T.J. COPE

Thomas Jefferson Cope founded T.J. Cope in Philadelphia, Pennsylvania in 1887. At that time, T.J. Cope's primary business was designing and manufacturing cable installation/pulling equipment for overhead and underground applications.

In 1948, T.J. Cope introduced the first modular Cable Tray System. The tray system was fabricated from sheet metal with the edges turned up forming a trough shape. This type of installation offered a more flexible and economical alternative to the traditional use of conduit.

In 1957, T.J. Cope was purchased by the Rome Cable Corporation, which in turn, was purchased by Alcoa in 1959. The Cyprus Mines Corporation purchased T. J. Cope six years later when the U. S. Justice Department forced Alcoa to divest its holdings of the Rome Cable Company.

Today, T.J. Cope is owned by Tyco International Ltd., and operates as a unit of Allied Tube & Conduit, the world's leading manufacturer of galvanized steel tubing, including electrical conduit. Allied also manufactures Power-Strut® metal framing and support systems, which, with T.J. Cope, is part of the Allied Support Systems Division, serving electrical and mechanical construction markets worldwide.

Abahsain-Cope of Saudi Arabia

T.J. Cope began manufacturing Cable Tray in Saudi Arabia in 1981.

Abahsain-Cope, is a licensed cable tray manufacturer in Saudi Arabia, which provides customers the ability to comply with Council of Ministers Resolution #1977.

Cable tray fabricated in Saudi Arabia is manufactured to identical design specifications as the cable tray produced in the United States.

Cable tray technical assistance is available from both the United States and Saudi Arabia.

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Philadelphia, PA 19154
Tele: 215-961-2570
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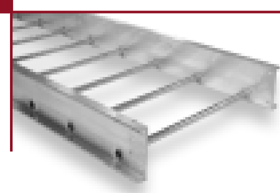
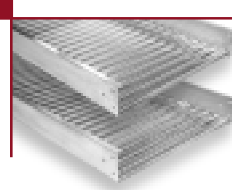
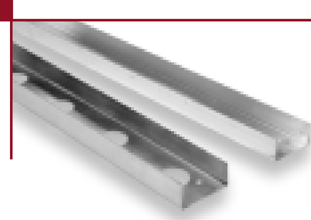
NEMA MEMBER

Cable Tray Institute







SELECTING A T.J. COPE CABLE TRAY SYSTEM

A number of factors must be considered when selecting the proper cable tray system and planning the installation:

- Material and Finish
- Types of Cable Tray
- NEMA Class
- Cavity Size – Load Depth/Width of Tray
- Length of Straight Sections
- Radius of Fittings
- Cable Tray Support Locations
- Electrical Grounding

MATERIALS AND FINISH

The material selection is based on the environmental conditions and economic considerations for the project.

Steel – Pre-Galvanized

Hot Dip Mill-Galvanized steel (ASTM-A-653-G90 CQ) is zinc coated by a hot dip process. Steel strip from a coil is fed through a continuous zinc coater which cleans, fluxes and coats the steel with molten zinc. After cooling, the steel is recoiled.

The pregalvanized coating conforms to ASTM A-924 and provides 1.25 oz. zinc coating/sq. ft. of material. That is, 1.25 oz. total weight of coatings on both sides of one sq. ft. of material.

Mill galvanized ladder is generally used indoors or in locations not exposed to the elements or corrosives.

Steel – Hot Dip Galvanized After Fabrication

In hot dip galvanizing after fabrication (HDGAF), the finished part is immersed in a bath of molten zinc (ASTM 123). This method results in complete zinc coverage and a thicker coating than pregalvanized or electro-plated steel.

The zinc coating is typically 2.6 MIL or 1.5 oz./sq. ft. of surface area.

This is the coating of choice for applications where protection from severe corrosion is a design factor.

Stainless Steel

Type 304 and Type 316 stainless steel material in accordance with ASTM-A-240.

Aluminum

Aluminum material in accordance with AA-6063-T6. Aluminum trays are suitable for most outdoor applications and offer reductions in total installed costs.

Fiberglass

For extremely corrosive areas, T. J. Cope offers the most complete line of Fiberglass cable trays available. For a complete T. J. Cope "Cope-Glas" catalog, please contact the factory or the T. J. Cope representative in your area.

Special Finishes

For extremely corrosive areas Cope can supply a PVC (polyvinyl chloride) coating over aluminum or uncoated steel. This is applied using the fluidized bed process to a nominal thickness of 12 mils.

Weathering steel is also available; contact factory for availability.

TYPES OF CABLE TRAY

Any assembly of cable tray straight sections, fittings and accessories that form a rigid system to support cables is a cable tray. The different types of tray designs are described below.

Ladder

A prefabricated metal structure consisting of two side rails connected by individual transverse members or rungs.

Ladder tray is the most common and the most economical type of tray. It also provides maximum ventilation for cabling.

Ventilated Trough

A prefabricated metal structure with clear openings no greater than 4".

Trough cable trays are the best choice for smaller cables. Ventilated troughs offer some air-flow while completely eliminating cable sagging.

Solid Trough

A prefabricated metal structure consisting of a bottom with no openings within the cable bearing surface.

Solid bottom cable trays completely eliminate cable sagging and offer the most protection for the cables.

Channel

A prefabricated metal structure consisting of a one-piece ventilated or solid bottom channel section not exceeding 6" in width.

NEMA CLASS

The NEMA Classifications for Cable Tray were established to simplify and standardize the specification of Cable Tray. This classification is based on the working load (the total weight of the cables), and the support span (the distance between supports). The NEMA VE1 specifications are contained in Section 2.

T.J. Cope is a member of NEMA and offers designs in all NEMA cable tray classifications.

Cable Load/Working Load

The Cable load or the working load is the total weight of the cables to be placed in the tray. The NEMA classes are based on cable loads of 50#, 75#, and 100# per lineal foot. This is the total weight of cables in the tray. For purposes of selecting a suitable tray, this weight should be rounded off to the next higher NEMA working (allowable) load.

Support Spans

Support span is the distance between the supports. The NEMA standard support spans are based on 8', 12', 16' and 20'.

NEMA Classes

The following table summarizes the NEMA classes based on cable/working load and support span described previously.

NEMA Load/Span Designations

Class Designation	Support Span Feet	Working Load Lbs./Linear Ft.
8A	8	50
8B	8	75
8C	8	100
12A	12	50
12B	12	75
12C	12	100
16A	16	50
16B	16	75
16C	16	100
20A	20	50
20B	20	75
20C	20	100

In cases where cable loads cannot be determined prior to specification or purchase an estimate of cable weight may have to be made. The following table represents the maximum weight of insulated copper conductors which can be contained in a lineal foot of tray of the widths and load depths given. The National Electrical Code (NEC) greatly limits cable fill area and actual loads will be less. For example, the weight of multiconductor control and/or signal cable is close to those in the table; however, Article 318-8(3)(b) limits fill to 50% of cross section of tray, with 6" the maximum depth usable for computation. A 6" deep x 36" wide cross section would only be permitted to be loaded to 130 pounds per linear foot, using the table below. As cables increase in size and interstices get larger between cables, the total weight decreases. Total weights of cable are rarely more than NEMA categories.

Width	Loading Depth (Lbs./Ft.)			
(in.)	3"	4"	5"	6"
6	22	29	36	44
9	33	44	54	66
12	44	58	72	88
18	65	87	108	130
24	88	116	144	175
30	108	144	180	216
36	130	174	216	260

Other Loading Considerations

It is important to note that when specifying loading requirements, there are other loading factors that may need to be considered over and above the actual cable loads.

Destruction Load Capacity

The total weight in the tray which causes the tray to collapse, is called the "destruction load capacity". When trays do collapse, they generally do so by premature lateral buckling (compression) of the top flange.

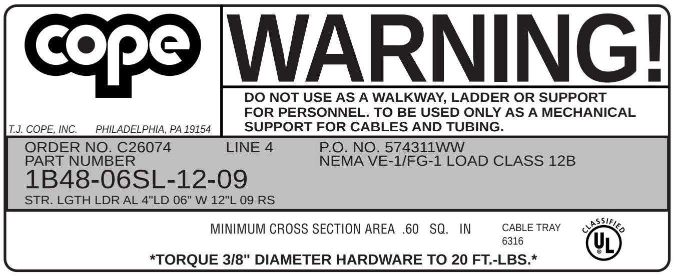
Concentrated Loads

A concentrated load is a static weight applied between the side rails at mid span. When specified, these concentrated static loads may be converted to an equivalent uniform load (We), in pounds per lineal foot, using the following formula:

$$We = \frac{2 * \text{Concentrated Load}}{\text{Support Span}}$$

This load (We) is then added to the static weight of the cable before selecting the appropriate NEMA load span designation.

Please note per the NEMA VE-1 guidelines all T.J. Cope Cable Trays are labeled as follows:



Environmental Loads

Environmental loads should be considered in any outdoor installation, particularly when cable tray is to be covered. These loads include wind loads, snow loads, and ice loads. Specific information data concerning these loads can be obtained by contacting the T.J. Cope Factory. Other sources for this type of information can be obtained through the local weather bureau.

It is important to note that these types of loads need to be considered in terms of pounds per square feet, unlike the cable loads, which are calculated in terms of pounds per lineal foot.

The following are general guidelines to follow:

- **Wind Loads**
  75 m.p.h. wind = 25 lbs./sq. ft. pressure
- **Ice Loads**
  ½" thick ice on tray surfaces weighs 2.4 lbs/sq. ft.
- **Snow Loads**
  Snow loads vary greatly depending on the latitude and altitude at the job site. Contact local weather bureau for information.

Safety Factor

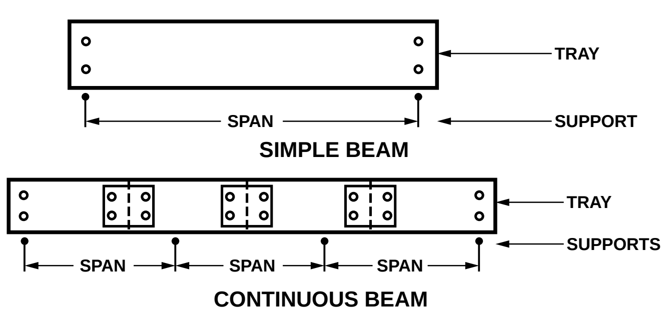
All loads stated in the Cope Selection Charts have a 1.5 safety factor, in accordance with the NEMA VE-1 Guidelines. A safety factor is the reserve strength, above the actual cable loading, for which a tray system was designed.

Conversion of Safety factor from 1.5 to 2.0

The loads stated in the Selection Charts have a safety factor of 1.5 per the NEMA VE-1 guidelines. To convert the load carrying capabilities, as listed in these charts, to a 2.0 safety factor, multiply the stated loads by 0.75.

Testing Methods

Loading data stated in the catalog has been derived from actual testing of the tray systems, or by means of structural calculations. These figures were based on Simple Beam calculation, per the NEMA VE-1 guidelines.

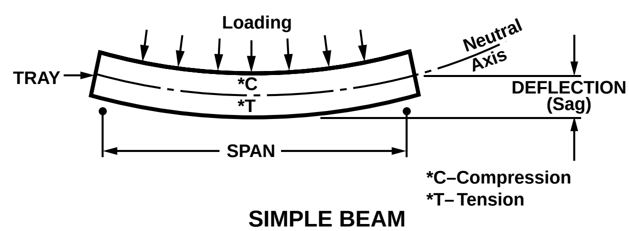


When tray is supported as a simple beam, the load causes bending moments all along the beam resulting in deflection, called sag, inducing stress in the beam. The material above the longitudinal centerline (neutral axis) is compressed. Material below, is stretched and is in tension. The *maximum stress* in a simple beam is at the center of the span. Failure of cable tray will occur in compression before tension. This is why tray rails often have stiffened top flanges.

A simple beam is present when a single straight section of tray is supported on each end. When a series of straight sections are connected and supported by more than one support it is referred to as a continuous beam. The NEMA VE-1 Standards consider only simple beams for testing purposes, due to the following reasons:

1. It requires maximum properties for a given load and support spacing.
2. It is easiest to approximate by calculation.
3. It represents the most severe or worst case loading.
4. Destruction load capacities can be easily verified.

Deflection vs. Economy



Cable tray that meets all performance and dimensional criteria with the safety factor specified without regard for deflection is the most economical tray for the installation. When deflection limitations are imposed, a less economical tray system may result. Cope recommends that deflection limitations should be imposed in only the most stringent situations. If deflection is a concern, Cope recommends these maximum limits for the optimum design.

	Simple Beam Span	
	12'	20'
STEEL	1/100	1/75
ALUMINUM	1/75	1/50

Note: Continuous beams (such as installed tray) deflect approximately ½ of that of simple beams.

CAVITY SIZE – LOAD DEPTH/WIDTH OF TRAY

The size of the cable tray cavity is determined specifically by the electrical requirements and the by the specific cables being used to meet those requirements.

Article 318 of the National Ele"BP5≥al Code lists the specific requirements concerning allowable Cable Fill. It is imperative that the size of the cavity meets the conditions set forth by the NEC, specifically:

- Types of cables allowed in which type of cable trays
- Requirements for arranging the cables in the trays.

The NEC breaks down the allowable cable fill into three main categories:

- **Multi-Conductor:** The number of multi-conductor cables rated at 2000 volts or less in cable tray.
- **Single conductor:** The number of single conductor cables rated at 2000 volts or less in cable tray.
- **MV and MC Cables:** The number of MV & MC cables rated at 2001 volts or over in the cable tray.

Cable fill guidelines set forth by the NEC, are generally based on limiting heat build up in the trays. Where data or communications type cables are being installed, heat is not a critical issue and the allowable fill is determined by the total cross sectional area of the tray cavity:

Total Cross Sectional Area = (Width) x (Load Depth).

LENGTH OF STRAIGHT SECTIONS

Cope Cable Tray is available in 12' and 24' lengths in accordance with the NEMA Standards. It is also available in 10' and 20' lengths in accordance with CSA Standards. Customized lengths are also available upon request.

The following factors need to be considered when specifying the lengths of the tray:

Support Span – The support span should not be greater than the tray length. This ensures that two splice plate connections will not fall within one support span.

Space Constraints – When installing trays in a limited space, as often encountered in commercial applications, 10' and 12' lengths of tray are easier to handle and therefore are better suited for those applications.

Labor Costs – Where trays are being installed in an industrial facility, where space is not as significant an issue, handling 20' and 24' lengths may be more economical. In this instance, half as many tray connections need to be made. Additionally, if the proper tray system is specified, support spans may be lengthened.

RADIUS OF FITTINGS

Cable tray fittings are used to change directions both horizontally and vertically. The standard radii for cable tray fittings are 12", 24", and 36".

The radius of the fittings should be based upon minimum bending radius of the cables. This information can be obtained from the cable manufacturer.

Based on the total number of cables to be placed in the tray it may be more practical to use the next higher radius.

CABLE TRAY SUPPORT LOCATIONS

Straight Sections

A general rule of thumb is that the splice plates should not fall beyond the ¼ point of the span, or the distance between supports. For example: On a 20' support span the splice plates should not be further than 5' away from the support location.

Under no circumstances should two cable tray splices fall between any pair of supports.

For special applications, mid-span splice plates can be furnished. Please contact the factory.

Fittings

Supports for cable tray elbows are critical. It is important to note that the cable tray will come under its greatest stress when cables are being pulled into the tray. Therefore, proper placement of supports is necessary to insure that the integrity of the tray system is maintained during the cable pulling operation.

The diagrams on page 2-10 shows the recommended support locations for fittings.

Thermal Expansion and Contraction

It is important to use expansion connectors when installing long runs of cable tray. The number of expansion connectors required will depend on:

(1) the maximum temperature differential

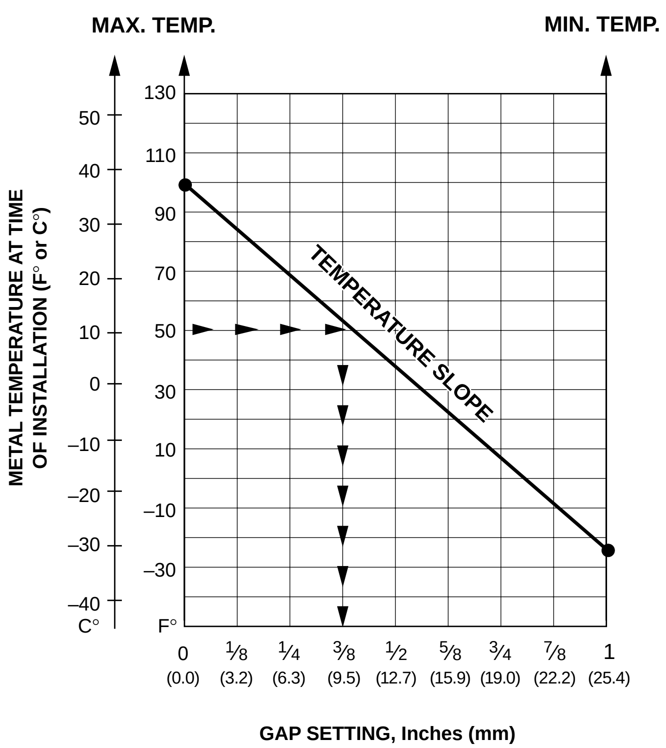
(2) the tray material being installed

Cope Expansion Connectors allow 1" of travel. This table illustrates how often expansion splice plates must be used.

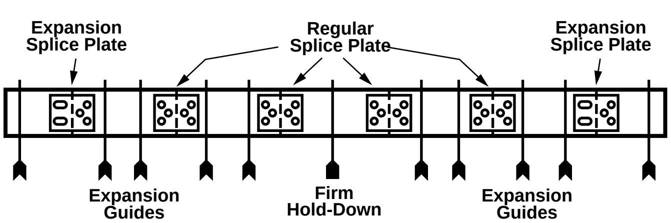
Temperature Difference		Dist. Between Expansion Joints Steel		Aluminum		Copper	
25°F	(14°C)	512'	(156m)	260'	(79m)	363'	(111m)
50°F	(28°C)	256'	(78m)	130'	(40m)	182'	(55m)
75°F	(42°C)	171'	(52m)	87'	(27m)	121'	(37m)
100°F	(56°C)	128'	(39m)	65'	(20m)	90'	(27m)
125°F	(70°C)	102'	(31m)	52'	(16m)	72'	(22m)
150°F	(83°C)	85'	(26m)	43'	(13m)	60'	(18m)
175°F	(97°C)	73'	(22m)	37'	(11m)	52'	(16m)

The following table is used to determine the proper gap setting between trays. The metal temperature determines the proper gap setting at the time of installation. Establish maximum and minimum temperatures in summer and winter for the area. Draw line connecting them. Using the metal temperature at time of installation (C° or F°) draw horizontal to temperature slope and plot straight down to find gap distance at expansion joint.

The following diagram illustrates the proper installation of an expansion system.



It is important to note that grounding straps are required when expansion connections are made. This will insure proper grounding continuity.

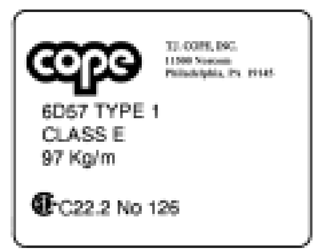


ELECTRICAL GROUNDING

The National Electrical Code, Article 318-7 allows for Cable Tray to be used as an equipment grounding conductor in commercial and industrial establishments. The following table lists specific ampere ratings and the minimum cross sectional area requirements for each rating.

T.J. Cope produces trays that meet the National Electrical Code (ANSI/NFPA 70), and are classified by Underwriters Laboratories, Inc. (UL) as equipment ground conductor. These can be used for any project worldwide except where another standard may take precedence, such as the Canadian Standards Association.

For projects requiring adherence to the Canadian Standards Association (CSA), Cope products as shown in the CSA Selection Charts, sections 3 and 5 are certified as complying with CSA C22.2 No. O and No. 126 and will bear the CSA Mark as shown below.



When required, the trays can be installed per the Canadian Electrical Code Parts I and II (CEC). Cope trays and splice plates meet the bonding requirements of the CSA Standards and the CEC.

Cope CSA steel designs are offered in Type 1 (HDGAF) finish and aluminum with plain finish. Available are ladder, vented and solid bottom cable troughs for 3 meter spans and ladder type for 6 meter spans.

Max. Fuse Amp Rating Circuit Breaker Amp Trip Setting or Relay Amp Trip Setting for Ground Fault Protection of any Cable Tray Circuit In the Cable Tray system	Minimum Cross Sectional Area of Metal* Steel Cable Trays In²	mm²	Aluminum Cable Trays In²	mm²
60	0.2	129	0.2	129
100	0.4	258	0.2	129
200	0.7	452	0.2	129
400	1	645	0.4	258
600	1.50**	968	0.4	258
1,000	-		0.6	387
1,200	-		1	645
1,600	-		1.5	968
2,000	-		2.00**	1,290

*Total cross sectional area of both siderails for ladder trough type trays, or the minimum cross sectional area for metal in channel type cable trays or cable trays of one piece construction.

The cross-sectional area for each T.J. Cope Cable Tray system, straight sections and fittings, can be found on the appropriate Cope Selection charts contained within this publication. In addition all Cope Cable Tray, straight sections and fittings, are supplied with a pressure sensitive labels indicating the cross sectional area of both siderails, as required by the (NEC) National Electrical Code, Article 318.

Bonding Jumpers / Straps

Cable Tray connections made with Cope's standard rigid splice plates do not exceed .00033 ohms net resistance, and are classified in Underwriters Laboratories Classification Program. These rigid type connections do not require electrical bonding straps. T. J. Cope's UL assigned number is "E60627", UL cards will be furnished upon request. T. J. Cope is listed in the UL Electrical Construction Directory under code CYNW as T.J. Cope, Inc.

Electrical bonding straps are required where cable trays are joined by connectors which allow for movement, such as; vertical adjustable connectors, horizontal adjustable connectors, and expansion connectors.

Proper grounding is also necessary where cable trays run parallel to each other, are stacked upon one another, and in other instances, where tray runs are discontinuous.

Further questions concerning grounding issue should be directed to T.J. Cope.

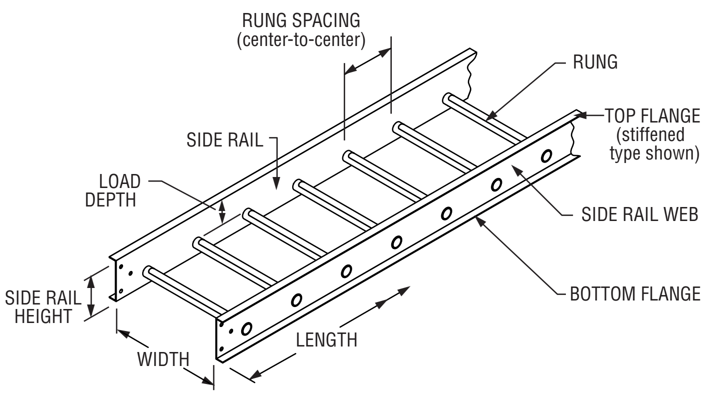
SUMMARY

You are now ready to select the best Cope Cable Tray system to meet your needs. By now, we hope you've decided to select the system using the NEMA CLASSIFICATION (8A, 12B, 20C, etc.) which makes your work so much easier. Selection is also possible using physical dimensions, performance, or any combination of these data listed in our exclusive NEMA oriented T. J. Cope selection charts. As always, should you need additional information, we suggest you contact your nearest Cope Representative or call Cope directly.

NEC Articles

Description	2002 Edition	Prior Editions
Cable Trays	392	318

COPE SWAGE LADDER is a structure consisting of two side rails, connected by individual rungs and is manufactured in accordance with NEMA Standard #VE-1. Cope rungs are fastened to the side members by an exclusive swaging process. This assembly method insures a superior mechanical and electrical connection.



Side Members – Cope side members are designed with top and bottom flanges turned outward. This simplifies fastening the cable tray to the supports. Cable tray with outward facing flanges allows complete access within the cable loading area and eliminates the possibility of cable damage from sharp edges within the cable area. The return on the top flange strengthens the side member and allows cable to be smoothly dropped over the side.

Rung – Cope ladder rungs are 1.00" diameter tubing flattened on top to provide a cable bearing surface. This construction allows cable to drop out anywhere without contacting a sharp edge.

Rung Spacing – The interval at which rungs are swaged to the side member. This is measured from centerline of rung to centerline of rung. Cope manufactures straight lengths with four standard rung spacings; 6", 9", 12", and 18". Rung spacing selected is generally determined by size and type of cable being supported. When in doubt, 9" rung spacing is a generally accepted compromise.

Length – The longitudinal dimensions of standard Cope Cable Ladder are 10', 12', 20' or 24'.

Width – The transverse dimensions of Cope Cable Ladder are measured inside, (from side member web to side member web), and are furnished in seven standard widths: 6", 9", 12", 18", 24", 30", or 36".

Overall Width – Overall ladder width is equal to the inside or nominal width plus the width of side member flanges.

Load Depth – Measured from top surface of rung to top of side member. This is not to be confused with overall height. Cope manufactures four loading depths: 3", 4", 5", and 6" in accordance with NEMA Standard VE-1.

Overall Height – Cope overall height is equal to the loading depth plus 1¼".

Fittings – For changing direction horizontally and vertically, Cope manufactures elbows, tees and crosses in all widths and loading depths. Fittings are available in three standard radii; 12", 24", and 36". Cope maintains a nominal 9" rung spacing through the centerline of all fittings.

COPE CABLE LADDER FEATURES IMPORTANT INDUSTRY-LEADING FEATURES:

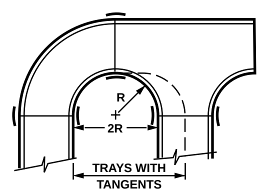
1. Universal Curvilinear Splice Plate System

The splice plates for rigid connections have a slight curve so they can be used on straight sections or fittings. Tightening of the fastener pulls the plate flush with the side rail. The fasteners are snug and the joint is superior structurally and electrically. Even when hand-tight, there is pressure on the fastener to hold it securely.

Note: *Heavy Duty, Mid Span Splice Plates available upon request .*

2. New Zero Tangent Fittings

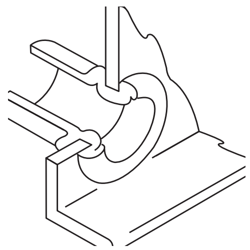
Tangent as referred to on cable tray fittings is the straight at the end of the curve to accommodate a flat splice plate. This wastes space in tightly packed areas, such as spreader rooms, where the heat of thousands of cables accumulate. Eliminating tangents allow more tray runs to distribute the heat. COPE ZERO TANGENT FITTINGS CAN SAVE UP TO 12" PER ROW OF TRAY.



BONUS: Inspection for proper installation of splice plate is visual. If the plate is bowed away from the rail, nuts must be tightened.

3. Cope's Swaged Rung Cable Ladder System

Process – The heart of the Cope design is the tubular rung and its connection to the side rail by cold swaging... a process where special machinery compresses and locks the tubular rung material around both the inside and outside of the cable tray side rails. This connection is made without the use of heat which can potentially disturb the molecular structure of the metal and weaken it.



Cutaway – Cope Swage

The tubular rung is flattened during the swaging process to ensure a proper cable bearing surface.

Testing – The superior strength of the swaged ladder tray system has been verified in independent testing conducted by the Pittsburgh Testing Laboratory. Pullout loads of 2500 lbs. were reached. Other tests show the same type rungs, when welded, had a 35% lower pullout load.

The strength of the swage also maintains the 90° relationship of the rungs to the side rail. The tubular rungs, which are very stiff, transmit the cable loads to the side rails resulting in much less deflection than in a similar system with welded rungs.

For a copy of the independent test results, please contact the factory.

Swage Advantages – Cold swaging allows for the side rails to be turned outward, simplifying cable installation and provides 100% access to the cables.

The cold swaging yields the most rigid tray system in the industry. The swaged rung connection resists stresses in all directions; up or down, side to side, or in and out. The swaged ladder also resists the camber and warping effects encountered in a typical welded system.

The increased rigidity means that a 24' section of tray can be lifted on one end with little or no twisting or bending of the tray section. Theis rigid construction makes the trays safer for field personnel to handle and reduces shipping damage.

Electrical Properties – Electrically, the 106 tons of pressure in the swaging process virtually eliminates the interstices and a homogenous electrical path results:

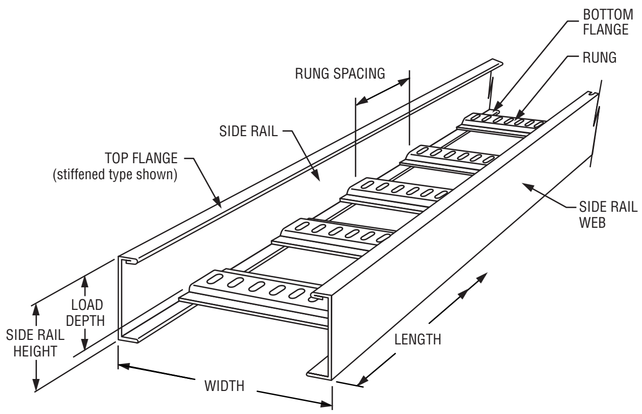
Resistance of Cope Aluminum Swaged Tray: 31 microhms

Resistance of Cope Steel Swaged Tray: 37.3 microhms

Resistance of Popular Aluminum Welded Tray: 101 microhms

Conclusion - Cold swaging yields a very strong, efficient and aesthetically pleasing system that has stood the test of time and offers installation savings due to its ease of handling.

COPE HAT is a prefabricated metal structure consisting of reinforced hat-shaped rungs, arc-welded to the side rails, and is manufactured to NEMA Standard VE-1. Cope Hat rungs are fastened to the side rails with an automatic, self-indexing MIG-arc-welding system, plug welding a ½" diameter zone. The superior strength of the Cope plug weld withstands the rigors of shipping, handling, erection and cable support service.

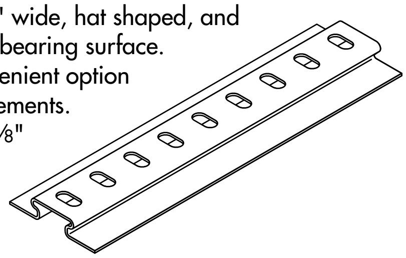


Side Members – Cope Hat side members are designed with top and bottom flanges turned inward. This minimizes the space requirements of the cable tray system, and allows a very low side rail height for each NEMA Standard VE-1 load depth.

Rungs – Cope Hat provides for hat shaped rungs.

Slotted Rungs—*Slotted Hat shaped Rungs are provided on trays 6", 9", 12", 18", and 24" wide.

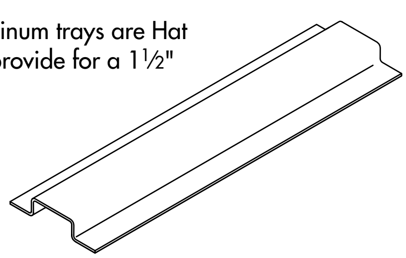
All Slotted rungs are 2½" wide, hat shaped, and provide for a 1¼" cable bearing surface. Slots provide a neat convenient option for cable tie down requirements. Slots are 5⁄16" wide and ⅝" in length, and are located on 1" centers across the entire width of the rung.



Solid Rungs—*Solid Hat shaped Rungs are provided on trays 30" and 36" wide.

Solid Hat Rungs for Steel trays are Hat shaped, 2¼" wide and provide for a ⅞" cable bearing surface.

Solid Hat Rungs for Aluminum trays are Hat shaped, 3¼" wide and provide for a 1½" cable bearing surface.



Rung Spacing – Cope manufactures straight lengths with four standard rung spacings; 6", 9", 12", and 18". The 6" rung spacing results in a 3 ¾" opening between rungs allowing the tray to be classified as a ventilated trough per NEMA Standard VE-1.

Length – The longitudinal dimensions of standard Cope Hat cable tray are 10', 12', 20' and 24'.

Width – The transverse dimensions of Cope Hat cable tray are measured inside, (from side member web to side member web), and are furnished in seven standard widths: 6", 9", 12", 18", 24", 30" and 36".

Overall Width – Overall tray width is equal to the inside or nominal width plus the thickness of the two side rail webs.

Overall Tray Width = Nominal + 3⁄16" Width

Load Depth – Measured from the top surface of the rungs to the top of the side member. Cope manufactures four loading depths; 2⅞", 3⅝", 4⅝" and 5⅝" corresponding to the four nominal loading depths in NEMA Standard VE-1; 3", 4", 5" and 6".

Overall Height – Cope Hat cable tray overall height is equal to the loading depth plus ⅝".

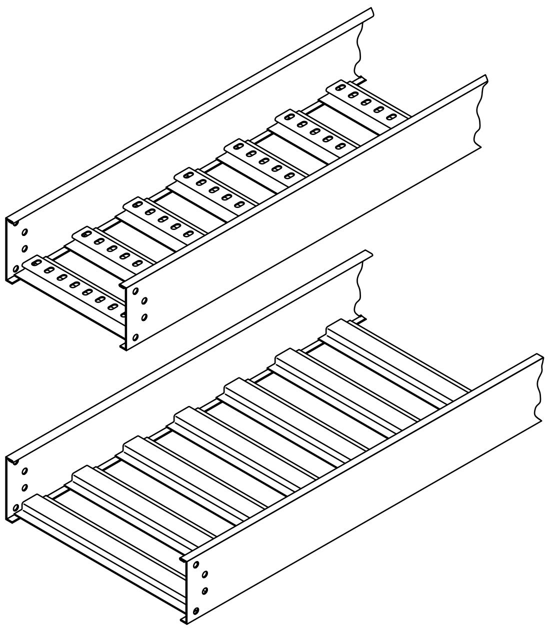
Fittings – For changing direction both horizontally and vertically, Cope manufactures elbows, tees and crosses in all widths and loading depths. Fittings are available in three standard radii; 12", 24" and 36". Standard fittings maintain a nominal 9" rung spacing through the centerline of the fitting. Cope manufactures *all* standard fittings with zero tangents.

COPE HAT CABLE TRAY WITH FOUR IMPORTANT INDUSTRY-LEADING FEATURES:

1. **Compact Economical System –** Cope Hat cable tray is an extremely compact economical flange in cable tray system which allows the designer to utilize this cable tray in tight locations. The extremely low profile Hat Rungs (5⁄8" high) minimize the required side rail height while maintaining NEMA Standard VE-1 nominal load depths. Overall system height is only 5⁄8" greater than the actual loading depth.

2. **Universal Curvilinear Splice Plate System –** The splice plates for rigid connections have a slight curve so they can be used on straight sections or fittings. Tightening of the fastener pulls the plate flush with the side rail. The fasteners are snug and the joint is superior structurally and electrically. Even when hand-tight, there is pressure on the fastener to hold it securely.

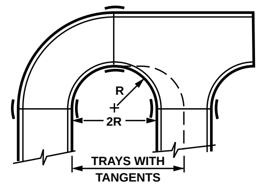
   Note: *Heavy Duty, Mid Span Splice Plates available upon request.*



Straight Lengths

Slotted Rungs *provided on trays 6", 9", 12", 18" and 24" wide.*
Solid Rungs *provided on trays 30" and 36" wide.*

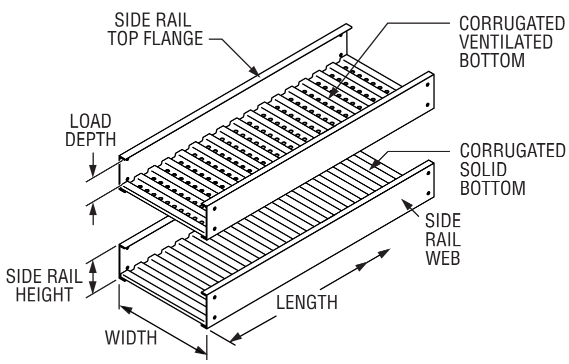
3. **Zero Tangent Fittings –** Tangent as referred to on cable tray fittings is the straight at the end of the curve to accommodate a flat splice plate. This wastes space in tightly packed areas, such as spreader rooms, where the heat of thousands of cables accumulate. Eliminating tangents allow more tray runs to distribute the heat. COPE ZERO TANGENT FITTINGS CAN SAVE UP TO 12" PER ROW OF TRAY.

   BONUS: Inspection for proper installation of splice plate is visual. If the plate is bowed away from the rail, nuts must be tightened.

4. **The Exclusive Auto MIG-Arc-Welded Assembly System –** Cope Hat rungs on straight sections are assembled to the side rails using an automatic, self indexing MIG-arc-welding system fusing a ½" diameter zone. These welds are 700% larger and stronger than the common resistance (spot) weld in use today. Electrical properties of the assembly are unequalled; are well within the NEMA requirements due to the continuous electrical path. The mechanical strength of this welded assembly withstands the rigors of shipping, handling, erection and service. The size of the weld keeps the vertical axis of the side rail from sloping inward under load. The weld maintains the 90° angle between the side rail and bottom. This allows full use of the section properties. Spot welds do not permit this. Also, stresses on spot welds (barely ⅛" in diameter) are so severe that breakage often occurs during shipping and erection. Cope Hat fittings are also assembled by MIG-arc welding.

COPE TROF is a prefabricated metal structure consisting of ventilated or solid bottoms, welded to the side rails, and are manufactured and tested to NEMA Standard VE-1. Straight sections, fittings (elbows, tees, crosses, reducers, etc.) and a full line of matching and interfacing accessories are available. Corrugations give great lateral rigidity to the bottom transmitting the load to the side rails. Lateral (transverse) deflection is nearly eliminated compared to rung type troughs where the rails are not continuously braced by the bottom. Cope Corrugated bottoms do NOT limit the tray load capacity.



STRAIGHT SECTION

Corrugated bottoms have 1" wide ribs on 2" centers. Ventilation holes in the valleys of the corrugations are 11⁄16" diameter on one inch (1") centers. Free passage of air through the openings results in a 68% open area at the elevated cable support surface on top of ribs.

Solid Trof have the same corrugations but have no holes. Note: Where drain holes are required, one can be placed in the center of each valley, if specified.

COPE TROF WITH THREE IMPORTANT INDUSTRY-LEADING FEATURES:

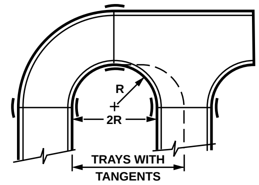
1. New Universal Curvilinear Splice Plate System

The splice plates for rigid connections have a slight curve so they can be used on straight sections or fittings. Tightening of the fastener pulls the plate flush with the side rail. The fasteners are snug and the joint is structurally and electrically superior. Even when hand-tight, there is pressure on the fastener to hold it securely.

Note: *Heavy Duty, Mid Span Splice Plates available upon request.*

2. New Zero Tangent Fittings

Tangent as referred to on cable tray fittings is the straight at the end of the curve to accommodate a flat splice plate. This wastes space in tightly packed areas, such as spreader rooms, where the heat of thousands of cables accumulate. Eliminating tangents allow more tray runs to distribute the heat. COPE ZERO TANGENT FITTINGS CAN SAVE UP TO 12" PER ROW OF TRAY.



BONUS: Inspection for proper installation of splice plate is visual. If the plate is bowed away from the rail, nuts must be tightened.

3. The Exclusive Auto Arc-Welded Assembly System

Corrugated bottoms on straight sections are assembled to the side rails using an automatic, self indexing MIG-arc-welding system fusing a ½" diameter zone. These welds are 700% larger and stronger than the common resistance (spot) weld in use today. Electrical properties of the assembly are unequalled; are well within the NEMA requirements due to the continuous electrical path. The mechanical strength of this welded assembly withstands the rigors of shipping, handling, erection and service. The size of the weld keeps the vertical axis of the side rail from sloping inward under load. The weld maintains the 90° angle between the side rail and bottom. This allows full use of the section properties. Spot welds do not permit this. Also, stresses on spot welds (barely ⅛" in diameter) are so severe that breakage often occurs during shipping and erection. Cope Trof fittings are also assembled by MIG-arc-welding.

USES OF COPE TROF

Generally, Cope Trof is optimum for ANY size cable. It offers continuous support with or without ventilation. The bottom design offers safety and security from unauthorized personnel. The vent holes may be bushed with a grommet for dropping out communication cables (Cat. DOG-2).