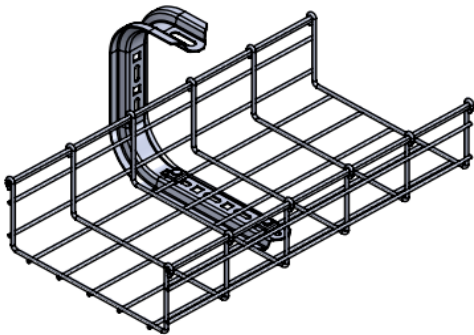
SAVINGS VALUE



Manufacturer recommended support | for installation instructions refer CTI-S50019

3.5 WALL Support for Horizontal Tray Installation: C-BRACKET SUPPORT

Part# TMA-CBRKT-(W)-(*)



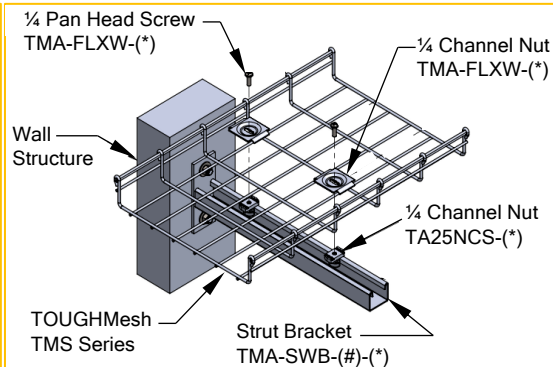
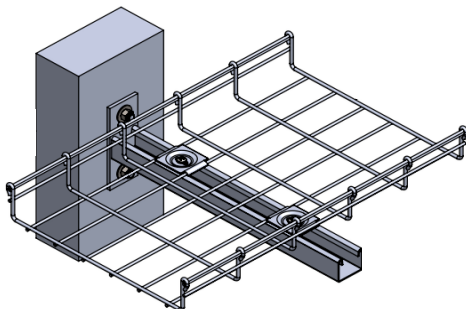
SAVINGS VALUE



Manufacturer recommended support | for installation instructions refer CTI-S50020

3.6 WALL Support for Horizontal Tray Installation: STRUT BRACKET SUPPORT

Part# TMA-SWB-(#)-(*)



SAVINGS VALUE

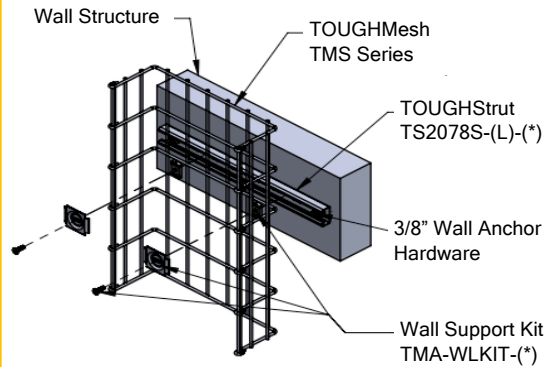
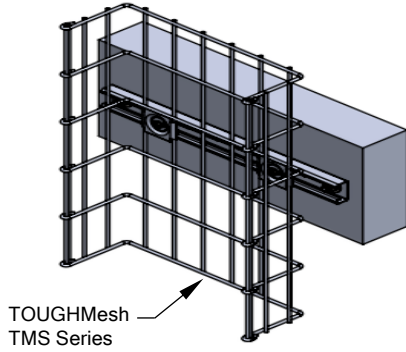


Industry standard support method | for installations instructions refer CTI-S50024



3.7 WALL Support for Vertical Tray Installation: STRUT CHANNEL SUPPORT

Part# TS2078S-(L)-(*)



SAVINGS VALUE

DS

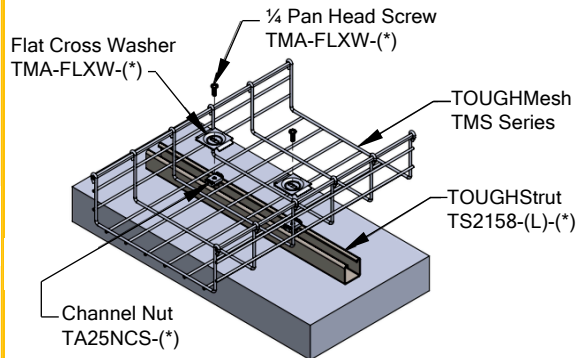
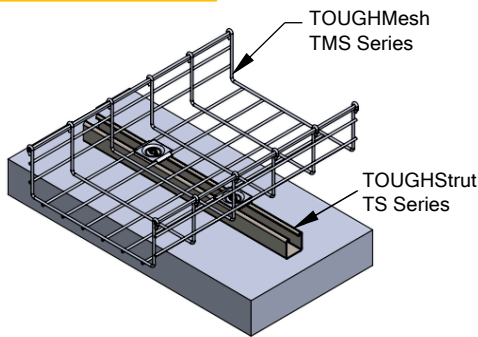
MS

IS

Industry standard support method | for installations instructions refer CTI-S50023

3.8 FLOOR Support for Horizontal Tray Installation: STRUT CHANNEL SUPPORT

Part# TS2158S-(L)-(*)



SAVINGS VALUE

DS

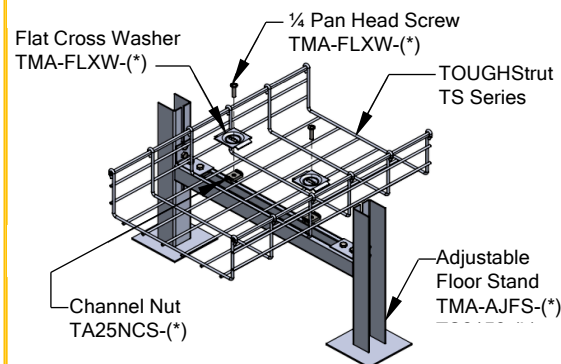
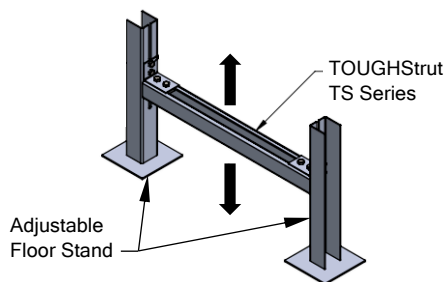
MS

IS

Industry standard support method | for installations instructions refer CTI-S50043

3.9 FLOOR Support for Horizontal Tray Installation: STRUT CHANNEL SUPPORT

Part# TMA-AJFS-(*)



SAVINGS VALUE

DS

MS

IS

Industry standard support method | for installations instructions refer CTI-S50030



Section 4.

TOUGHMesh Cable Tray INSTALLATION INSTRUCTIONS

The installation instructions detailed within this section are to ensure the TOUGHMesh cable tray supports are correctly assembled and installed.

INSTALLATION INSTRUCTION

CTI-S50013_A01



RAPID HANGER (UNIVERSAL)

TMA-URH-(W)-(*)

TOUGHMesh Accessories

STEP 1:

Align the Rapid Hanger, Hex Nut, and Threaded Rod as shown. Once the Assembly is set to the required elevation, torque the hex nut to 19ft-lbs.

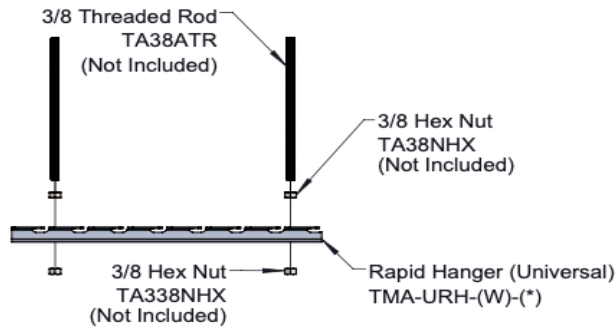


FIGURE 1

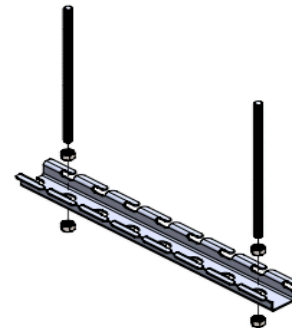


FIGURE 2

STEP 2:

Insert the basket tray bottom longitudinal wire into the Rapid Hanger tab until it will snap/lock shown below.

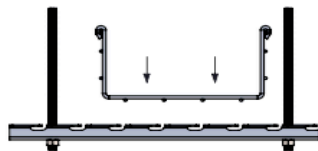


FIGURE 3

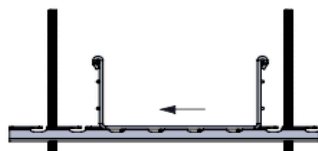


FIGURE 4

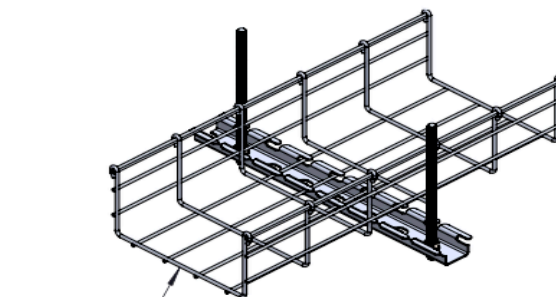


FIGURE 5



INSTALLATION INSTRUCTION CTI-S50042_A02



TRAPEZE HANGER SUPPORT TOUGHMesh Accessories

STEP 1:

Determine the required length of the TOUGHStrut channel based on the width of the TOUGHMesh tray to be supported (See Table 1). Once identified, align the TOUGHStrut Channel, Hex Nut, Square Washer and Threaded Rod as shown in Figure 1.

TOUGHMesh P/N	TOUGHMesh WIDTH (in)	TOUGHStrut P/N	TOUGHStrut LENGTH (in)
TMS-(H)X2X10-(*)	2	TS2158-08-(*)	8
TMS-(H)X4X10-(*)	4	TS2158-10-(*)	10
TMS-(H)X6X10-(*)	6	TS2158-12-(*)	12
TMS-(H)X8X10-(*)	8	TS2158-14-(*)	14
TMS-(H)X10X10-(*)	10	TS2158-16-(*)	16
TMS-(H)X12X10-(*)	12	TS2158-18-(*)	18
TMS-(H)X16X10-(*)	16	TS2158-22-(*)	22
TMS-(H)X18X10-(*)	18	TS2158-24-(*)	24
TMS-(H)X20X10-(*)	20	TS2158-26-(*)	26
TMS-(H)X24X10-(*)	24	TS2158-28-(*)	28

(H) - Insert TOUGHMesh Tray Height (2, 4, 6 H)

(*) - Insert Material/Finish

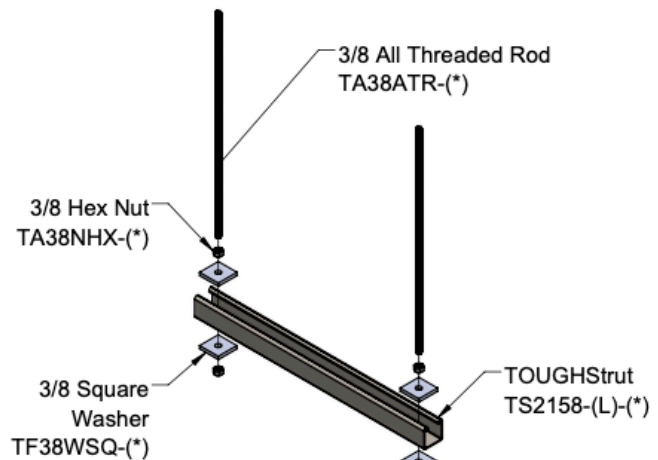


FIGURE 1

STEP 2:

Once the assembly is set to the required elevation, torque the hex nut to 19ft-lbs.

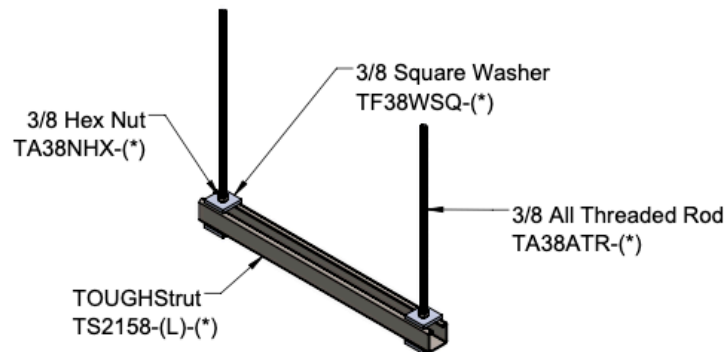


FIGURE 2



INSTALLATION INSTRUCTION

CTI-S50042_A02



CT INNOVATIONS

TRAPEZE HANGER SUPPORT

TOUGHMesh Accessories

STEP 3:

Install the TOUGHMesh tray and align the Flat Cross Washer with the tray bottom wire and install the hardware as shown.

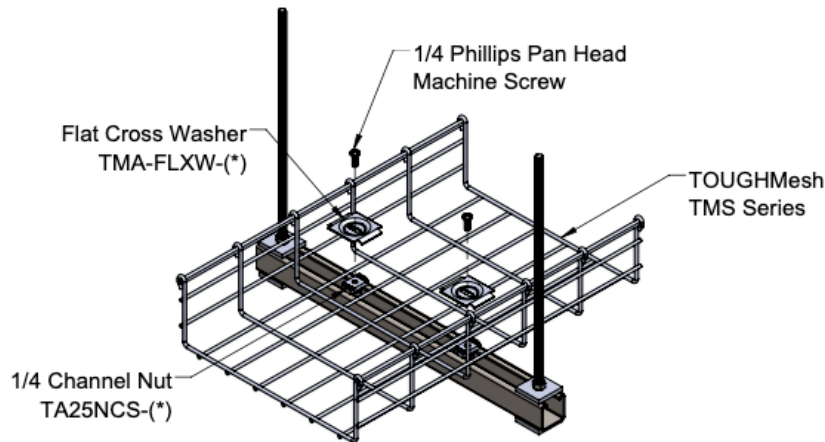


FIGURE 3

STEP 4:

Hold down clamp installation: Torque the hardware to 6ft-lbs.

Hold down expansion guide installation: Torque the hardware to 6ft-lbs, then back off 1/4 turn.

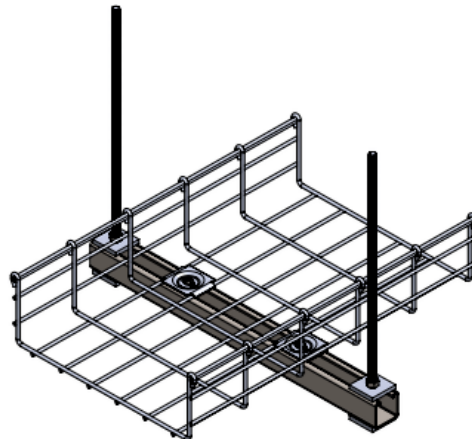


FIGURE 4



INSTALLATION INSTRUCTION

CTI-S50015_A01



CT INNOVATIONS

SUSPENSION CLIP (UNIVERSAL)

TMA-USC-(*)

TOUGHMesh Accessories

STEP 1:

Align the Suspension Clip, Hex Nut, and Threaded Rod as shown. Once the Suspension Clip is set to the required elevation, torque the hex nut to 6ft-lbs.

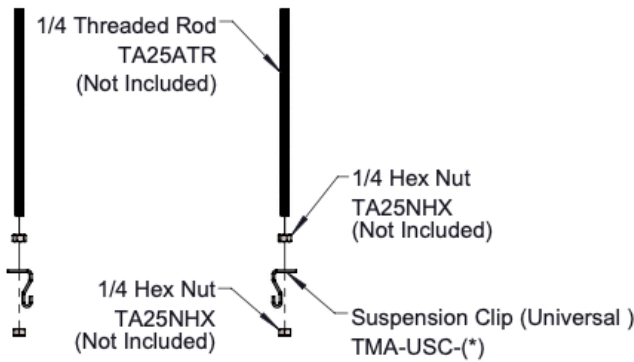


FIGURE 1

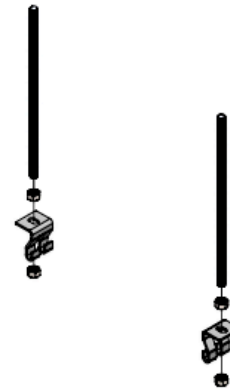


FIGURE 2

STEP 2:

Position the wirebasket siderail to hook up into the Suspension Clip as shown below.

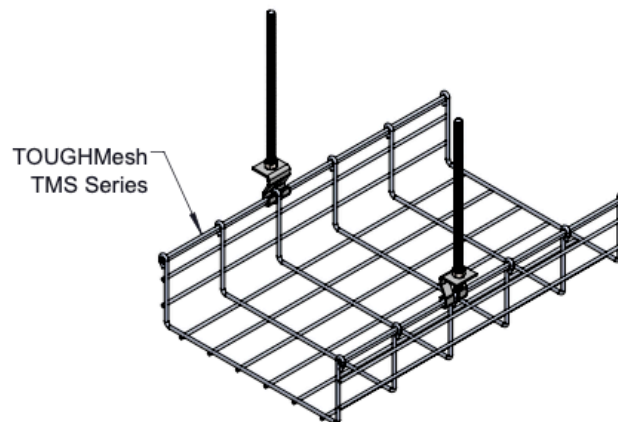


FIGURE 3



INSTALLATION INSTRUCTION

CTI-S50019_A02



CT INNOVATIONS

L BRACKET TMA-LBRKT-(W)-(*) TOUGHMesh Accessories

STEP 1:

Align the hold down kit with the bottom longitudinal wire of the TOUGHMesh and L bracket slot holes, then install the hardware as shown below. Refer to Table 1 for the required hold down kit quantity and L bracket part number based on the size of the TOUGHMesh tray.

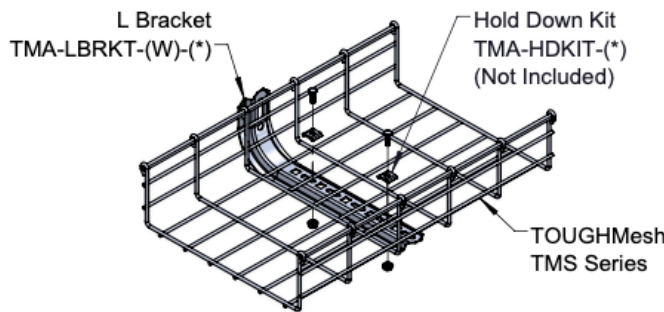


FIGURE 1

TABLE 1			
L BRACKET P/N	TOUGHMesh P/N	TOUGHMesh WIDTH (in)	HOLD DOWN KIT QTY TMA-HDKIT-(*)
TMA-LBRKT-04-(*)	TMS-(H)X4X10-(*)	4	1
TMA-LBRKT-06-(*)	TMS-(H)X6X10-(*)	6	2
TMA-LBRKT-08-(*)	TMS-(H)X8X10-(*)	8	2
TMA-LBRKT-10-(*)	TMS-(H)X10X10-(*)	10	2
TMA-LBRKT-12-(*)	TMS-(H)X12X10-(*)	12	2
TMA-LBRKT-16-(*)	TMS-(H)X16X10-(*)	16	2
TMA-LBRKT-18-(*)	TMS-(H)X18X10-(*)	18	2
TMA-LBRKT-20-(*)	TMS-(H)X20X10-(*)	20	2
TMA-LBRKT-24-(*)	TMS-(H)X24X10-(*)	24	2

(H) - Insert TOUGHMesh Tray Height (2, 4, 6 H)
(*) - Insert Material/Finish

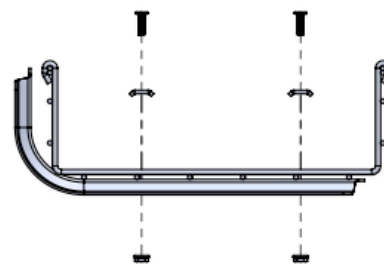


FIGURE 2

STEP 2:

Torque all Hold Down Kit hardware to 6ft-lbs.



FIGURE 3

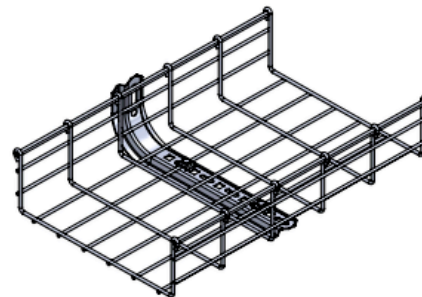


FIGURE 4



INSTALLATION INSTRUCTION

CTI-S50020_A01



CT INNOVATIONS

C BRACKET TMA-CBRKT-(W)-(*) TOUGHMesh Accessories

STEP 1:

Align the hold down kit with the bottom longitudinal wire of the TOUGHMesh and C bracket slot holes, then install the hardware as shown below. Refer to Table 1 for the required hold down kit quantity and C bracket part number based on the size of the TOUGHMesh tray.

L BRACKET P/N	TOUGHMesh P/N	TOUGHMesh WIDTH (in)	HOLD DOWN KIT QTY TMA-HDKIT-(*)
TMA-CBRKT-04-(*)	TMS-(H)X4X10-(*)	4	1
TMA-CBRKT-06-(*)	TMS-(H)X6X10-(*)	6	2
TMA-CBRKT-08-(*)	TMS-(H)X8X10-(*)	8	2
TMA-CBRKT-10-(*)	TMS-(H)X10X10-(*)	10	2

(H) - Insert TOUGHMesh Tray Height (2, 4, 6 H)
(*) - Insert Material/Finish

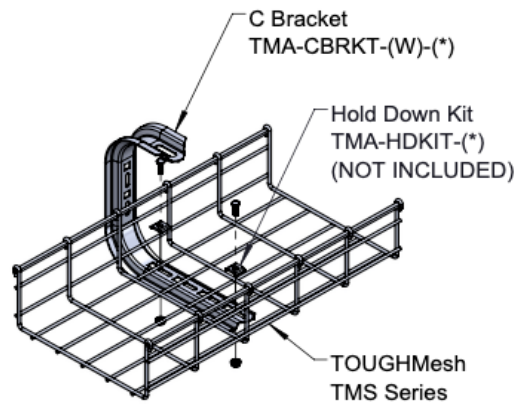


FIGURE 2

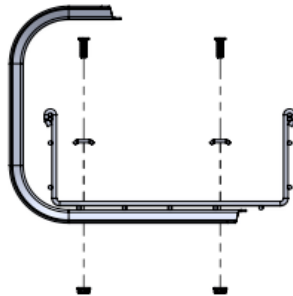


FIGURE 1

STEP 2:

Torque all Hold Down Kit hardware to 6ft-lbs.

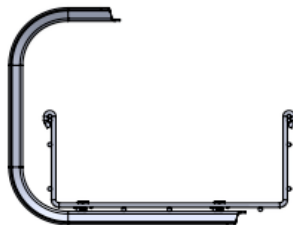


FIGURE 3

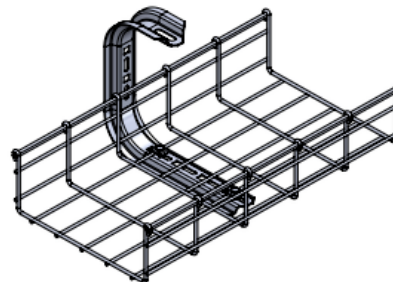


FIGURE 4



INSTALLATION INSTRUCTION

CTI-S50024_A03



STRUT WALL BRACKET

TMA-SWB-#-(*)

TOUGHMesh Accessories

STEP 1:

Determine the required size of the strut wall bracket based on the width of the cable tray to be supported and install as shown below using 3/8 anchor (to be ordered separately).

TABLE 1		
STRUT WALL BRACKET P/N	TOUGHMesh P/N	TOUGHMesh WIDTH (in)
TMA-SWB-04-(*)	TMS-(H)X2X10-(*)	2
TMA-SWB-04-(*)	TMS-(H)X4X10-(*)	4
TMA-SWB-06-(*)	TMS-(H)X6X10-(*)	6
TMA-SWB-08-(*)	TMS-(H)X8X10-(*)	8
TMA-SWB-10-(*)	TMS-(H)X10X10-(*)	10
TMA-SWB-12-(*)	TMS-(H)X12X10-(*)	12
TMA-SWB-16-(*)	TMS-(H)X16X10-(*)	16
TMA-SWB-18-(*)	TMS-(H)X18X10-(*)	18
TMA-SWB-20-(*)	TMS-(H)X20X10-(*)	20
TMA-SWB-24-(*)	TMS-(H)X24X10-(*)	24

(H) - Insert TOUGHMesh Tray Height (2, 4, 6 H)
 (*) - Insert Material/Finish

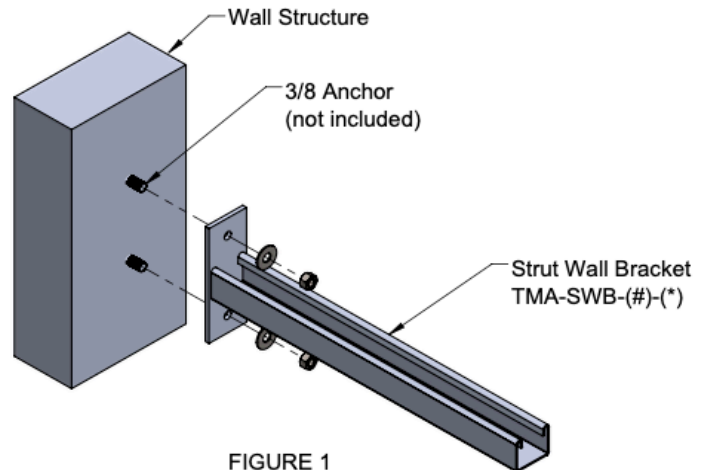


FIGURE 1

STEP 2:

Torque 3/8 anchor nuts to 19ft-lbs.

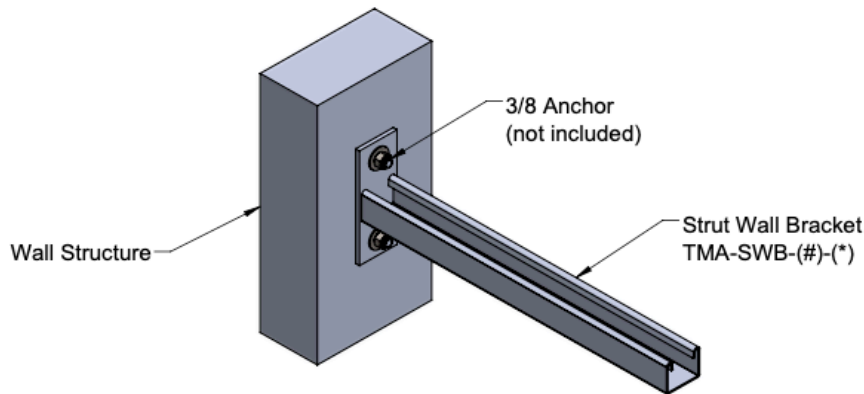


FIGURE 2



INSTALLATION INSTRUCTION

CTI-S50024_A03



CT INNOVATIONS

STRUT WALL BRACKET

TMA-SWB-#)-(*)

TOUGHMesh Accessories

STEP 3:

Install the TOUGHMesh tray and secure it with flat cross washer and install the hardware as shown below.

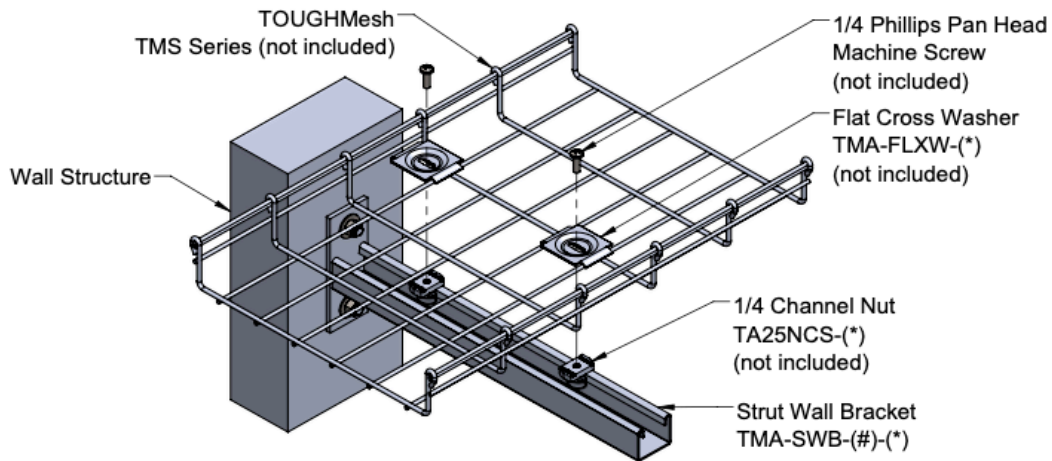


FIGURE 3

STEP 4:

Hold down clamp installation: Torque the hardware to 6ft-lbs.

Hold down expansion guide installation: Torque the hardware to 6ft-lbs, then back off 1/4 turn.

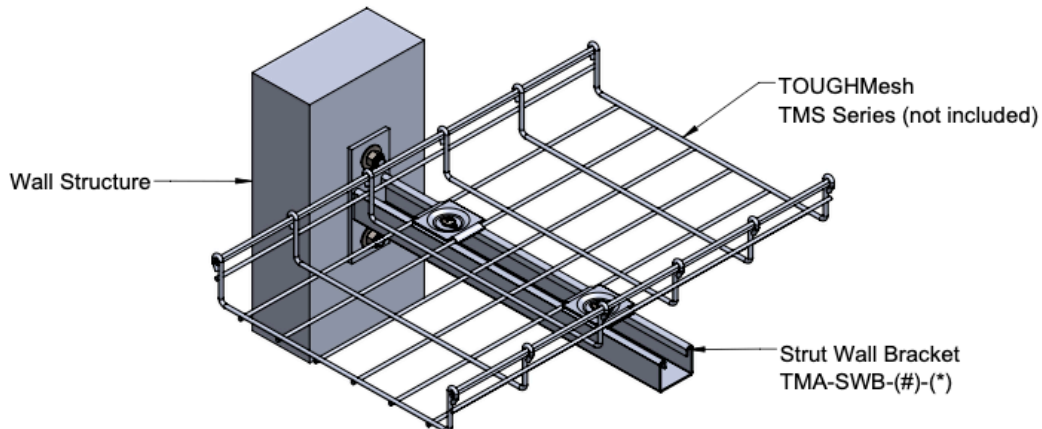


FIGURE 4



INSTALLATION INSTRUCTION

CTI-S50023_A03



CT INNOVATIONS

WALL SUPPORT KIT TMA-WLKIT-(*)

TOUGHMesh Accessories

TOUGHMesh TRAY INSTALLED PARALLEL TO THE WALL

STEP 1:

Identify the required length of the strut channel based on the width of the cable tray to be supported (See Table 1).

Align the Flat Cross Washer with wire basket tray bottom wire and install the hardware as shown in Figure 1.

Hold down clamp installation: Locate the flat cross washer right next to the transverse wire, see Detail A.

Hold down expansion guide installation: Locate the flat cross washer in between the transverse wires, see Detail B.

TABLE 1				
TOUGHMesh P/N	TOUGHMesh WIDTH (in)	TOUGHStrut P/N	TOUGHStrut LENGTH (in)	WALL SUPPORT KIT QTY TMA-WLKIT-(*)
TMS-(H)X2X10-(*)	2	TS2078S-08-(*)	8	1
TMS-(H)X4X10-(*)	4	TS2078S-10-(*)	10	1
TMS-(H)X6X10-(*)	6	TS2078S-12-(*)	12	1
TMS-(H)X8X10-(*)	8	TS2078S-14-(*)	14	1
TMS-(H)X10X10-(*)	10	TS2078S-16-(*)	16	1
TMS-(H)X12X10-(*)	12	TS2078S-18-(*)	18	1
TMS-(H)X16X10-(*)	16	TS2078S-22-(*)	22	1
TMS-(H)X18X10-(*)	18	TS2078S-24-(*)	24	1
TMS-(H)X20X10-(*)	20	TS2078S-26-(*)	26	1
TMS-(H)X24X10-(*)	24	TS2078S-28-(*)	28	1

(H) - Insert TOUGHMesh Tray Height (2, 4, 6 H)

(*) - Insert Material/Finish

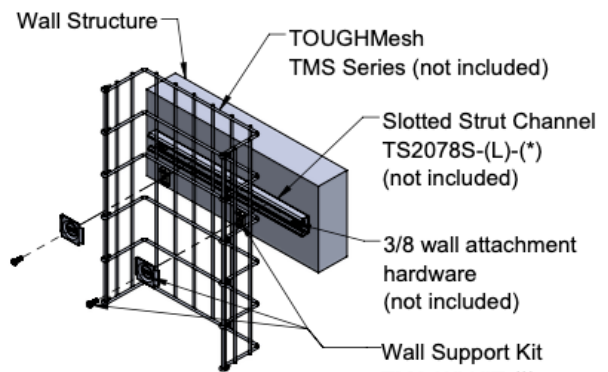


FIGURE 1

Includes:
2 pc TMA-FLXW-(*)
2 pc TA25NC-(*)
2 pc TA25PHM075-(*)

STEP 2:

Hold down clamp installation: Torque the hardware to 6ft-lbs.

Hold down expansion guide installation: Torque the hardware to 6ft-lbs, then back off 1/4 turn.

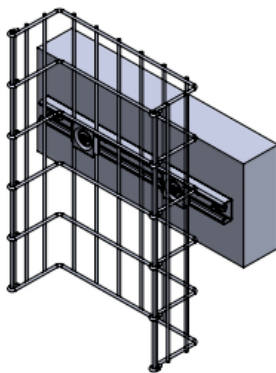
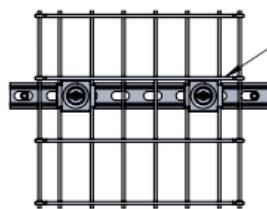
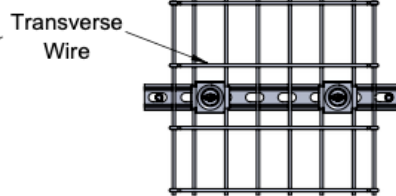


FIGURE 2



DETAIL A
(Hold Down Clamp)



DETAIL B
(Hold Down Expansion Guide)



INSTALLATION INSTRUCTION

CTI-S50043_A02



FLOOR MOUNTED SUPPORT

TOUGHMesh Accessories

STEP 1:

Identify the required length of the TOUGHStrut channel (See Table 1) based on the width of the cable tray to be supported and install as shown below using 3/8 anchor.

TABLE 1			
TOUGHMesh P/N	TOUGHMesh WIDTH (in)	TOUGHStrut P/N	TOUGHStrut LENGTH (in)
TMS-(H)X2X10-(*)	2	TS2158-08-(*)	8
TMS-(H)X4X10-(*)	4	TS2158-10-(*)	10
TMS-(H)X6X10-(*)	6	TS2158-12-(*)	12
TMS-(H)X8X10-(*)	8	TS2158-14-(*)	14
TMS-(H)X10X10-(*)	10	TS2158-16-(*)	16
TMS-(H)X12X10-(*)	12	TS2158-18-(*)	18
TMS-(H)X16X10-(*)	16	TS2158-22-(*)	22
TMS-(H)X18X10-(*)	18	TS2158-24-(*)	24
TMS-(H)X20X10-(*)	20	TS2158-26-(*)	26
TMS-(H)X24X10-(*)	24	TS2158-28-(*)	28

(H) - Insert TOUGHMesh Tray Height (2, 4, 6 H)
 (*) - Insert Material/Finish

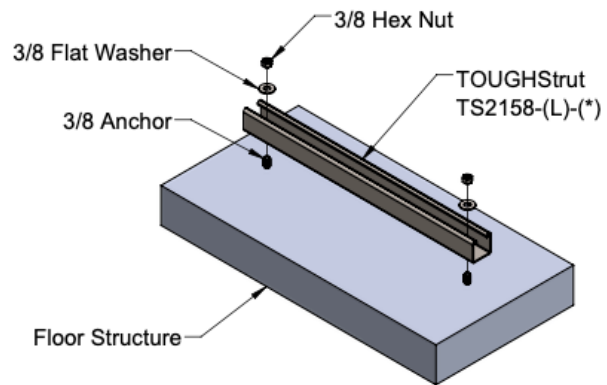


FIGURE 1

STEP 2:

Torque anchor nuts to 19ft-lbs.

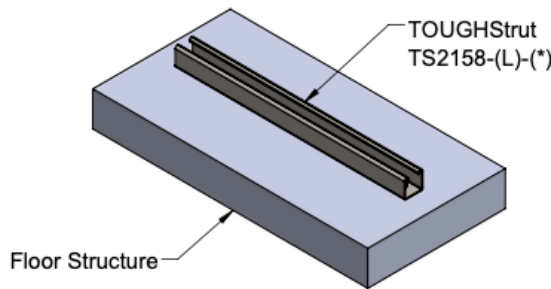


FIGURE 2



INSTALLATION INSTRUCTION

CTI-S50043_A02



CT INNOVATIONS

FLOOR MOUNTED SUPPORT

TOUGHMesh Accessories

STEP 3:

Install the TOUGHMesh tray and align the Flat Cross Washer with the tray bottom wire and install the hardware as shown.

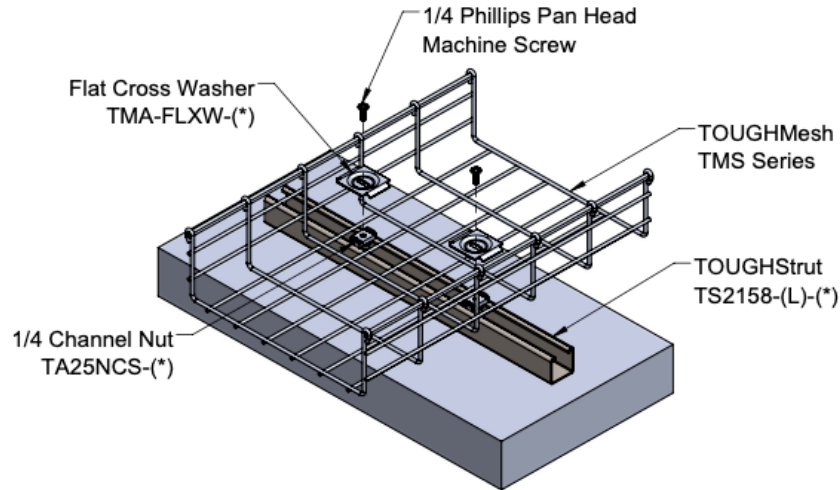


FIGURE 3

STEP 4:

Hold down clamp installation: Torque the hardware to 6ft-lbs.

Hold down expansion guide installation: Torque the hardware to 6ft-lbs, then back off 1/4 turn.

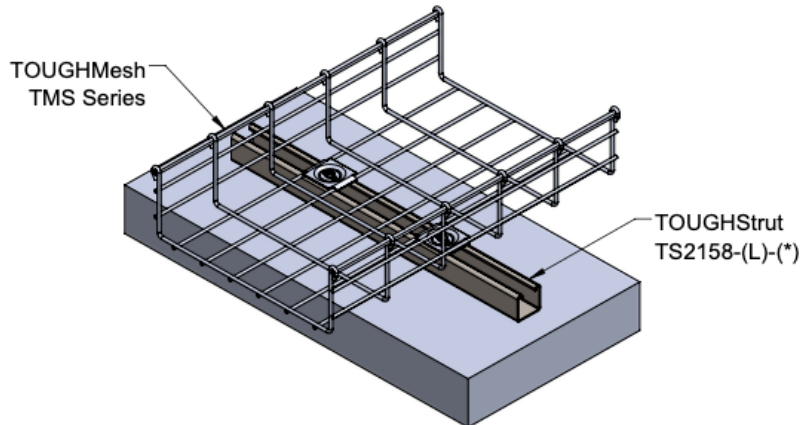


FIGURE 4



INSTALLATION INSTRUCTION

CTI-S50030_A01



CT INNOVATIONS

ADJUSTABLE FLOOR STAND

TMA-AJFS-(*)

TOUGHMesh Accessories

STEP 1:

Determine the required length of the TOUGHStrut channel based on the width of the cable tray to be supported (See Table 1) and install the hardware as shown in Figure 1. Torque the hardware to 6ft-lbs.

TABLE 1			
TOUGHMesh P/N	TOUGHMesh WIDTH (in)	TOUGHStrut P/N	TOUGHStrut LENGTH (in)
TMS-(H)X2X10-(*)	2	TS2158-08-(*)	8
TMS-(H)X4X10-(*)	4	TS2158-10-(*)	10
TMS-(H)X6X10-(*)	6	TS2158-12-(*)	12
TMS-(H)X8X10-(*)	8	TS2158-14-(*)	14
TMS-(H)X10X10-(*)	10	TS2158-16-(*)	16
TMS-(H)X12X10-(*)	12	TS2158-18-(*)	18
TMS-(H)X16X10-(*)	16	TS2158-22-(*)	22
TMS-(H)X18X10-(*)	18	TS2158-24-(*)	24
TMS-(H)X20X10-(*)	20	TS2158-26-(*)	26
TMS-(H)X24X10-(*)	24	TS2158-28-(*)	28

(H) - Insert TOUGHMesh Tray Height (2, 4, 6 H)

(*) - Insert Material/Finish

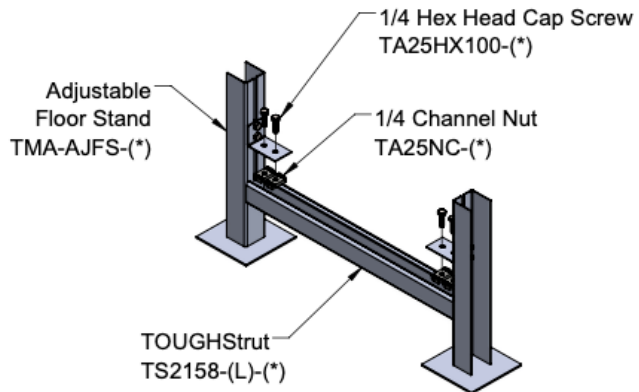


FIGURE 1

STEP 2:

Once the horizontal TOUGHStrut channel is installed on the adjustable floor stand bracket, slide up or down to set the support to the required elevation and torque the side attachment hardware to 6ft-lbs.

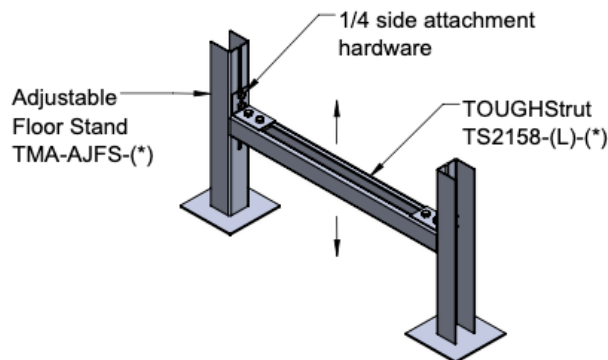


FIGURE 2



INSTALLATION INSTRUCTION

CTI-S5030_A01



CT INNOVATIONS

ADJUSTABLE FLOOR STAND

TMA-AJFS-(*)

TOUGHMesh Accessories

STEP 3:

Install the TOUGHMesh tray and align the Flat Cross Washer with the tray bottom wire and install the hardware as shown.

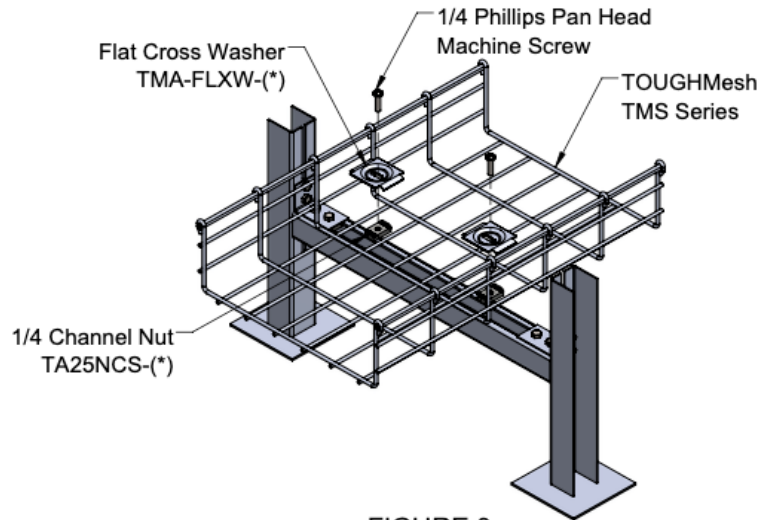


FIGURE 3

STEP 4:

Hold down clamp installation: Torque the hardware to 6ft-lbs.

Hold down expansion guide installation: Torque the hardware to 6ft-lbs, then back off 1/4 turn.

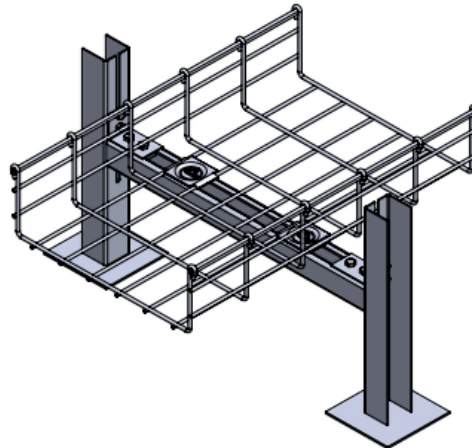


FIGURE 4



INSTALLATION INSTRUCTION

CTI-S5006_A02



CT INNOVATIONS

Expansion Splice Kit

TMA-EXSB-(*)

TOUGHMesh Accessories

STEP 1:

Identify the maximum spacing between expansion joints that provide for 1" (25mm) movement and the required gap settings between cable tray. Refer to Technical Data Sheet document no. CTI-S65001 for the step by step procedure.

STEP 2:

Once the maximum spacing between expansion joints and gap setting are identified, position the wirebasket tray based on the gap setting and install the Expansion Splice Kit as shown below.

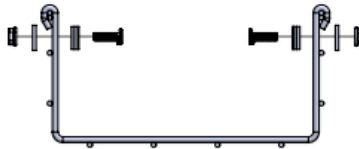


FIGURE 1

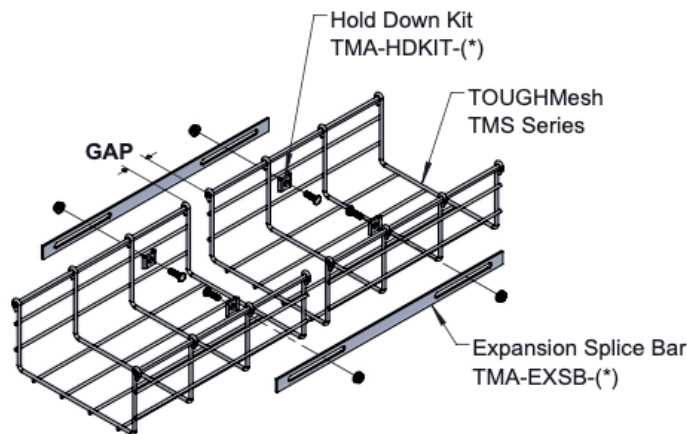


FIGURE 2



INSTALLATION INSTRUCTION

CTI-S50006_A02



CT INNOVATIONS

Expansion Splice Kit TMA-EXSB-(*) TOUGHMesh Accessories

STEP 3:

Torque all Hold Down Kit hardware to 9ft-lbs (12Nm) and back off 1/4 turn.



FIGURE 3

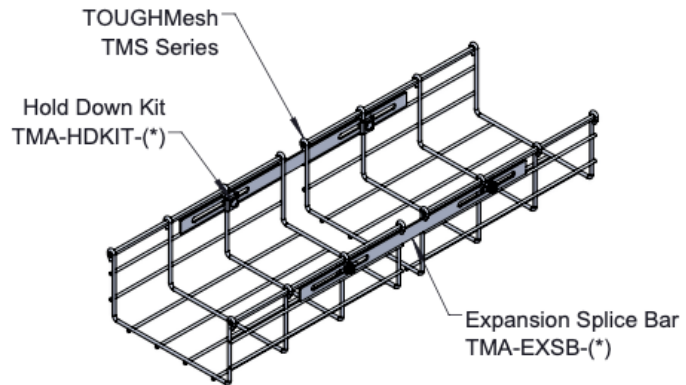


FIGURE 4

Provide support within 2ft on each side of the expansion splice plates and install bonding jumper to maintain electrical continuity as shown in Figure 5. Refer to Document No. CTI-S50010 for ground bolt and bonding jumper installation instructions.

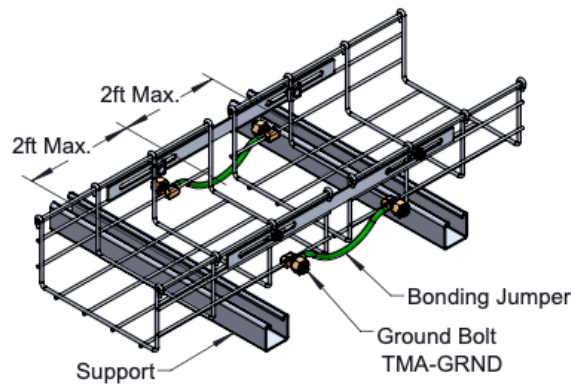


FIGURE 5



INSTALLATION INSTRUCTION

CTI-S50033_A01



CT INNOVATIONS

Expansion Joint Installation

(Mechanically Discontinuous)

STEP 1:

Identify the maximum spacing between expansion joints that provide for 1" (25mm) movement and the required gap settings between cable tray. Refer to Technical Data Sheet document no. CTI-S65001 for the step by step procedure.

STEP 2:

Once the maximum spacing between expansion joints and gap settings are identified, install the wirebasket tray based on these settings. Provide support within 2ft on each side of the expansion joints as shown in Figure 1.

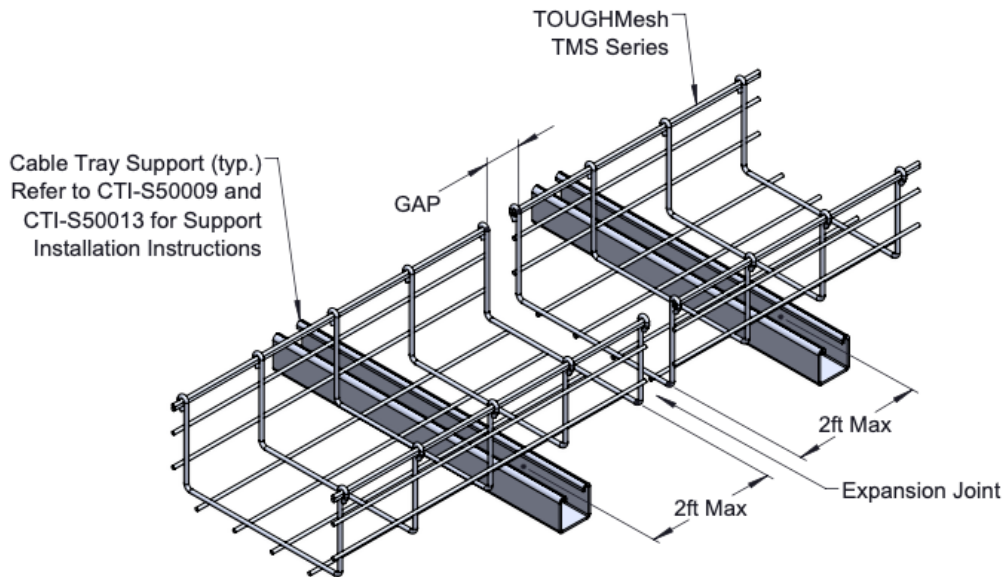


FIGURE 1



INSTALLATION INSTRUCTION

CTI-S50033_A01



CT INNOVATIONS

Expansion Joint Installation (Mechanically Discontinuous)

STEP 3:

Determine the appropriate size of the bonding jumper according to NEC Articles 250 and 392 then install the ground bolt and bonding jumper as shown in Figure 2.

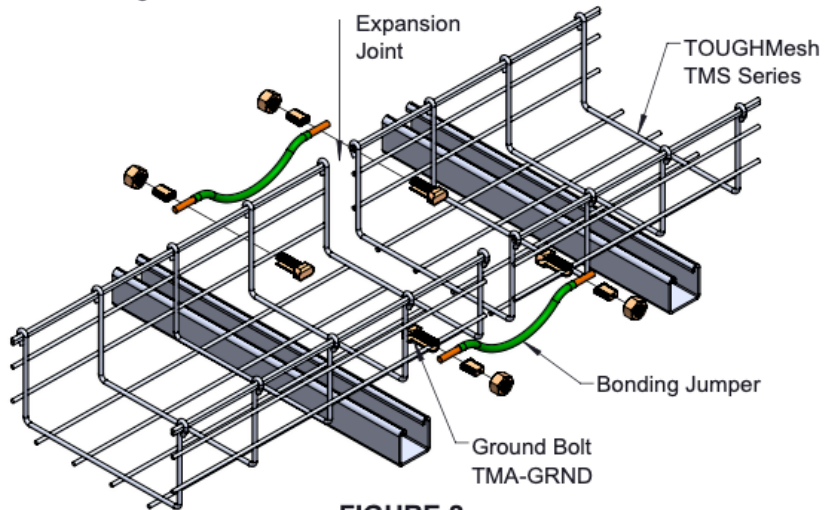


FIGURE 2

STEP 4:

Torque all ground bolt to 19 ft-lbs.

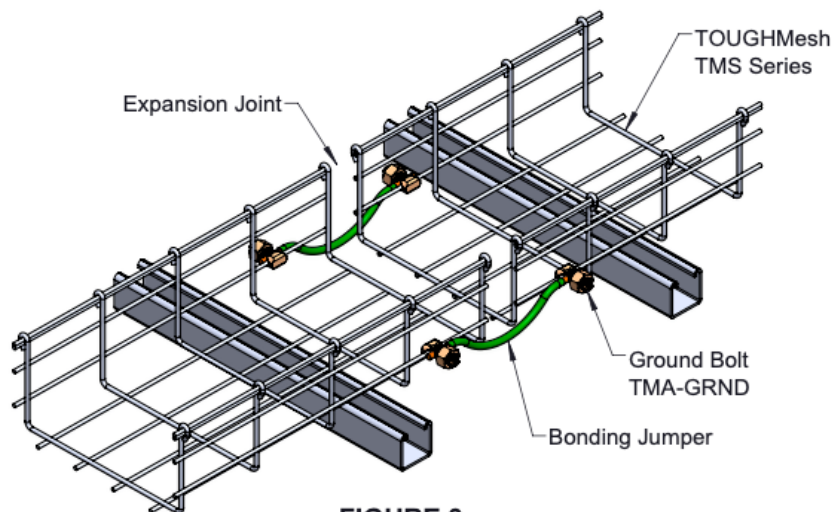


FIGURE 3



INSTALLATION INSTRUCTION

CTI-S50003_A

Washer Splice Kit TMA-WSKIT-(*) TOUGHMesh Accessories

STEP 1:

Align the wirebasket tray and install the Washer Splice Kit as shown below. Refer to Splice Chart for UL Classified Washer Splice Kit quantity.

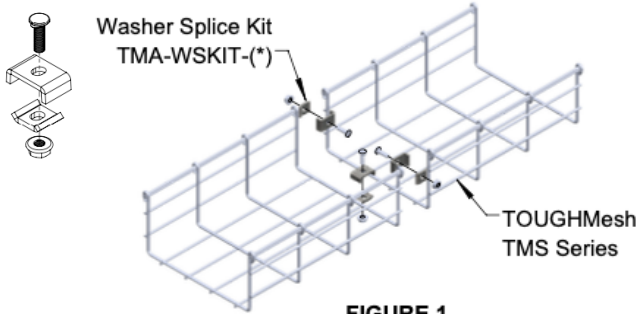


FIGURE 1

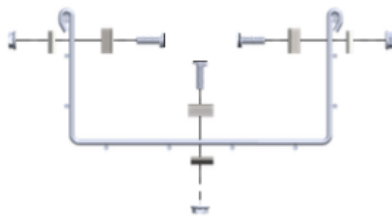


FIGURE 2

SPLICE CHART (UL Classified)		
TRAY SIZE H X W (in)	WASHER SPLICE KIT QTY	
	SIDERAIL	BOTTOM
2X2	2	0
2X4	2	0
2X6	2	0
2X8	2	1
2X10	2	1
2X12	2	1
2X16	2	2
2X18	2	2
2X20	2	2
2X24	2	2
4X4	2	2
4X6	2	2
4X8	2	3
4X10	2	3
4X12	2	4
4X16	2	4
4X18	2	4
4X20	2	5
4X24	2	5
6X8	4	2
6X10	4	2
6X12	4	3
6X16	4	3
6X18	4	3
6X20	4	4
6X24	4	4

STEP 2:

Torque all Washer Splice Kit hardware to 6ft-lbs.

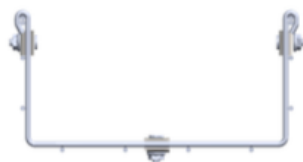


FIGURE 3

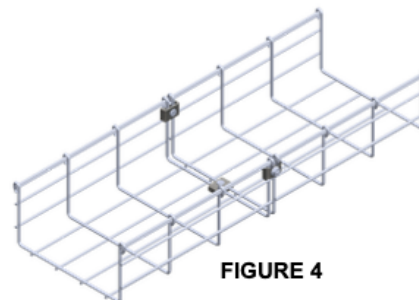


FIGURE 4



INSTALLATION INSTRUCTION

CTI-S50001_A01



Posi-Lok Splice TMA-PLOK-(*) TOUGHMesh Accessories

STEP 1:

Align the wirebasket tray and insert the Posi-Lok splice into the siderail longitudinal wire as shown. Refer to Splice Chart for UL Classified Posi-Lok splice quantity.

SPLICE CHART (UL Classified)	
TRAY SIZE H X W (in)	POSI-LOK SPLICE QTY TMA-PLOK-(*)
2X12	2
2X16	2
2X18	2
2X20	2
2X24	2
4X12	2
4X16	2
4X18	2
4X20	2
4X24	2
6X12	2
6X16	2
6X18	2
6X20	2
6X24	2

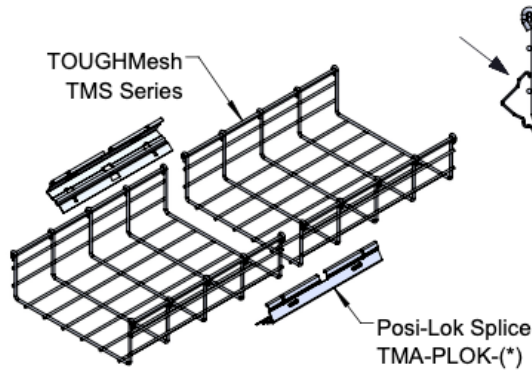


FIGURE 1

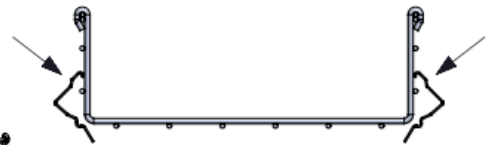


FIGURE 2

STEP 2:

Once the Posi-Lok tab is hook up into the wirebasket siderail longitudinal wire, push the bottom of the Posi-Lok until it will snap into the bottom longitudinal wire as shown below.



FIGURE 3



FIGURE 4

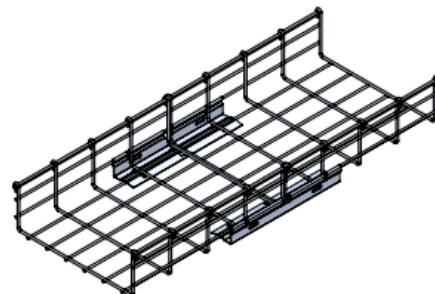


FIGURE 5



INSTALLATION INSTRUCTION

CTI-S50009_A02



CT INNOVATIONS

FLAT CROSS WASHER

TMA-FLXW-(*)

TOUGHMesh Accessories

STEP 1:

Align the Flat Cross Washer with wirebasket tray bottom wire and install the hardware as shown.

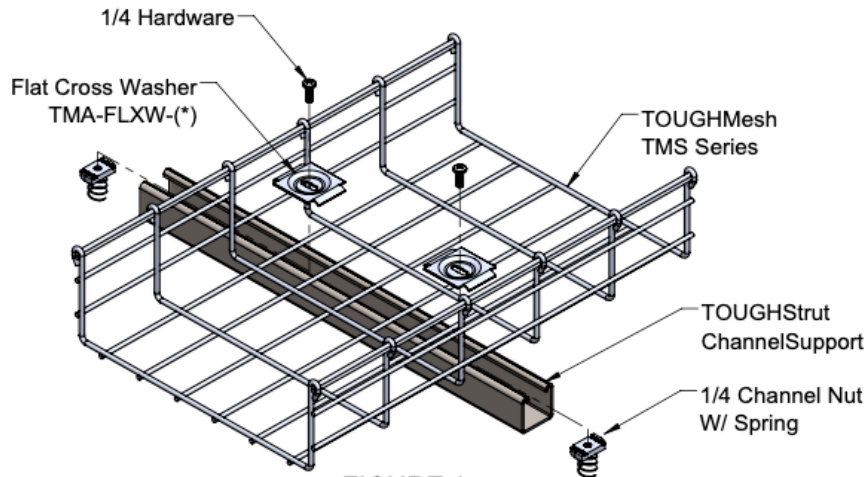


FIGURE 1

STEP 2:

Hold down clamp installation: Torque the hardware to 6ft-lbs.

Hold down expansion guide installation: Torque the hardware to 6ft-lbs, then back off 1/4 turn.

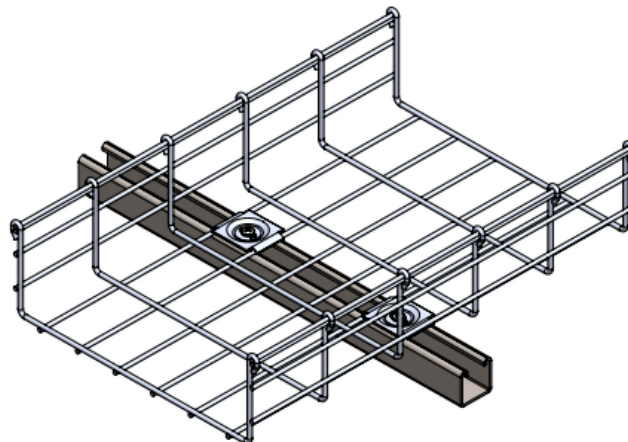


FIGURE 2



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CT INNOVATIONS

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