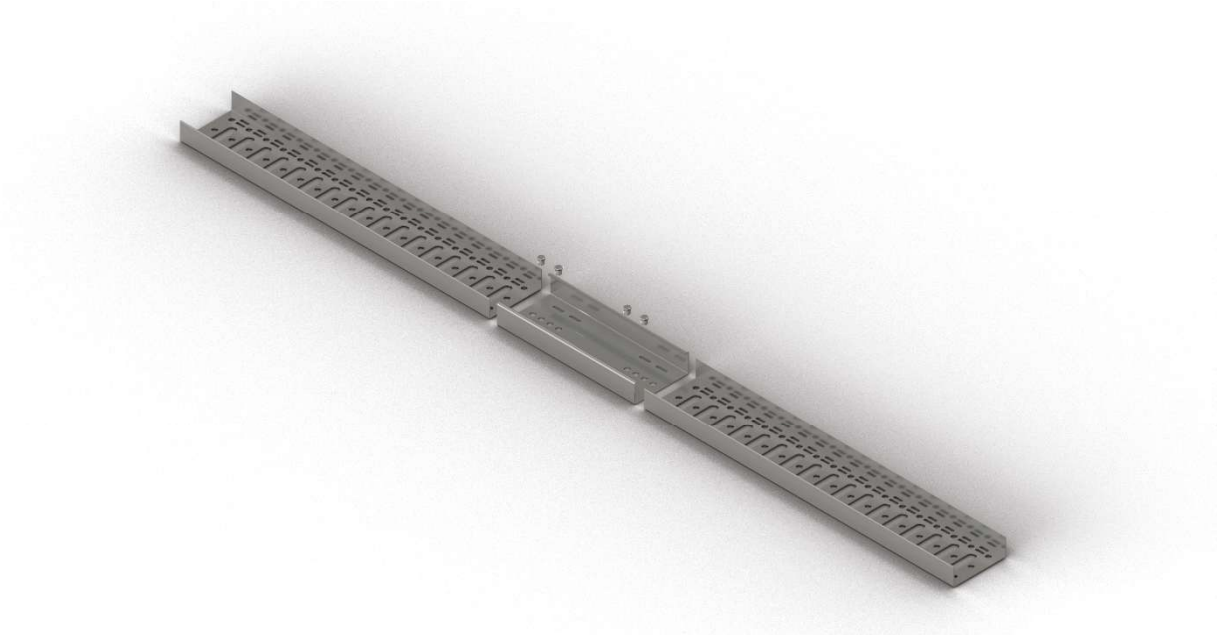
Snap Track



Snap Track Installation Manual

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Introduction

As the use of limited width ventilated channel cable tray has become more prevalent in industry, many questions have arisen. In some cases, ventilated channel tray systems have been misapplied or under applied based on the code requirements for other types of cable tray systems and/or existing end user standards. For these reasons the technical staff of TechLine Mfg. has produced this manual to assist engineers and contractors with the proper understanding and application of the unique Snap Track system.

This manual addresses the many aspects and considerations associated with the intended use of the Snap Track system. If additional information is required or if specific questions arise, please contact TechLine Mfg.

The information contained in this manual has been independently checked for accuracy and is believed to be correct and current. However, no warranty, either expressed or implied, is made as to applicability or compatibility with specific code requirements. In all cases it is the responsibility of the designer or end user to refer to the applicable current codes and/or standards for their specific installation.

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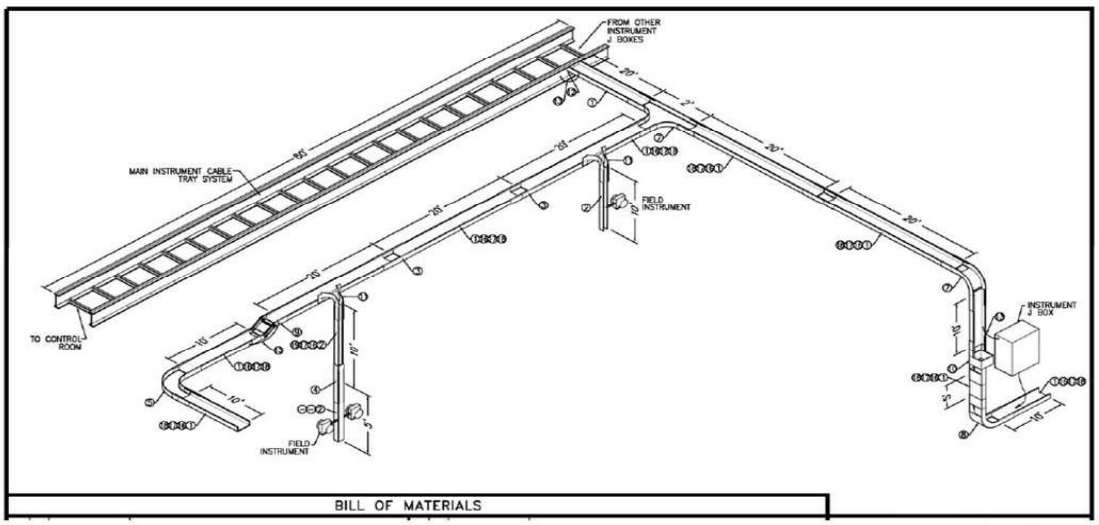
Overview

Background

Snap Track was developed as a limited-width tray system to replace wire basket tray and conduit in an industrial environment. It is stronger, provides better cable protection and reduces installation cost.

Snap Track is:

- An innovative channel tray system providing an adequate degree of cable protection.
- An alternative for transitioning from ladder tray to point of use in an industrial environment while providing an adequate degree of cable protection and dramatically reducing installation cost.
- Snap Track is a unique limited-width, ventilated bottom channel tray, to be used as an alternative to conduit. Snap Track transitions control, power, and instrument cable from ladder tray to point of use, i.e. instruments and motor control stations in an industrial environment.
- Commonly accepted benefits of running channel tray systems in lieu of conduit include
    - Reduced total installed cost
    - Cable accessibility
    - Ease of future modifications
    - Labor and material savings
    - Snap Track is an effective conduit alternative for routing power, control cable, and instrument cable.



Intended Use

The Snap Track tray is a ventilated channel type tray that is available in 2, 4, and 6 inch widths. The tray is an extruded structure having longitudinal side members that are integral with the ventilated bottom. The Snap Track system is an innovative multifaceted UL Classified cable support. The system is classified by UL as suitable for use as an EGC when installed per NEC 2020 article 392. The system is suitable for use with power cables, control cables, or signal cables. Snap Track tray systems are typically used to support:

A) Conductors enclosed in a continuous metal sheath or of the interlocked armor types, and

B) Conductors having exposure rated (ER test rating), non-metallic and moisture resistant insulation. Ventilated bottom trays are considered the best choice for smaller cables in preventing sagging.

C) The Snap Track system is not limited to these uses and is also suitable for non-industrial applications. Snap Track tray is also an ideal product for use as a mechanical support for instrument tubing.

Permitted Usage and Wiring Methods Under NEC.

Usage permitted under NEC section 392.10 – Cable trays are permitted to be used as a support system for service conductors, feeders, branch circuits, communication circuits, control circuits, and signaling circuits. Under this section it is noted that cable tray systems and therefore the Snap Track system is not limited to industrial establishments.

(A) Wiring Methods

The wiring methods in NEC Table 392.10(A) are permitted to be installed in the Snap Track systems under the conditions described in their respective articles and sections. The following guidelines should be followed when installing Snap Track as cable tray system. (Partial most common list)

Table 392.10 (A) Wiring Methods (Partial List- Most Common)

Wiring Method For:	Arti-cle:	Wiring Method For:	Article:
CATV Cables		Network Powered Broadband Communication Cables	
Class 2 and Class 3 Cables		Non-Powered Limited Fire Alarm Cables	
Communication Cables		Optical Fiber Cables	
Fire Alarm Cables		Power and Control Tray Cables	
Instrument Tray Cables		Power Limited Fire Alarm Cables	
Metal Clad Cables			

(B) In Industrial establishments.

The wiring methods in table 392.10 (A) are permitted to be used in any industrial establishment under the conditions described in their respective articles. In industrial establishments only, where conditions of maintenance and supervision ensure that only qualified persons service the installed Snap Track system, any of the cables in 392.10 (B) (1) and (B) (2) shall be permitted to be installed in **ventilated channel trays i.e. Snap Track.**

(B) (1) Single-conductor cables shall be permitted to be installed in accordance with

392.10 (B) (1) (a) through (B) (1) (c).

(a) Single conductor Cable shall be 1/0 AWG or larger and should be of a type listed and marked on the surface for use in channel trays.

(c) Single conductors used as equipment grounding conductors should be insulated, covered, or bar, and should be 4 AWG or larger.

(B) (2) Single – and multiconductor medium voltage cables shall be Type MV cable. Single conductors shall be installed in accordance with 392.10 (B) (1)

(C) Hazardous (Classified) Locations. Channel Trays in hazardous (classified) locations should contain only the cable types permitted by NEC.

Note: *In Hazardous (Classified) locations limitations are on cable types NOT the Snap Track system*.

Usage NOT permitted under NEC section 392.12 – Cable tray systems shall NOT be used in hoist ways or where subject to severe physical damage. The designer should identify and avoid areas where severe cable damage may occur. Usually these areas are limited and the cable tray system can simply be rerouted.

Certain conditions may call for the use of totally enclosed tray systems. Local building codes should be examined to determine the suitability of a ventilated bottom tray.

It should be noted that NEC Section 300.80, states that cable trays containing electrical conductors shall not contain any pipe, tube, or equal for steam, water, air, gas, drainage, or any other service other than electrical. Therefore, separate tray systems should be installed when Snap Track is used both as a cable tray system and as a tubing raceway.

Field Routing (Final Design)

Installers should refer to the guidance provided by the client, engineer, or designer. Guidance is generally provided in the form of installation details. Details may include a complete system detail, a minimum a system overview, various typical installation details or point of use drawings; in addition to tray fill capacity tables, and support structure requirements. ***Should these minimum guidelines not be provided, the installer should request them from the general contractor, engineer, or client***. Historically it has been left to the installer to determine the final field routing and resulting Snap Track component requirements. **This is best accomplished through a walk-through of the facility.** The following section is intended to provide additional guidance for this purpose.

WARNING! – Final field design considerations should only be made by qualified personnel experienced in cable tray installations.

Locations

Not Allowed - NEC Article 392 section 392.12 states that cable tray systems (including Snap Track) shall not be installed in hoist ways or where subject to severe physical damage.

Not Recommended – It is not recommended to install any cable tray system in possible fire areas.

Hazardous Locations – When installing Snap Track in classified or hazardous locations installers should refer to NEC Article 392 section 392.10 Wiring methods. The system must also be bonded in accordance with NEC article 250.100. Local codes may also apply.

Field Routing

In addition to any guidance provided by the client, engineer, or designer installers should also review the Snap Track Design Manual, prior to proceeding, and include the following considerations in conjunction with a walk-through

Access Considerations – The Snap Track system should be installed in a manner that will provide access to the cables. **TechLine Mfg. recommends a minimum of 300mm (12 inches) be maintained above and between the Snap Track tray and any other system or structure.**

Available Pathways - In many cases the Snap Track system is utilized as an effective alternative to conduit. As such the routing plan may not be shown in the detailed engineering drawings i.e. P&ID. However, route plans for process piping and equipment are typically detailed with specific locations. Installers should avoid these areas when determining the layout (route) of the Snap Track system.

System Structure –TechLine Mfg. recommends that the Snap Track system be bonded to building steel and earth every sixty ft. (60'), either through an inherent connection to a metallic support member or with a bonding jumper. As such installers should consider routing the Snap Track system in proximity to the system structure.

Elevation – It is generally accepted as best practice to install long horizontal runs (main or "home" runs) overhead with individual drops to the instruments, equipment etc. The optimum elevation points will be the point which allows sufficient clearance for personnel and equipment, while minimizing drop distances. Typically elevation points will be between 10' and 20'.

Informational Note: *Snap Track channels are extruded in 20' lengths.*

Channel Requirements- Refer to the fill capacity tables provided by the engineer, designer, or client to determine the appropriate tray widths. Lacking this guidance refer to NEC Article 392, Table 399.22 (A) 5 for 4" & 6" trays and Table 392.22 (A) (6) for 2" trays, for allowable tray fill capacities. Designate all routes by cable tray width. Measure all routes and its branches, add together all the measurements. Depending on the overall size of the facility add 2%-5% for measurement errors.

Changes in direction, elevation, or plane – TechLine Mfg. offers an extensive range of fittings for the Snap Track system. Prior to conducting a walk-through, installers are encouraged to review the current Snap Track catalog for a complete understanding of the available fittings and accessories. **When selecting fittings attention should be given to the minimum bend radii of the cables to be installed.**

*** Support Locations and Types –** The number and location of supports is dictated by the total load requirements of the system. Unless otherwise specified by the engineer, designer or client, **TechLine Mfg. recommends support locations and span distances as outlined in the Snap Track Load Table.**

Snap Track Load Data

NOTE: Span is the distance between supports, not the tray length.

Snap Track Span (feet)																	
Tray		**6'**		**8'**		**10'**		**12'**		**14'**		**16'**		**18'**		**20'**	
w	h	Load	Deft*	Load	Deft	Load	Deft	Load	Deft	Load	Deft	Load	Deft	Load	Deft	Load	Deft
2	2	45.33 lbs/ft	0.27 in.	25.19 lbs/ft	0.48 in.	15.9 lbs/ft	0.76 in.	10.83 lbs/ft	1.09 in.	7.79 lbs/ft	1.48 in.	5.66 lbs/ft	1.89 in.	3.78 lbs/ft	2.12 in.	2.59 lbs/ft	2.36 in.
4	2	54.92 lbs/ft	0.25 in.	30.5 lbs/ft	0.45 in.	19.25 lbs/ft	0.71 in.	13.08 lbs/ft	1.01 in.	9.43 lbs/ft	1.39 in.	7.02 lbs/ft	1.81 in.	4.99 lbs/ft	2.14 in.	3.41 lbs/ft	2.38 in.
6	2	54.67 lbs/ft	0.24 in.	30.25 lbs/ft	0.42 in.	19.1 lbs/ft	0.66 in.	12.96 lbs/ft	0.95 in.	9.29 lbs/ft	1.3 in.	6.88 lbs/ft	1.69 in.	4.85 lbs/ft	2.01 in.	3.28 lbs/ft	2.23 in.

*Deft = Deflection

TechLine Mfg. offers both common and unique supports for the Snap track system. Installers are encouraged to review the current Snap Track catalog.

Transitions- The Snap Tack system is designed to transition from ladder tray to point of use. Transitions should be made as outlined by the engineer, designer, or client. Lacking guidance installers should refer to the current Snap Track catalog for the appropriate hardware.

After reviewing the Snap Track catalog and Design Manual, installers are encouraged to conduct a walk-through of the facility, while considering the points outlined within this section. Notations should be made for all channel, fitting, support, and accessory requirements. To assist with these notations TechLine Mfg. provides a material take-off spreadsheet (next page).

SNAP TRACK

Material Take-Off Worksheet

Fax to 251.380.7301 or email to sales@techlinemfg.com

Company:			
Contact Name:			
Address:			
City:	**State:**	**Zip:**	
Phone:		**Fax:**	
Email:			
Project Name:	**Area:**	**Installing Contractor:**	

Covers: Pre-Fabricated covers are available for Snap Track tray and fittings. Indicate requirements by noting "CVF" in the appropriate box.

Cable Tray Requirements / Fitting Requirements

Tray Widths	Cable Tray **STC** Linear Footage	Vert Outside **STVO** Qty	Vert Inside **STVI** Qty	Horz Elb **STHE** Qty	Tee **STCT** Qty	Cross **STCC** Qty	Large Radius Sweeps Indicate Type & Qty: Type	Qty	Exit Fittings: Waterfall Qty	Downspout Qty
6"										
4"										
2"										

Splice Requirements

Splice plates may be used as expansion joints

Tray Widths	Splice Plates **STCS** Qty	Adjust Vert **STAVS** Qty	Adjust Horz **STAHS** Qty	Adapter: Reducing **RA** Qty	Adapter: Plane **RH,LH,BK** Qty
6"					
4"					
2"					

Support Requirements

All fittings should be supported w/in 2' of each extremity

Tray Widths	Hanger Bkt **STHB** Qty	Wall Bkt **STWB** Qty	Post Base **STFPB** Qty	Hold Down **STHC** Qty	Universal **STUSB** Qty
6"					
4"					
2"					

Accessories

Bonding Jumpers **ST0203**	Grounding Clamps **STCTG**	Wire Clamps **STWC**	Wire Spool **STWS**	Gromets **STG** 1/2"	Gromets **STG** 1"	Blind End **STBE**	Divider Strip **STDS**	Thermal Exp Guide **STEG**	Conduit Splice **STCOS**	Ladder Tray Transition **STLTT**

Unloading and Receiving

The Snap Track system incorporates precision components. Consequently, TechLine Mfg. uses great care and only quality materials to package and ship Snap Track components.

Snap Track tray is extruded in twenty foot (20') lengths and is generally shipped via motor freight, except for export shipments which are shipped in cargo containers. Fittings, accessories, and other small components are boxed and or palletized based on quantity and size.

To ensure the proper performance of the Snap Track system, TechLine Mfg. recommends the following practices be followed when unloading and storing Snap Track components.

Full Truck Load

Dedicated flatbed trailers are recommended and utilized whenever possible for full truck load shipments (typically 5000 ft. or greater). Channel bundles are separated with dunnage to allow for side unloading. **Side forklift unloading is recommended.**

CORRECT

NOT CORRECT

Less than truckload (LTL) Shipments

Small to medium sized orders are generally shipped via common carrier – LTL in enclosed trailers. When shipped via common carrier, Snap Track channel will be crated to allow for unloading with a forklift. **Crates should be pulled from the trailer using a SLING ONLY. To prevent damage NEVER pull Snap Track crates using a chain.**

Inspection

Should any damage be visible to the packaging or otherwise, immediately inventory all items using the TechLine Mfg. packing list. It is the responsibility of the receiver to note any damage on the carrier bill of lading. **Failure to note damage may result in denied freight claims!**

Storage

Snap Track is manufactured from aluminum. As with any aluminum product a white oxidation film will naturally occur when Snap Track components are exposed to weather. **Therefore, TechLine Mfg. recommends whenever possible that Snap Track components be stored indoors.**

When stored outdoors all components should be loosely stacked, elevated off the ground, ventilated, and when possible covered to prevent storage staining.

Informational Note: *The naturally occurring thin film of oxidation (storage stain) will not affect the performance of the system. However, storage stain does affect the appearance and may result in some components being NON-RETURNABLE.*

Installation Guidelines

This section is intended as a practical guide for the proper installation of the Snap Track system. Installers are encouraged to contact TechLine Mfg. for additional guidance, should contingencies occur which are not addressed in this manual.

It is recommended that Snap Track installations follow the recommendations provided in the Snap Track Design manual. When Snap Track is used as a cable tray it should in all cases be installed in compliance with NFPA 70, NEC Article 392, NEMA VE-1 and VE-2, and follow safe work practices. Prior to proceeding, installers should also refer to applicable local codes and / or facility specifications for additional restrictions or guidance.

It is recommended that the Snap Track system be installed ONLY by qualified persons familiar with standard electrical construction practices, electrical equipment, and the safety of electrical wiring systems. Including training and authorization to test, energize, clear, ground, tag, and lock out circuits in accordance with safety practices.

WARNING! – Do not use the Snap Track system as a walkway, ladder, or support for people.

Snap Track is intended to be a mechanical support system for cables and tubing ONLY! Using the Snap Track system as a walkway can cause personal injury and also possibly damage cables and other equipment.

The proper performance of the Snap Track system is dependent on its proper installation. Failure to follow the design, installation, and maintenance guidelines set forth by TechLine Mfg., NEC, NEMA, and NFPA may lead to personal injury as well as damage to property.

Installation of Support Structure

Definitive layouts for the Snap Track support structure are typically not provided by the designer. Consequently, it is often left to the field supervisor to determine the type, number, and location of the supports.

Installers must be familiar with the total loads the support structure will be subject to in order to determine the appropriate span distances. Installers are encouraged to review the load and support section of the Snap Track Design manual. Installers should also seek guidance from the general contractor or owner relative to tray span distances which are often specified. However, it should be noted, most existing support span specifications DO NOT take into account the inherent strength and capability of the Snap Track system. When selecting support locations, installers should also be aware of the support position in relation to the Snap Track splice connectors to prevent joining the trays in a simple beam structure.

Calculating the appropriate span distances for straight section horizontal runs are covered in the Snap Track Design manual. However, due to the inherent complexity of this calculation and the resulting common confusion, further detailed instructions and examples have been provided in this section for the installer.

Horizontal Span Distance Calculation

1. Determine the Total Load requirement. The total load is the sum of all components (accessories,cable, and the additional loads based on outdoor factors i.e. snow and ice).

2. If in a hurricane zone, contact TechLine Mfg. to request the Snap Track Wind Load white paper.

Note: *The following is one example, and may not be applicable to all applications. Refer to ASCE 7 for more information.*

Example: Given a 100 foot horizontal straight run of covered 4"W x 2"D Snap Track tray containing (10) segments of SWA foundation fieldbus cable, secured every 3 feet. In an area with anticipated maximum accumulation of.5 inches of ice, the total load is calculated as follows:

$$T_L = W_{ctotal} + W_{snic} + W_{ct}$$

= 0.44 lbs. /ft. + 0.47 lbs. / ft. + 0.6 lbs. /ft.

= 1.51 lbs. / ft. Total Load

T_L = Total Load

W_{ctotal} = Total weight of cable tray accessories: 44lbs/ 100 = .44lbs./ft.

(100' 4" cover = 40lbs.) + (33 wire clamps = 4.125 lbs.)

W_{snic} = Total weight of wind, ice, snow, or seismic conditions = 4.75 lbs. / ft.

0.47 lbs. / ft. (ice load)

W_{ct}= Total cable weight: 0.06 lbs. /ft. = 0.60 lbs. / ft.

60 lbs./Mft./1000 = 0.06 lbs. /ft. x 10= 0.60 lbs. /ft.

3. Use the Snap Track Load Data table (page 7) to determine the appropriate span distance for the 4" tray. Based on a total load of 1.51 lbs. / ft., supports should be placed on a span distance not exceeding eighteen feet (18').

Informational Note: *Snap Track Span distances of eighteen feet (18') are common for many applications!*

Elevation Points

Elevation points for the support system are determined either from the top or bottom of the tray. An elevation benchmark (preferably set by the general contractor) can be transferred via laser level or transit to convenient points along the length of the tray run. Once a few hangers are hung at points along the tray run, a carpenters string or bailing wire strung end to end will assist in maintaining the elevation points for the tray supports.

Vertical Span Distance

Span distances for vertical drops can be extended as dictated by the building structure. However, **span distances vertical or horizontal should never exceed the 20'.**

Fitting Supports

TechLine Mfg. recommends that Snap Track radius fittings less than 12" be supported with a SINGLE center support. Following this recommendation will greatly reduce the installed cost! Snap Track fittings with a radius of 12" or larger should be supported as outlined in NEMA VE-2, which states that vertical fittings and 12"r fittings should be supported within 2' of each extremity. When Snap Track splices are used as thermal expansion splices, a support is also required within 2' of each end. When larger radius fittings (24"r-36"r) are installed in a horizontal plane, an additional center support is recommended.

After determining the appropriate span distance and support locations select the types of supports best suited for the application. Refer to the current Snap Track catalog for support options.

Support Bracket Installation Notes:

Trapeze and Hanger Brackets – These systems allow for very little horizontal adjustment of the tray once the vertical hangers are in place. It is essential that these hangers be positioned properly. Horizontal adjustment is proportionate to the length of the vertical rods. The shorter the rod, the less horizontal adjustment allowed.

The use of beam or window clamps is recommended to attach these brackets to structural steel. **DO NOT weld or drill to structural steel without explicit approval from the structural engineer responsible for that element.**

Cantilever, Post Base and Wall Brackets – These supports may be attached to the following structural materials: poured-in-place concrete, precast concrete, brick or concrete and structural steel. For concrete and concrete related structures use masonry expansion bolts. A minimum of two (2) bolts must be used. Consult the manufacturer's data for both pullout and shear loads for masonry bolts. The masonry structure strength must also be verified. For attachment to structural steel use beam clamps, bolting or welding. **DO NOT weld or drill to structural steel without explicit approval from the structural engineer responsible for that element.**

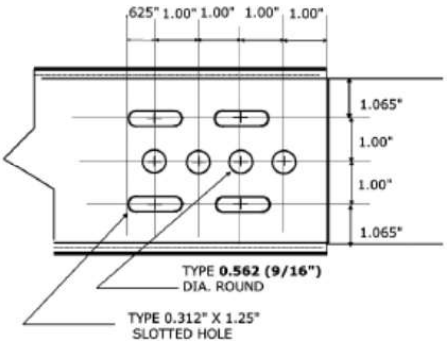
Post base supports are also commonly attached to grating. When attaching post base supports to grating use Snap Track grating clamp part number GM 1 ½ .

Roof and Floor installations – Do not mount Snap Track tray directly to a floor or roof. Strut 1 5/8" should be used as a cross member and the Snap Track tray secured with a hold down clamp.

Planning for Thermal Expansion

When Snap Track fittings are used as thermal expansion splices, the installation procedure is slightly different. Therefore, prior to installing Snap Track tray and fittings, installers should consider requirements for thermal expansion splices. The number of thermal expansion splices required is based on the maximum Delta T (difference between the minimum ambient temperature and maximum ambient temperature). **In most areas, when Snap Track is installed outdoors, spacing of thermal expansion splices on sixty-five foot (65') intervals is sufficient.** Sixty five foot spacing is the spacing recommended by NEMA VE-2 when the Delta T is 100 degrees F. In areas with a Delta T other than 100 degrees F, installers should refer to NEMA VE-2 -2013, section 3.4.2 to determine the appropriate spacing.

All Snap Track fittings are manufactured with four 1.25" (31.75mm) oval slots and are designed to be used as the thermal expansion gap. However, it is considered best practice to use straight splice fittings whenever possible.



When installing Snap Track splice plates and or Snap Track fittings as thermal expansion splices, install Snap Track hardware kit EJBK-SS through the four (4) oval slots. Kit EJBK-SS contains (4) ¼" X .75" Stainless Steel Carriage Bolts and (4) ¼" Stainless Steel Nylon lock Nuts. The lock nuts should be tightened and then back off ¼ turn. **DO NOT USE SNAP TRACK PUSH PINS WHEN INSTALLING THERMAL EXPANSION SPLICES.**

When installing thermal expansion spices, allowances must also be made to allow longitudinal movement of the tray. This is accomplished through the use of expansion guides and hold down clamps. There are slight dimensional differences between Snap Track expansion guides and hold down clamps. Both clamps are designated accordingly.

The tray should be anchored with hold down clamps or with a fixed support nearest the midpoint between expansion plates and secured with expansion guides at all other support locations.

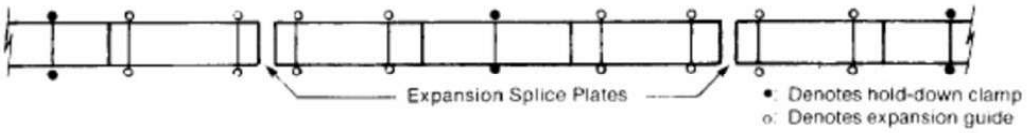
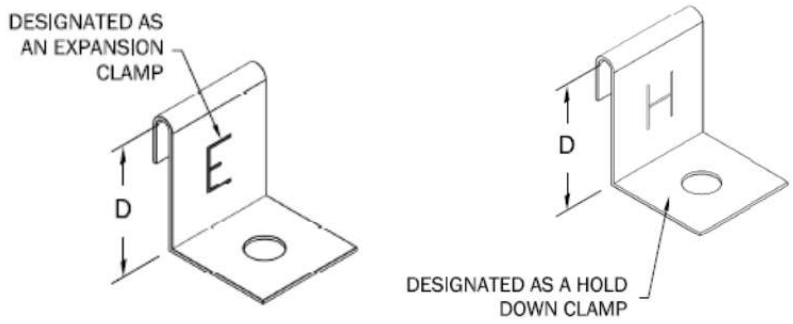


Figure 4.13A
HOLD DOWN AND GUIDE CLAMP LOCATIONS

Note: *At any time all Snap Track splices and fittings can be converted to expansion splices simply by removing the pins and properly installing hardware kit EJBK-SS.*

However, when splices or fittings are changed to expansion splices, modifications to the support structure (inclusion of expansion guides for longitudinal movement) are generally required. It is for this reason TechLine Mfg. recommends prior planning of expansion splice placement.

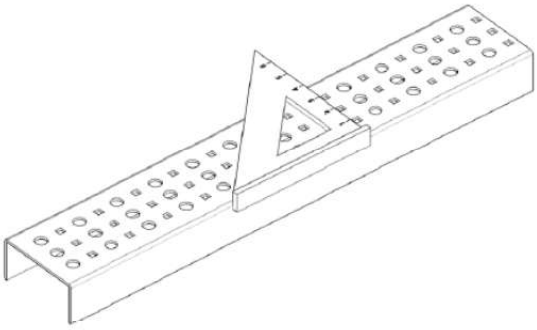


Installing Channel and Fittings

TechLine Mfg. recommends at a minimum to install straight horizontal run and straight vertical run supports, as dictated by the predetermined span distances, prior to installing Snap Track tray and fittings. When possible the entire support structure should be installed prior to the tray installation.

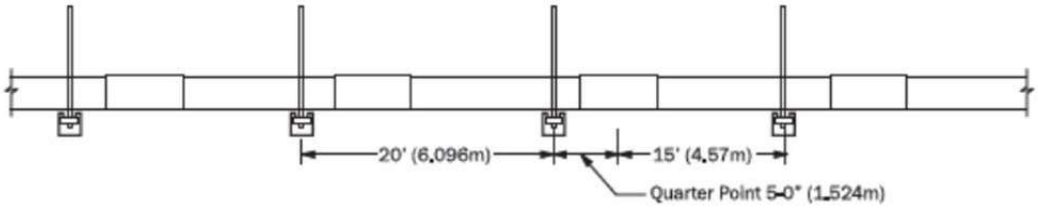
Using the support structure as guidance a pre-layout of material is recommended. Once laid out the physical appearance of both the tray and fittings should be inspected for creases, bends, or any other damage. If the cable tray has creases or bends, avoid using that section for splices. Do Not use any fittings that are damaged.

At some point during the installation, it may become necessary to field modify or cut the tray. When doing so the tray should be positioned with the side rails down and a square used to mark and ensure a square cut is made. Cuts are generally made with a band saw, chop saw, or sawzall. The use of a suitable lubricant will speed the process and preserve the cutting blade. It is important to get a 90 degree (to the longitudinal axis) cut. After cutting, use a file to de-bur any rough edges.

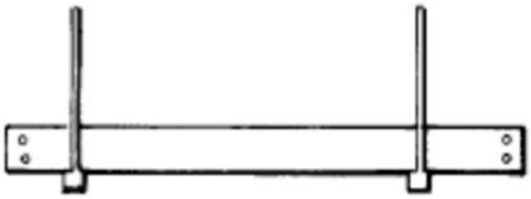


Once the supports are in place, the locations for expansion splices have been noted, and the material has been laid out and inspected, installation of the Snap Track tray may begin. Installation of the tray can begin at any point that is convenient.

Straight Section Runs



To maximize the rigidity of the Snap track system, the tray sections should be installed so that the splice locations fall at the quarter point of the support span. When the tray length is the same as the support span distance and both remain consistent throughout the run, the splice locations will fall at the same position throughout the tray run. On the other hand if the span distance between the supports is less than the length of the straight section tray, place the tray across both supports so that the ends are cantilevered.



Splices should be placed to fall on the quarter span of the support distance

When the tray length is greater than the support span, place the tray so that it is cantilevered across both supports.

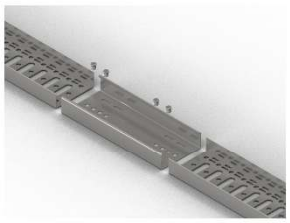
The support span should not exceed the length of one section of tray and not exceed twenty feet (20'). There should not be more than one splice connection between two (2) supports and <u>splices should not be located over supports or at the midpoint.</u>

With the first section of tray in place, connect the first splice and second section of tray. When installing a splice, slide the cable tray into the splice a minimum of four inches (4") (10.16cm). Line up at least (2) of the 9/16" (smaller) holes, the second and fourth hole are recommended. Please be aware to not use the larger round holes in the 2" and 4" channel, as they will not properly fasten.

Informational Note: *Do Not butt the tray together in the tray splice. Leaving some space between the channel joints will allow for adjustability.*

Four push pins are provided with each splice, two for each side. When the 9/16" round holes on the cable tray and the 9/16" holes in the splice are lined up, insert the push pin(s) and apply thumb pressure to the push pin and lock it into position. For maximum strength utilize the second and fourth holes when possible. You will hear a click or "Snap" when the pins are secure. Install two pins on each side of the splice. Inspect the bottom of the tray to ensure both clevises of the pin have fully inserted and engaged. Continue to lay the tray so that the splices fall on the quarter span; assemble additional splices, as described, throughout the length of the straight run. **Where thermal expansion splices are required DO NOT install the splice with the supplied pins. Use Snap track bolt kit EJBK-SS and install as described on page 15.**

Secure the tray sections, hold down clamps, or expansion guides as required to the support brackets as they were laid out.

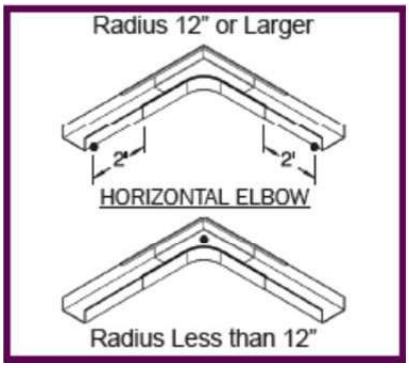


Radius Fittings

Radius fittings, elbows, tees, crosses, exit fittings, etc. should also be assembled with two (2) pins at each end of the fitting as indicated above. If support brackets for the fittings were not previously installed, install supports in the following manner for ALL fittings.

A) Small Radius Fittings - 3" and 6" (or any Non-Standard radius fittings less than 12"r)

1) Short radius fittings (<12"r) may be supported either with a single center support or alternatively (based on load) with supports within two feet (2') of each extremity



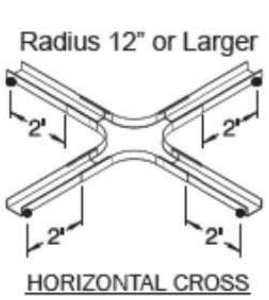
In most cases when a single center support is used, it will be necessary to drill a hole in the fitting in order to bolt the fitting to the support bracket. TechLine Mfg. recommends using 3/8" bolts at a minimum with ½" bolts considered best practice.

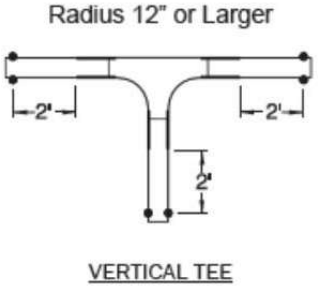
B) Large Radius Fittings-12"r-36"r

1) Snap Track large radii fittings should be supported per the guidelines set forth in NEMA VE2 -2013 section 3.5

b) Snap Track Fittings installed in the vertical position and all 12"r fittings should be supported within 2' of each extremity

c) Expansion connections should also be supported within 2' of each end





d) When installed in the horizontal position Snap Track 24"r, 36"r fittings should be supported within 2' of each extremity and include an additional center support

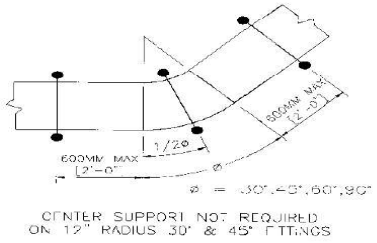


Figure 3-54 Horizontal Elbows

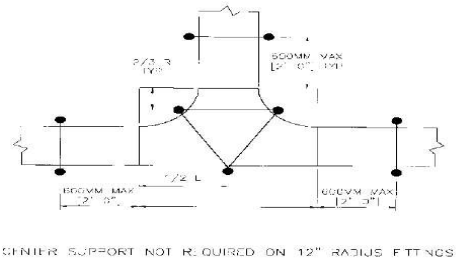


Figure 3-55 Horizontal Tee

C) Specialty Fittings – Waterfalls, Plane adapters, Take-off fittings, Downspouts, Adjustable fittings etc.

1) Snap Track specialty fittings should be supported within two feet (2") of each extremity

Note:

1. *Whenever possible avoid mounting the assembled (connection) end(s) of Snap Track fittings to the support bracket.*
2. *The unique feature of using single supports for smaller radius fittings IS ALLOWED under NEMA VE 2-2013 SECTION 3.5.1 "Unless otherwise recommended by manufacturer".*

Installation of Bonding Jumpers

Bonding Jumpers must be installed in ALL cable tray installations

When installed as a cable tray the Snap Track system must be grounded and electrically continuous per NEC Article 392 and Article 250. In Snap Track cable tray installations the following areas require bonding for electrical continuity.

1) Transitions – Wherever mechanically discontinuous sections exist including transitions from the Snap Track system to other cable trays, equipment, or sections within the Snap Track system

a) Mechanical discontinuous sections are limited to 6 feet (1.8m) under NEC Article 392.30

2) Adjustable Fittings – Including both vertical and horizontal adjustable fittings

3) Thermal Expansion Joints – Wherever Snap Track splices or fittings are installed as a thermal expansion joint

When bonding jumpers are required, electrical continuity can be achieved using a single bonding jumper attached to the existing holes in the base of the Snap Track tray. **It is not necessary to drill holes in the side rails and to install two jumpers as described in NEMA VE2 section 3.8.4 and depicted in figures 3-95 -3-98.** Snap Track is a ventilated channel with integral side walls. Section 3.8.4 is referring to the installation of bonding jumpers for ladder tray. Additionally, NEMA VE2 is not a Standard as is NEMA VE1, rather NEMA VE2 is as stated in the forward a practical guide.

VE 2-2006
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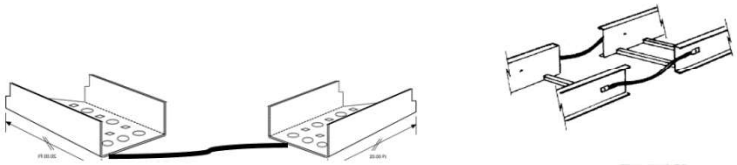


Figure 4.59
DISCONTINUOUS SEGMENTS

Install bonding jumpers using a ¼" cap screw, place the screw head on the inside of the cable tray, utilize existing 5/16" slots, put the jumpers on the bottom of the cable tray, add a flat washer, locknut, tighten securely.

Installation of an Equipment Ground Conductor

The Equipment Grounding Conductors are the most important conductors in the electrical system. The Grounding Conductor is the electrical circuit's safety conductor.

When installing the Snap Track system, the contractor should evaluate the available

Equipment Grounding Conductor (EGC) options and determine which is most applicable for the project.

Options:

1) Use the cable tray as the EGC

2) Use a single conductor cable as the common EGC for all the circuits in the cable tray

3) Use individual EGC conductors in each multi-conductor cable in the cable tray

4) Utilizing the tray as a supplemental EGC

1) Using the Snap Track system as the EGC

NEC section 392.60 clearly indicates that metallic cable trays shall be permitted to be used as an EGC where continuous maintenance and supervision ensure that qualified persons will service the installed cable tray system and that the tray's cross sectional area complies with the Metal Area Requirements for Cable Trays Used as Equipment Ground Conductors section 392.60 (A).

Table A

Table 392.60(A) Metal Area Requirements for Cable Trays Used as Equipment Grounding Conductor

Maximum Fuse Ampere Rating, Circuit Breaker Ampere Trip Setting, or Circuit Breaker Protective Relay Ampere Trip Setting for Ground-Fault Protection of Any Cable Circuit in the Cable Tray System	Minimum Cross-Sectional Area of Metal[a]			
	Steel Cable Trays		Aluminum Cable Trays	
	mm^2	$in.^2$	mm^2	$in.^2$
60	129	0.20	129	0.20
100	258	0.40	129	0.20
200	451.5	0.70	129	0.20
400	645	1.00	258	0.40
600	967.5	1.50[b]	258	0.40
1000	—	—	387	0.60
1200	—	—	645	1.00
1600	—	—	967.5	1.50
2000	—	—	1290	2.00[b]

[a]Total cross-sectional area of both side rails for ladder or trough cable trays; or the minimum cross-sectional area of metal in channel cable trays or cable trays of one-piece construction.

[b]Steel cable trays shall not be used as equipment grounding conductors for circuits with ground-fault protection above 600 amperes. Aluminum cable trays shall not be used as equipment grounding conductors for circuits with ground-fault protection above 2000 amperes.

Metal cable trays, including the Snap Track system, which meet the requirement set forth by NEC, are sent to Underwriters Laboratories (UL) to be Classified with regard to suitability for use as an EGC. The UL Classification as of suitability is based on two criteria a.) the cross sectional area meets the requirements of NEC b.) The connection is tested and found to be electrically continuous (bonded) per the standards set forth by NEMA VE 1 5.1.2

The entire Snap Track system, including the assembly of fittings, has been tested and is classified by Underwriters Laboratories, both UL and CUL file number E249472, and was found to be suitable for use as an equipment ground conductor (EGC).

(Resistance = Voltage/30)

RESULTS

STCS 2-2AL and STPACS 2-2AL fittings (sample tag 1039704-001) With Cat. No. STC 2-2AL Cable Tray (Sample Tag 1049130-001) and Cat. No. STSLP 9.22T Push Pin Connectors (sample tag 1039704-001)

Location	Voltage Drop (V)	Resistance (ohm)
1. ~~STCS 2-2AL to~~ STC 2-2AL to STPACS 2-2AL (top)	0.0025	0.00008
2. STPACS 2-2AL to STC 2-2AL splice plate (opposite top)	0.0028	0.00009
3. STPACS 2-2AL to STC 2-2AL splice plate (bottom)	0.0025	0.00008
4. STCS 2-2AL to STPACS 2-2AL (opposite bottom)	0.0025	0.00008

NOTE: Cat. Nos. changed by Project Handler to represent actual assembly. RAF 2008-08-25

NOTE: The fitting STCS 2-2AL (sample tag 1039704-001) was connected to the cable tray STC 2-2AL (sample tag 1049130-001), which was connected on the other end to the fitting STPACS 2-2AL (sample tag 1039704-001).

Table B

Cat. No.	Height	Width	Thickness	Minimum Cross Sectional Area (Marked) in²
Galvanized Steel				
TLC-2-2 HDG	2.0	2.0	0.075	0.4
TLC-4-2 HDG	2.0	4.0	0.08	0.4
TLC-6-2 HDG	2.0	6.0	0.08	0.4
Aluminum				
TLC-2-2 AL	2.0	2.0	0.097	0.4
TLC-4-2 AL	2.0	4.0	0.097	0.6
TLC-6-2 AL	2.0	6.0	0.097	0.6
STC-2-2 AL	**2.0**	**2.0**	**0.100 min.**	**0.4**
STC-4-2 AL	**2.0**	**4.0**	**0.100 min.**	**0.6**
STC-6-2 AL	**2.0**	**6.0**	**0.100 min.**	**0.6**
STC-2-2 AL-V2	**2.0**	**2.0**	**0.105 min.**	**0.4**
STC-4-2 AL-V2	**2.0**	**4.0**	**0.105 min.**	**0.6**
STC-6-2 AL-V2	**2.0**	**6.0**	**0.105 min.**	**0.6**
Stainless Steel				
TLC-2-2 SS	2.0	2.0	0.073	0.4
TLC-4-2 SS	2.0	4.0	0.061	0.2
TLC-6-2 SS	2.0	6.0	0.061	0.4

Based on the UL Classified cross-sectional area <u>Snap Track 2” tray and fittings are suitable for use as an EGC up to 600 Ampere, and Snap Track 4”-6” tray and fittings are suitable for use as an EGC up to 1000 Ampere.</u> Note: the cross-sectional area of our fittings is greater than that of the tray.

It is not necessary to apply conductive compound on the cable tray splices or any of the Snap Track fittings. Bonding jumpers must be installed as described in the Bonding Jumper installation section. **In all cases the Snap Track system should also be bonded back to the source, transitions to other cable tray systems, and transitions to conduit or other**

wiring drops.

When the Snap Track system is installed as an EGC, it must be grounded per NEC article 250. See Grounding the System for further detail.

<u>Note: NEC 392.60 (B) (4) states</u> *- Cable Tray sections, fittings, and connected raceways are bonded in accordance with 250.96 , using bolted mechanical connectors or bonding jumpers sized and installed in accordance with 250.102*

The Snap Track connection is UL Classifiefd as bonded and the bonding capability meets the requirements set forth for bolted connetions. When the code was originally written the only available method of bonding fittings and sections was a bolted connection.

Note: *Standard Snap Track bonding jumpers are 2 AWG and rated for 500 ampere per NEC table 250-122. Larger sizes are available upon request.*

2) Using a single conductor cable as the common EGC for all the circuits in the cable tray.

This method is commonly selected when single conductor cables are used, typically only in a few industrial applications. The single conductor EGC must be sized for the circuit breaker trip setting (NEC Table 250- 122) of the highest capacity circuit in the cable tray and bonded to the tray.

NEC Table 250.122 **Minimum Size Equipment Grounding Conductors for Grounding *Raceway and Equipment***

Rating or Setting of Automatic Overcurrent Device in Circuit Ahead of Equipment, Conduit Etc. Not Exceeding (Amperes)	**Wire Size AWG or kcmil**	
	Copper wire Size	**Aluminum or Copper – Clad Aluminum***
	14 AWG	**12 AWG**
		250 kcmil
	250 kcmil	

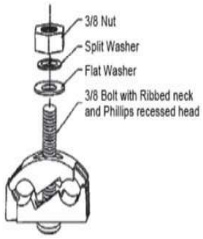
*** See Installation restrictions in 250.120**

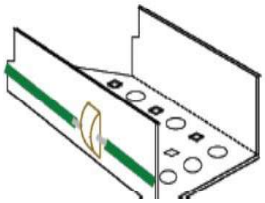
In outdoor installations, a bare copper EGC should not be installed in the Snap Track cable tray due to the potential of electrolytic corrosion. In outdoor installations, it is best to use an insulated conductor and to remove the insulation where connections are made to the cable tray.

A separate EGC may be installed either in the Snap Track tray or bonded to the side rail with a

UL Listed tin or zinc plated ground clamp. Snap Track part number STCTG250 is recommended.

In all cases the Snap Track system should also be bonded back to the source, transitions to other cable tray systems, and transitions to conduit or other wiring drops.





A separate EGC is not required when Snap Track is used in low power applications

STCTG250

3) Use individual EGC conductors in each multi-conductor cable in the cable tray.

This is the most common approach as UL requires all multiconductor cables to contain an integral EGC. It is also the most convenient and cost effective method.

EGC conductors in multi-conductor cables may be bare, covered, or insulated. If covered or insulated, the outer finish must be green or green with one or more yellow strips.

At time of installation, the conductor utilized as the EGC must be permanently identified as the Equipment Ground Conductor at each end and at every point where the conductor is accessible by one of the three methods indicated in NEC 2014 250.119 (B).

In all cases the Snap Track system should also be bonded back to the source, transitions to other cable tray systems, and transitions to conduit or other wiring drops.

4) Utilizing the cable tray as a supplemental EGC.

A Supplemental EGC IS NOT REQUIRED by NEC

However, electrically paralleling a separate EGC with the cable tray may provide some degree of improved safety for the facility and personnel, and consequently is considered by some engineers a desirable practice.

Grounding the System

Effective grounding must be permanent and continuous and have ample capacity to safely conduct any current likely to be imposed on the system. It should also have impedance sufficiently low to limit the potential above ground and facilitate the operation of over current devices in the circuit. A continuous, underground metallic water supply system is acknowledged to be the best electrical ground. Other suitable methods include continuous metallic steam and gas piping systems, the grounded metal frame of a building or structure, or an artificial electrode such as driven steel pipe, galvanized or otherwise protected from corrosion, or a buried metallic plate.

Informational note: *Wherever multiple grounds are used, it is important that they be tied together in order to avoid any difference in potential between the various parts of the tray system.*

NEC article 392.60 requires that metallic cables trays that support electrical conductors shall be grounded in accordance with 250.96.

In general, non-current carrying parts of equipment that are likely to become energized are required to be bonded to an equipment ground. In addition to article 250.96 this requirement is also clearly stated in articles 250.110, 250.112 and 250.134.

Where cable tray systems contain only non-power circuit(s) article 392.6 requires the cable tray system only to be electrically continuous. However, even in non-power applications, cable trays are generally still grounded for lightening protection, noise, electromagnetic interference, and static discharge.

TechLine Mfg. recommends, as an accepted best practice, all Snap Track cable tray installations should be bonded to building steel or the facility grounding system every 60'. By bonding every 60', the tray will maintain a low potential to ground, which reduces EMI and provides a continuous path for stray currents.

Supports securely fastened to building steel usually provide a solid bond. **When spans exceed 60' and are not inherently bonded to building steel and earth through metallic supports the tray should be bonded to an additional EGC connecting to earth or the facility ground network.**

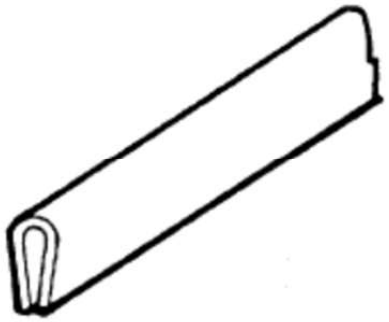
WARNING: IT IS THE RESPONSIBILTY OF THE DESIGNER AND INSTALLER TO ENSURE THAT THE SNAP TRACK SYSTEM IS PROPERLY BONDED TO THE POWER SOURCE AND THE GROUND NETWORK INCLUDING A PROPER SYSTEM GROUND.

Installing Guarding

In accordance with NEC section 392.30 (B) and 392.100 (B), TechLine Mfg. recommends that the ends of ALL mechanically discontinuous sections of channel be protected with guarding. This requirement by NEC will not only protect the cable from damage but also to protect personnel from injury.

Guarding

Snap Track guarding is designed to provide protection from potentially sharp edges that may result from cut sections of channel.



TechLine Mfg. recommends the use of Snap Track fire retardant part number **100B3TPRFRX1/8.** Snap Track edge guard protector is available in 250 foot rolls. It should be cut to length and pressed over the edge of all discontinuous sections of channel.

Cable Installation

Prior to beginning cable installation, installers should discuss in detail the installation of cables with the designers, engineers, or owners. Typically, the designer, engineer, or owner will provide the installer guidance including a wiring fill table and a cable schedule. Should this information not be available installers should follow the allowable fill area guidelines set forth under NFPA 70 NEC 2020, Article 392.22 (A) (2), Table 392.22 (A) (5) for 4" and 6" tray, and Table 392.22 (A) (6) for 2" tray.

Article 392.22 (A) (2) Number of Conductors or Cables.

A) Number of Multiconductor Cables, Rated 2000 Volts or Less, in Cable Trays.

The number of multiconductor cables rated 2000 volts or less permitted in a single cable tray shall not exceed the requirements of this section. The conductor sizes shall apply to both aluminum and copper conductors. Where dividers are used, fill calculations shall apply to each divided section of the cable tray.

2) Ladder or Ventilated Trough Cable Trays Containing Multiconductor Control and/or Signal Cables Only.

Where a ladder or ventilated trough cable tray having a usable inside depth of 150 mm (6 in.) or less contains multiconductor control and/or signal cables only, the sum of the cross-sectional areas of all cables at any cross section shall not exceed 50 percent of the interior cross-sectional area of the cable tray. A depth of 150 mm (6 in.) shall be used to calculate the allowable interior cross-sectional area of any cable tray that has a usable inside depth of more than 150 mm (6 in.).

Table 392.22(A) (5) Allowable Cable Fill Area for Multi-Conductor Cables in Ventilated Channel Cable Trays for Cables Rated 2000 Volts or Less.

		Maximum Allowable Fill Area for Multiconductor Cables			
Inside Width of Cable Tray		Column 1 One Cable		Column 2 More Than One Cable	
mm	in.	mm^2	$in.^2$	mm^2	in^2
75	3	1500	2.3	850	1.3
100	4	2900	4.5	1600	2.5
150	6	4500	7.0	2450	3.8

Table 392.22 (A) (6) Allowable Cable Fill Area for Multi-Conductor Cables in Solid Channel Cable Trays for Cables Rated 2000 Volts or Less.

Inside Width of Cable Tray		Maximum Allowable Fill Area for Multiconductor Cables			
		Column 1 One Cable		Column 2 More Than One Cable	
mm	in.	mm^2	$in.^2$	mm^2	in^2
50	2	850	1.3	500	0.8
75	3	1500	2.0	850	1.1
100	4	2900	3.7	1600	2.1
150	6	4500	5.5	2450	3.2

(B) Number of Single-Conductor Cables, Rated 2000 Volts or Less, in Cable Trays.

The number of single-conductor cables, rated 2000 volts or less, permitted in a single cable tray section shall not exceed the requirements of this section. The single-conductors, or conductor assemblies, shall be evenly distributed across the cable tray. The conductor sizes apply to both aluminum and copper conductors.

(B) (2) Ventilated Channel Trays. Where 50 mm (2 in.), 75 mm (3”), 100 mm (4”), or 150mm (6”) wide ventilated channel cable trays contain single –conductor cables, the sum of the diameters of all single conductors shall not exceed the inside width of the channel.

The allowable ampacity (current-carrying rating) of conductors and cables, nominally rated

2000 volts or less, installed in Snap Track trays, should be in accordance with NEC sections

392.22 (A) and 392.22 (B), and as outlined in NEC section 392.80- Ampacity of Conductors. Installers should refer to the applicable tables mentioned in section 392.80 and note the adjustment factors, for non-ventilated covers, listed in sections 392.80(A) (1) (a)-(c) and 392.80 (A) (2) (a)-(d). Further attention should be paid to the spacing requirements and ambient temperature limitations in these sections.

In most installations cables may be hand laid into the Snap Track tray or pulled along the beveled edge of the side rail without the need for cable pulling equipment. The Snap Track UL Classification label and the Snap Track logo are alternated every meter (3.28 ft.) to assist in identifying cable and tray length.

Should cable pulling equipment be required, sufficient room must be allowed for cable pulling activities and equipment including reel setups. Refer to the cable manufacturer installations instructions for maximum pulling tension, minimum bend radii, maximum permissible pull length etc.

Informational Notes:

1. *Should power cables and communication cables be run in the same tray, the installation of Snap Track divider strips are recommended prior to pulling cable.*

2. *A cable tray and cable management record is highly recommended. The use of these records will assist with a quality installation and potentially reduce both installation and maintenance costs. Cable tray and cable management records should include but not necessarily be limited to cable tray tag numbers, cable tag numbers, cable description, cable origin location, cable routing, and cable termination location.*

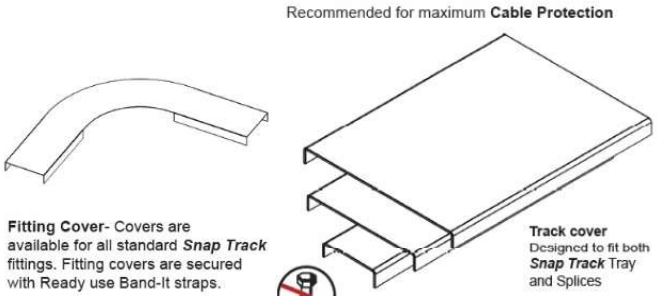
Securing Cables

TechLine Mfg. recommends that cables be fastened every 18 in. (450 mm) with cable ties on all vertical runs. Although not required by NEC, cables should also be fastened every 3 ft. (1M) on horizontal runs to maintain spacing.

Installing Covers

The installation of Snap Track covers provides maximum cables protection and should be considered in areas of high debris or areas where the cables may be subject to physical damage. In many industrial installations covers are used on tray runs between grade and 10 ft. (3 M).

Covers are available for all sizes of Snap Track tray and fittings and are designed to fit over the side rails. **In all cases Snap Track covers MUST be secured with strapping or clamps.**



Snap Track Cover Clamps – Available for Tray and Fittings

The appropriate type and number of straps or clamps is dependent on the maximum anticipated wind conditions.

Nominal Wind Loads =/< 50 MPH

For nominal wind conditions TechLine Mfg. recommends the use of Snap Track Reusable Band-It Straps as outlined.

Quantity of Band-it Straps or Clamps.

Straight sections 3.0 m (10 ft.)	3 pieces
Horizontal / Vertical Bends	3 pieces
Tees	4 pieces
Crosses	5 pieces

Note: *Contact TechLine Mfg. for specific recommendations when designing for medium and extreme wind conditions.*

Maintenance

If the 6063 T 6 aluminum Snap Track system is compatible with the environment in which it was installed and the system is properly installed, virtually no maintenance will be required.

An annual inspection for damage and loose electrical connections is recommended. All bonding and grounding connections should be inspected to ensure the system remains electrically continuous. The entire tray system should also be inspected for structural damage i.e. broken welds, bent fittings or deformed side rails. If damage is evident it is recommended that the damaged tray section or fitting be replaced. All supports should also be inspected for damage or loose connections and repaired or replaced as needed.

Informational Note: *Snap Track is manufactured from 6063 T6 marine grade aluminum alloy. It should be noted that 6063 T 6 aluminum may naturally develop a white oxide when exposed to the atmosphere. Numerous tests have documented that this oxidation does not detract from the structural strength of the aluminum and is simply a surface film.*

Modifications

The Snap Track system was specifically designed to be modular in concept and therefore to easily allow for future additions and or modifications. When additions or changes in direction or plane are required, simply add or change a fitting to the desired shape. To make changes remove the existing pins and fitting and exchange with the desired fitting. All new Snap Track fittings are supplied with the appropriate number of pins. The pins supplied with the new fitting should be used when modifications are made.