آکام استیل آراد
AKAM STEEL ARAD

PRODUCT CATALOGUE

Cable Support Solution

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Introduction

AKAM steel positioned through its local solutions to answer today's most clients need we are a privately owned company offering a flexible approach to business matched to policies of national and industrial units, machinery and personnel. We are energized by the challenge of powering up a world that demands twice as much energy as today. We are anticipating needs, engineering products, and creating solution to energize our markets today and in the future.

AKAM steel ensures products are manufactured to the highest standards and delivered on time. Fully trained operators offer a wealth of knowledge, experience and expertise to ensure continuity of industry standards in all products.

General

Why Cable Tray?

Because a Cable Tray Wiring System Provides Safe and Dependable Ways to Save Now and Later

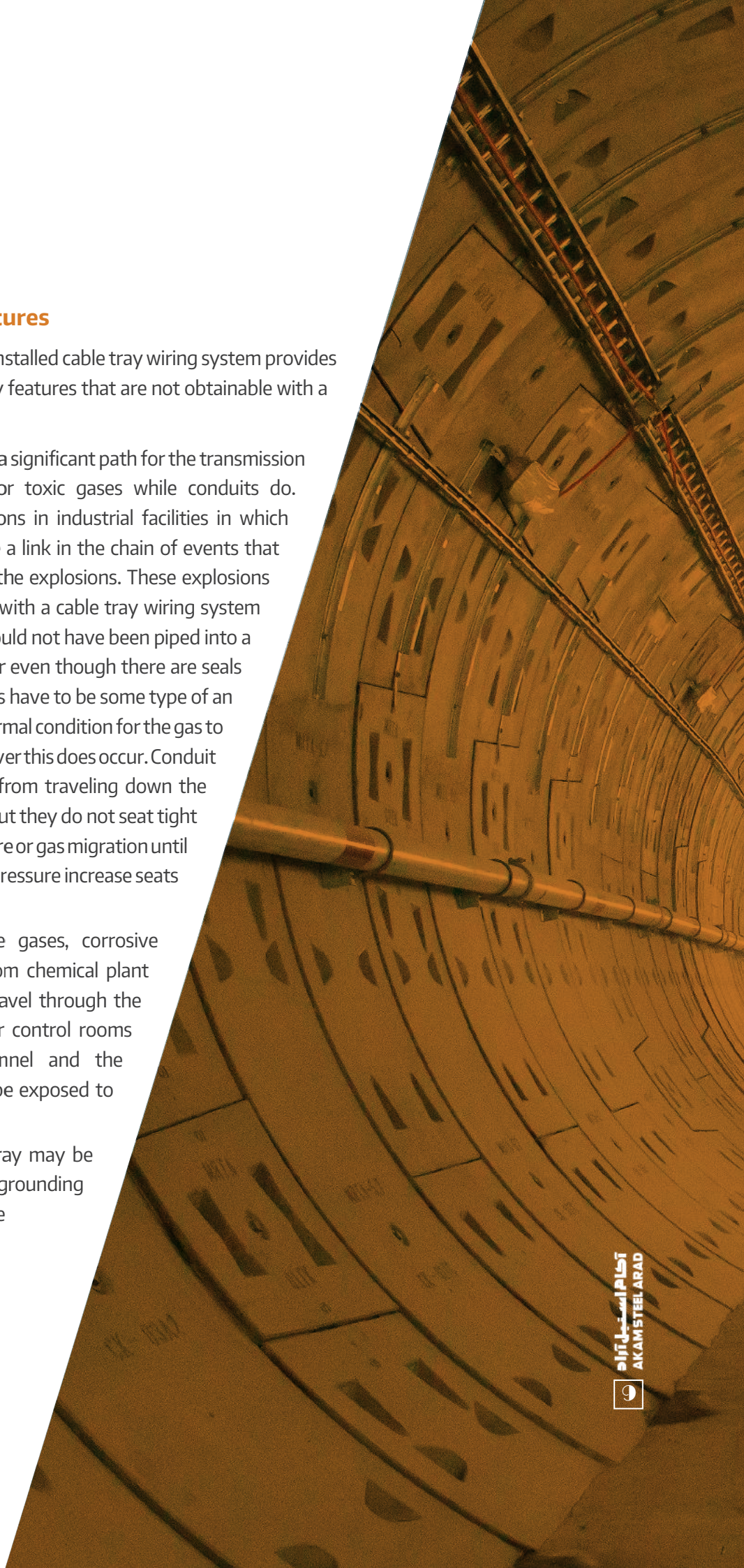
Large numbers of electrical engineers have limited detail knowledge concerning wiring systems. There is the tendency by engineers to avoid becoming involved in the details of wiring systems, leaving the wiring system selection and design to designers or contractors. Certain decisions must be made for any wiring system installation, and these decisions should be made in the design and construction activities) chain where maximum impact is achieved at the lowest possible cost. Deferring design decisions to construction can result in increased costs and wiring systems incompatible with the owner)s future requirements. Early in the project)s design life, the costs and features of various applicable wiring systems should be objectively evaluated in detail. Unfortunately, such evaluations are often not made because of the time and money involved. It is important to realize that these initial evaluations are important and will save time and money in the long run. The evaluation should include the safety, dependability, space and cost requirements of the project. Many industrial and commercial electrical wiring systems have excessive initial capital costs, unnecessary power outages and require excessive maintenance. Moreover, the wiring system may not have the features to easily accommodate system changes and expansions, or provide the maximum degree of safety for the personnel and the facilities. Cable tray wiring systems are the preferred wiring system when they are evaluated against equivalent conduit wiring systems in terms of safety, dependability, space and cost. To properly evaluate a cable tray wiring system vs. a conduit wiring system, an engineer must be knowledgeable of both their installation and the system features. The advantages of cable tray installations are listed below and explained in the following paragraphs.

- Safety Features
- Dependability
- Space Savings
- Cost Savings
- Design Cost Savings
- Material Cost Savings
- Installation Cost & Time Savings
- Maintenance Savings

Cable Tray Safety Features

A properly engineered and installed cable tray wiring system provides some highly desirable safety features that are not obtainable with a conduit wiring system.

- Tray cables do not provide a significant path for the transmission of corrosive, explosive, or toxic gases while conduits do. There have been explosions in industrial facilities in which the conduit systems were a link in the chain of events that set up the conditions for the explosions. These explosions would not have occurred with a cable tray wiring system since the explosive gas would not have been piped into a critical area. This can occur even though there are seals in the conduits. There does have to be some type of an equipment failure or abnormal condition for the gas to get into the conduit, however this does occur. Conduit seals prevent explosions from traveling down the conduit (pressure piling) but they do not seat tight enough to prevent moisture or gas migration until an explosion or a sudden pressure increase seats them.
- In addition to explosive gases, corrosive gases and toxic gases from chemical plant equipment failures can travel through the conduits to equipment or control rooms where the plant personnel and the sensitive equipment will be exposed to the gases.
- In facilities where cable tray may be used as the equipment grounding conductor in accordance



Cable Tray Dependability

A properly designed and installed cable tray system with the appropriate cable types will provide a wiring system of outstanding dependability for the control, communication, data handling, instrumentation, and power systems. The dependability of cable tray wiring systems has been proven by a 50 year track record of excellent performance.

- Cable tray wiring systems have an outstanding record for dependable service in industry. It is the most common industrial wiring system in Europe. In continuous process systems, an electrical system failure can cost millions of dollars and present serious process safety problems for the facility, its personnel and the people in the surrounding communities. A properly designed and installed cable tray system with the appropriate cable types will provide a wiring system of outstanding dependability for process plants.
- Television broadcast origination facilities and studios make use of cable tray to support and route the large volumes of cable needed for their operations with a high degree of dependability. It would be impossible to have the wiring system flexibility they need with a conduit wiring system.
- Large retail and warehouse installations use cable tray to support their data communication cable systems. Such systems must be dependable so that there are no outages of their continuous inventory control systems.
- Cable tray wiring systems have been widely used to support cabling in both commercial and industrial computer rooms overhead and beneath the floor to provide orderly paths to house and support the cabling. These types of installations need a high degree of dependability which can be obtained using cable tray wiring systems.

Cable Tray Space Savings

When compared to a conduit wiring system, an equivalent cable tray wiring system installation requires substantially less space. Increasing the size of a structure or a support system to handle a high space volume conduit wiring system is unnecessary when this problem can be avoided by the selection of a cable tray wiring system.

- Facilities with high density wiring systems devoted to control, instrumentation, data handling and branch circuit wiring have the choice of selecting cable tray or conduit wiring systems. A conduit wiring system is often a poor choice because large conduit banks require significant space, competing with other systems and equipment. Choosing a cable tray wiring system greatly reduces this problem.
- Financial institutions with large computer installations have high density wiring systems under floors or in overhead plenum areas that are best handled by cable tray wiring systems.
- Airport facilities have extensive cable tray wiring systems to handle the ever expanding needs of the airline industry.
- Cable tray is used in many facilities because of the ever present need of routing more and more cables in less space at lower costs.
- Large health care facilities have high density wiring systems that are ideal candidates for cable tray.

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Cable Tray Wiring System Cost Savings

Usually, the initial capital cost is the major factor in selecting a projectȷs wiring system when an evaluation is made comparing cable tray wiring systems and conduit wiring systems. Such an evaluation often covers just the conductors, material, and installation labor costs. The results of these initial cost evaluations usually show that the installed cable tray wiring system will cost 10 to 60 percent less than an equivalent conduit wiring system. The amount of cost savings depends on the complexity and size of the installation. There are other savings in addition to the initial installation cost savings for cable tray wiring systems over conduit wiring systems. They include reduced engineering costs, reduced maintenance costs, reduced expansion costs, reduced production losses due to power outages, reduced environmental problems due to continuity of power and reduced data handling system costs due to the continuity of power. The magnitudes of many of these costs savings are difficult to determine until the condition exists which makes them real instead of potential cost savings.

Design Cost Savings

- Most projects are roughly defined at the start of design. For projects that are not 100 percent defined before design start, the cost of and time used in coping with continuous changes during the engineering and drafting design phases will be substantially less for cable tray wiring systems than for conduit wiring systems. A small amount of engineering is required to change the width of a cable tray to gain additional wiring space capacity. Change is a complex problem when conduit banks are involved.
- The final drawings for a cable tray wiring system may be completed and sent out for bid or construction more quickly than for a conduit wiring system. Cable tray simplifies the wiring system design process and reduces the number of details.
- Cable tray wiring systems are well suited for computer aided design drawings. A spread sheet based wiring management program may be used to control the cable fills in the cable tray. While such a system may also be used for controlling conduit fill, large numbers of individual conduits must be monitored. For an equal capacity wiring system, only a few cable tray runs would have to be monitored.
- Dedicated cable tray installation zones alert other engineering disciplines to avoid designs that will produce equipment and material installation conflicts in these areas. As more circuits are added, the cable tray installation zone will increase only a few inches; the space required for the additional conduits needed would be much greater.

- The fact that a cable can easily enter and exit cable tray anywhere along its route, allows for some unique opportunities that provide highly flexible designs.
- Fewer supports have to be designed and less coordination is required between the design disciplines for the cable tray supports compared to conduit supports.

Installation Cost and Time Savings

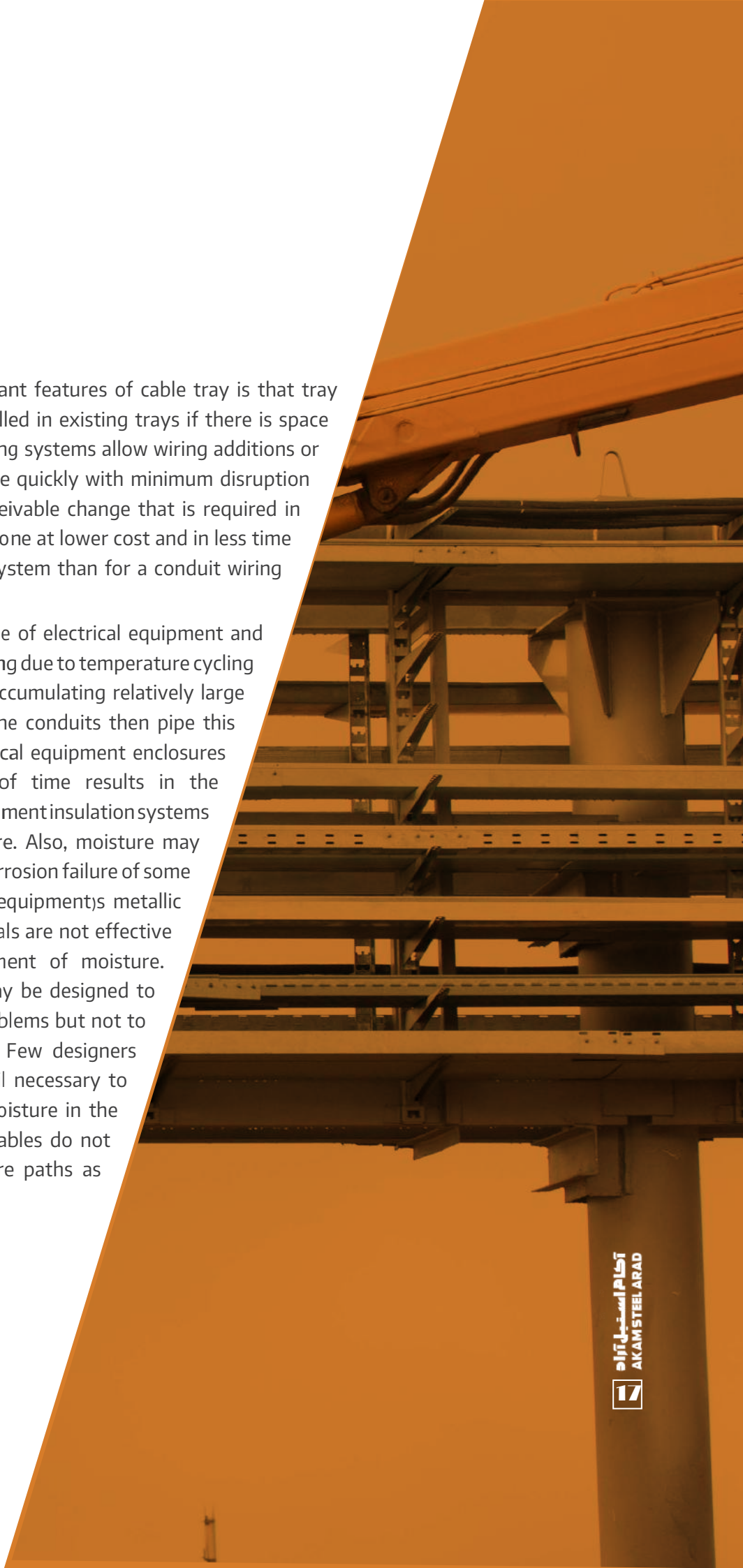
- Depending on the complexity and magnitude of the wiring system, the total cost savings for the initial installation (labor, equipment and material) may be up to ٧٥ percent for a cable tray wiring system over a conduit wiring system. When there are banks of conduit to be installed that are more than 100 feet long and consist of four or more 2 inch conduits or 12 or more smaller conduits, the labor cost savings obtained using cable tray wiring systems are very significant.
- Many more individual components are involved in the installation of a conduit system and its conductors compared to the installation of a cable tray system and its cables. This results in the handling and installing of large amounts of conduit items vs. small amounts of cable tray items for the same wiring capacity.
- The higher the elevation of the wiring system, the more important the number of components required to complete the installation. Many additional man-hours will be required just moving the components needed for the conduit system up to the work location.
- Conduit wiring systems require pull boxes or splice boxes when there is the equivalent of more than 360 degrees of bends in a run. For large conductors, pull or junction boxes may be required more often to facilitate the conductor's installation. Cable tray wiring systems do not require pull boxes or splice boxes.
- Penetrating a masonry wall with cable tray requires a smaller hole and limited repair work.
- More supports are normally required for rigid steel conduit
- Concentric conduit bends for direction changes in conduit banks are very labor intensive and difficult to make. However if they are not used, the installation will be unattractive. The time required to make a concentric bend is increased by a factor of 6-3 over that of a single shot bend. This time consuming practice is eliminated when cable tray wiring systems are used.
- Conductor pulling is more complicated and time consuming for conduit wiring systems than for cable tray wiring systems. Normally, single conductor wire pulls for conduit

wiring systems require multiple reel setups. For conduit wiring systems, it is necessary to pull from termination equipment enclosure to termination equipment enclosure. Tray cables being installed in cable trays do not have to be pulled into the termination equipment enclosures. Tray cable may be pulled from near the first termination enclosure along the cable tray route to near the second termination enclosure. Then, the tray cable is inserted into the equipment enclosures for termination. For projects with significant numbers of large conductors terminating in switchgear, this may be a very desirable feature that can save hours of an electrician)s time. Unnecessary power outages can be eliminated since tray cable pulls may be made without de-energizing the equipment. For conduit installations, the equipment will have to be de-energized for rubber safety blanketing to be installed, otherwise the conductor pulls might have to be made on a weekend or on a holiday at premium labor costs to avoid shutting down production or data processing operations during normal working hours.

- Conductor insulation damage is common in conduits since jamming can occur when pulling the conductors. Jamming is the wedging of conductors in a conduit when three conductors lay side by side in a flat plane. This may occur when pulling around bends or when the conductors twist. Ninety-two percent of all conductor failures are the result of the conductor's insulation being damaged during the conductor's installation. Many common combinations of conductors and conduits fall into critical jam ratio values. Critical jam ratio (J.R.= Conduit ID/Conductor OD) values range from 2.8 to 3.2. The J. R. for 3 single conductor THHN/THWN insulated 350 kcmil conductors in a 2/21 inch conduit would be 2.469) 3.0 inches/ 0.816 inches). If conductor insulation damage occurs, additional costs and time are required for replacing the conductors. This cannot occur in a cable tray wiring system.
- Smaller electrician crews may be used to install the equivalent wiring capacity in cable tray. This allows for manpower leveling, the peak and average crew would be almost the same number, and the electrician experience level required is lower for cable tray installations.
- Since the work is completed faster there is less work space conflict with the other construction disciplines. This is especially true if installations are elevated and if significant amounts of piping are being installed on the project.

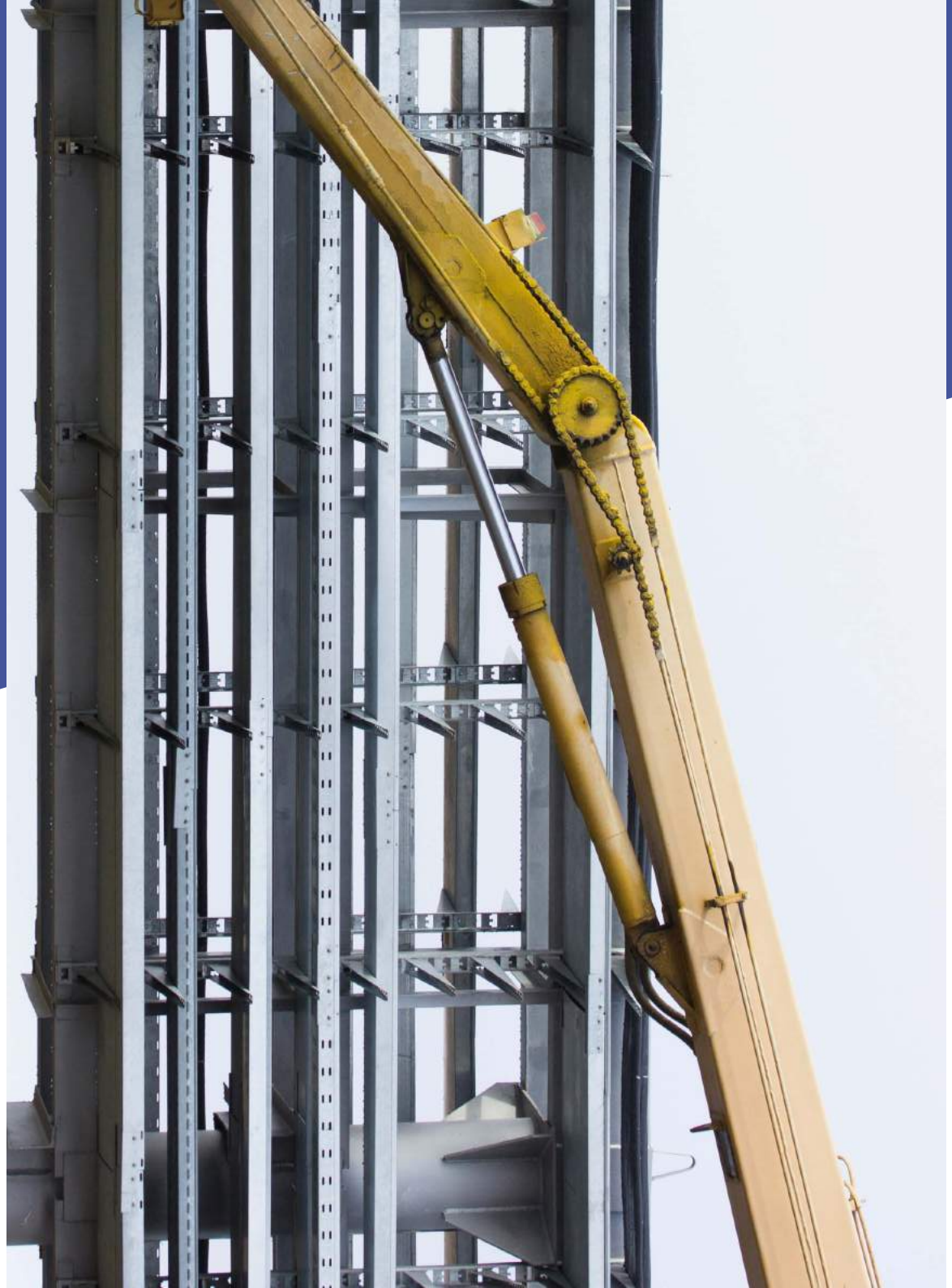
Maintenance Savings

- One of the most important features of cable tray is that tray cable can easily be installed in existing trays if there is space available. Cable tray wiring systems allow wiring additions or modifications to be made quickly with minimum disruption to operations. Any conceivable change that is required in a wiring system can be done at lower cost and in less time for a cable tray wiring system than for a conduit wiring system.
- Moisture is a major cause of electrical equipment and material failures. Breathing due to temperature cycling results in the conduits accumulating relatively large amounts of moisture. The conduits then pipe this moisture into the electrical equipment enclosures which over a period of time results in the deterioration of the equipment insulation systems and their eventual failure. Also, moisture may become a factor in the corrosion failure of some of the critical electrical equipment)s metallic components. Conduit seals are not effective in blocking the movement of moisture. The conduit systems may be designed to reduce the moisture problems but not to completely eliminate it. Few designers go into the design detail necessary to reduce the effects of moisture in the conduit systems. Tray cables do not provide internal moisture paths as do conduits.



- In the event of external fires in industrial installations, the damage to the tray cable and cable tray is most often limited to the area of the flame contact plus a few feet on either side of the flame contact area. For such a fire enveloping a steel conduit bank, the steel conduit is a heat sink and the conductor insulation will be damaged for a considerable distance inside the conduit. Thermoplastic insulation may be fused to the steel conduit and the conduit will need to be replaced for many feet. This occurred in an Ohio chemical plant and the rigid steel conduits had to be replaced for ٩٠ feet. Under such conditions, the repair cost for fire damage would normally be greater for a conduit wiring system than for cable tray and tray cable. In the Ohio chemical plant fire, there were banks of conduits and runs of cable tray involved. The cable tray wiring systems were repaired in two days. The conduit wiring systems were repaired in six days and required a great deal more manpower
- In the event of an external fire, the conduit becomes a heat sink and an oven which decreases the time required for the conductor insulation systems to fail. The heat decomposes the cable jackets and the conductor insulation material. If these materials contain PVC as do most cables, hydrogen chloride vapors will come out the ends of the conduits in the control rooms. These fumes are very corrosive to the electronic equipment. They are also hazardous to personnel. A flame impingement on a cable tray system will not result in the fumes going into the control room as there is no containment path for them. They will be dispersed into the atmosphere.

In Most Cases an Objective Evaluation Of The Requirements For Most High Density Wiring Systems Will Show That a Cable Tray Wiring System Provides a Wiring System Superior To a Conduit Wiring System.



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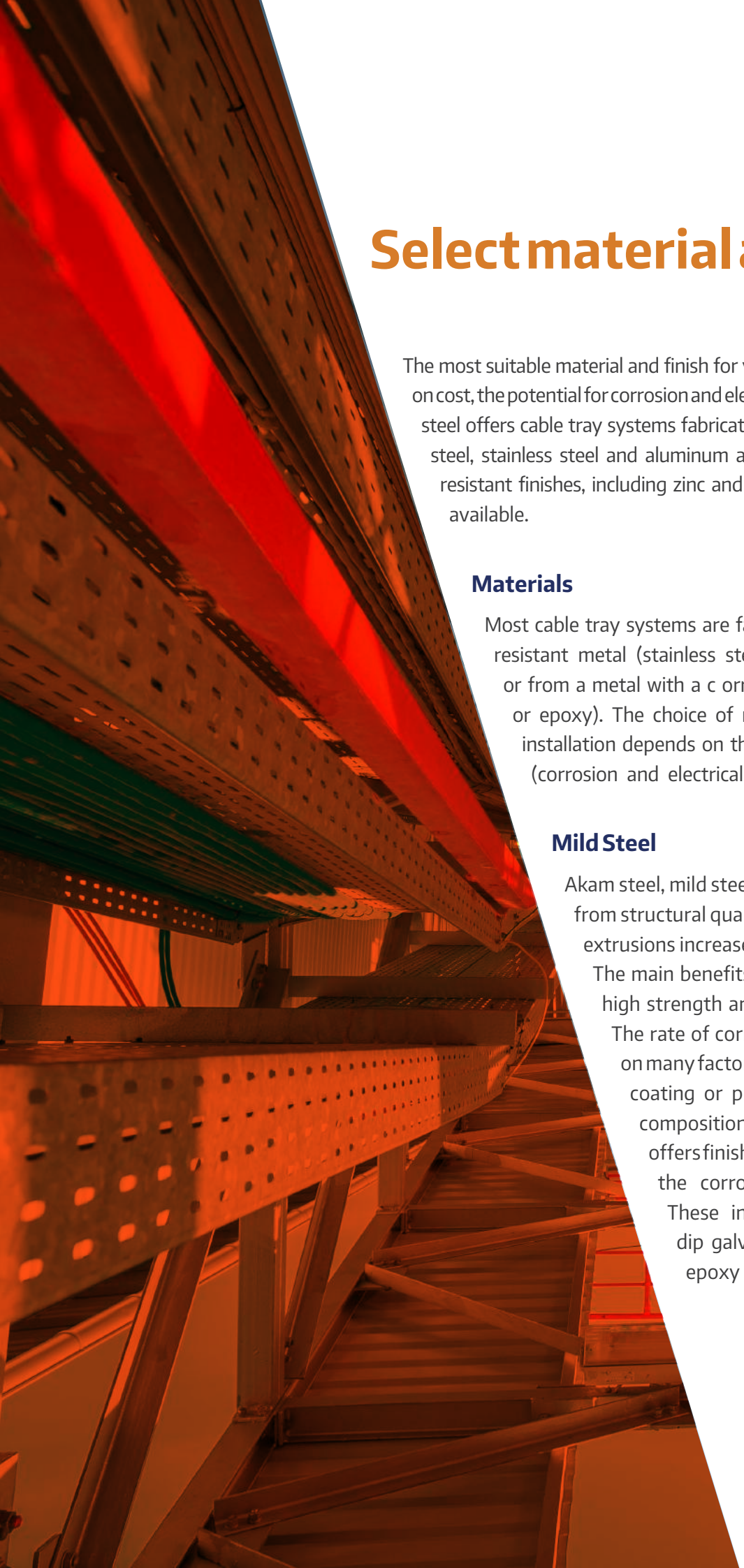


Select material and finish

The most suitable material and finish for your application will depend on cost, the potential for corrosion and electrical considerations. Akam steel offers cable tray systems fabricated from corrosion-resistant steel, stainless steel and aluminum alloys along with corrosion-resistant finishes, including zinc and epoxy. Special paint is also available.

Materials

Most cable tray systems are fabricated from acorrosion-resistant metal (stainless steel or an aluminum alloy) or from a metal with a c orrosion-resistant finish (zinc or epoxy). The choice of material for any particular installation depends on the installation environment (corrosion and electrical considerations) and cost.

Mild Steel

Akam steel, mild steel cable trays are fabricated from structural quality steels and Forming and extrusions increase the mechanical strength. The main benefits of steel cable tray are its high strength and low cost.

The rate of corrosion will vary depending on many factors such as the environment, coating or protection applied and the composition of the steel. Akam steel offers finishes and coatings to improve the corrosion resistance of steel. These include pregalvanized, hot dip galvanized (after fabrication), epoxy and special paints.

Stainless steel

Stainless steel offers high yield strength and high creep strength, at high ambient temperatures. Akam steel stainless steel cable tray is roll-formed from AISI Type 316/316L stainless steel. Stainless steel is resistant to dyestuffs, organic chemicals, and inorganic chemicals at elevated temperatures. Higher levels of chromium and nickel and a reduced level of carbon serve to increase corrosion resistance and facilitate welding.
Type 316 includes molybdenum to increase high temperature strength and improve corrosion resistance, especially to chloride and sulfuric acid.

Aluminum

Cable trays fabricated of extruded aluminum are often used for their high strength-to-weight ratio, superior resistance to certain corrosive environments and ease of installation. They also offer the advantages of being light weight (approximately less than %50 that of a steel tray) and maintenance-free, and since aluminum cable trays are non-magnetic, electrical losses are reduced to a minimum.
AKAM steel cable tray products are formed from the 6063 series alloys, which by design are copper-free alloys for marine applications. These alloys contain silicon and magnesium in appropriate proportions to form magnesium silicide, allowing them to be heat treated. These magnesium silicon alloys possess good formability and structural properties, as well as excellent corrosion resistance.
The unusual resistance to corrosion, including weathering, exhibited by aluminum is due to the self-healing aluminum oxide film that protects the surface. Aluminum's resistance to chemicals in the application environment should be tested before installation.

Finishes

Electrogalvanized coatings

The most widely used coating for cable tray is galvanizing. It is cost-effective, protects against a wide variety of environmental chemicals and is self-healing if an area becomes unprotected through cuts or scratches.
Steel is coated with zinc through electrolysis by dipping steel into a bath of zinc salts. A combination of carbonates, hydroxides and zinc oxides forms a protective film to protect the zinc itself. Resistance to corrosion is directly related to the thickness of the coating and the harshness of the environment.

Pregalvanized

Pregalvanized, also known as mill-galvanized or hot dip mill-galvanized, is produced in a rolling mill by passing steel coils through molten zinc. These coils are then slit to size and fabricated. Areas not normally coated

during fabrication, such as cuts and welds, are protected by neighboring zinc, which works as a sacrificial anode. During welding, a small area directly affected by heat is also left bare, but the same self-healing process occurs.
G90 requires a coating of 0.90 ounces of zinc per square foot of steel, or 0.32 ounces per square foot on each side of the metal sheet. In accordance with 653/A653M06-a, pregalvanized steel is not generally recommended for outdoor use or in industrial environments.

Hot-dipped galvanized

After the steel cable tray has been manufactured and assembled, the entire tray is immersed in a bath of molten zinc, resulting in a coating of all surfaces, as well as all edges, holes and welds. Coating thickness is determined by the length of time each part is immersed in the bath and the speed of removal. Hot-dip galvanizing after fabrication creates a much thicker coating than the pregalvanized and electrogalvanized process, a minimum of 3.0 ounces per square foot of steel or 1.50 ounces per square foot on each side of the sheet (according to ASTMA123, grade 65).
The process is recommended for cable tray used in most outdoor environments and many harsh industrial environment applications.

Corrosion

Corrosion of metal occurs naturally when the metal is exposed to chemical or electrochemical attack. The atoms on the exposed surface of the metal come into contact with a substance, leading to deterioration of the metal through a chemical or electrochemical reaction. The corroding medium can be a liquid, gas or solid.
Although all metals are susceptible to corrosion, they corrode in different ways and at various speeds. Pure aluminum, bronze, brass, most stainless steels and zinc corrode relatively slowly, but some aluminum alloys, structural grades of iron and steel and the 400 series of stainless steels corrode quickly unless protected.
Electrochemical corrosion Electrochemical corrosion is caused by an electrical current flow between two dissimilar metals, or if a difference of potential exists, between two areas of the same metal surface.
The energy flow occurs only in the presence of an electrolyte, a moist conductor that contains ions, which carry an electric charge. Solutions of acids, alkalies and salts contain ions, making water – especially salt water – an excellent electrolyte.

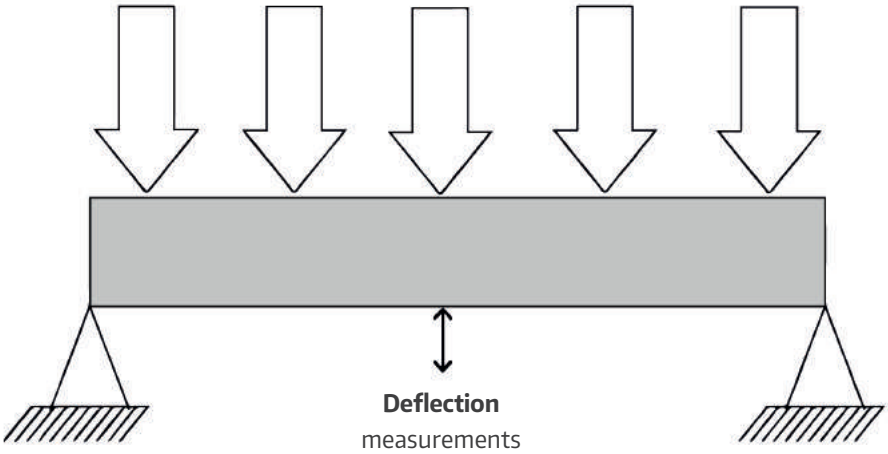
Deflection in Cable Tray and Ladders

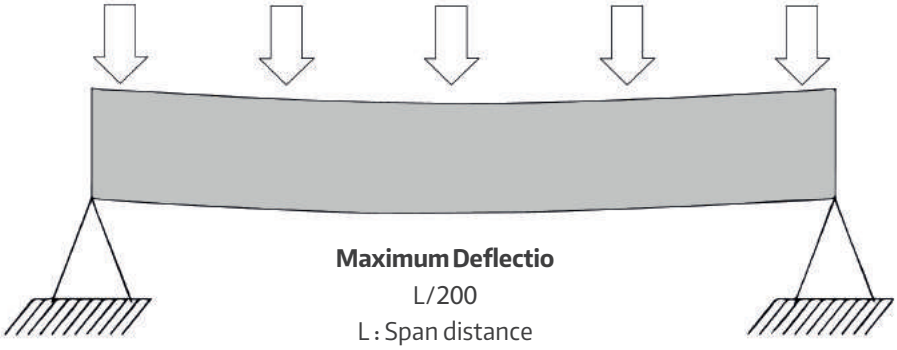
Deflection of the cable tray affects the appearance of an installation, but it is not a structural issue. In the case of nonmetallic cable tray, deflection may be affected by elevated temperatures.

The NEMA/CSA load test is a simple beam, uniformly distributed load test (see Figure 1). This type of test was initially selected because:

- It was easiest to test.
- It represents the worst case beam condition compared to continuous or fixed configurations.

When consulting the manufacturer's catalogue for deflection information, the designer must verify whether the data shown represents simple or continuous beam deflection. If continuous beam deflection is shown, the calculation factor should be given.
NEMA/CSA has one criterion for acceptance under their load test: the ability to support %150 of the rated load.



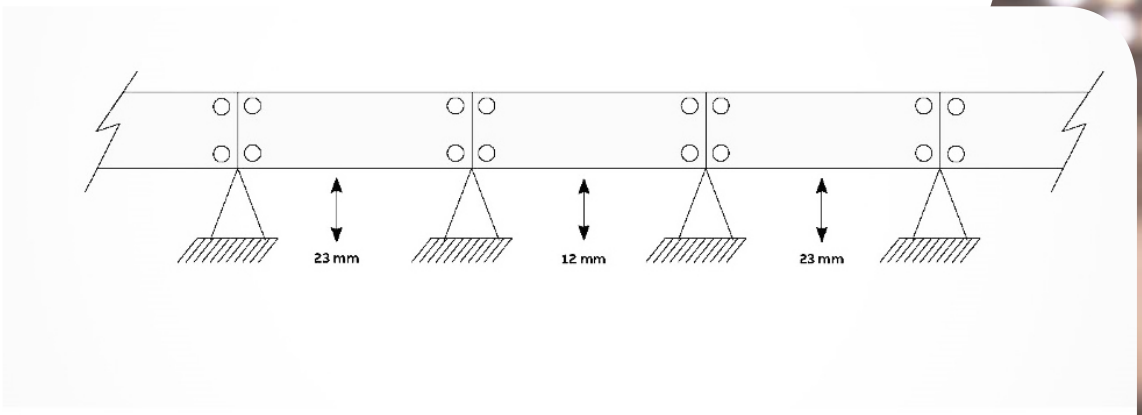


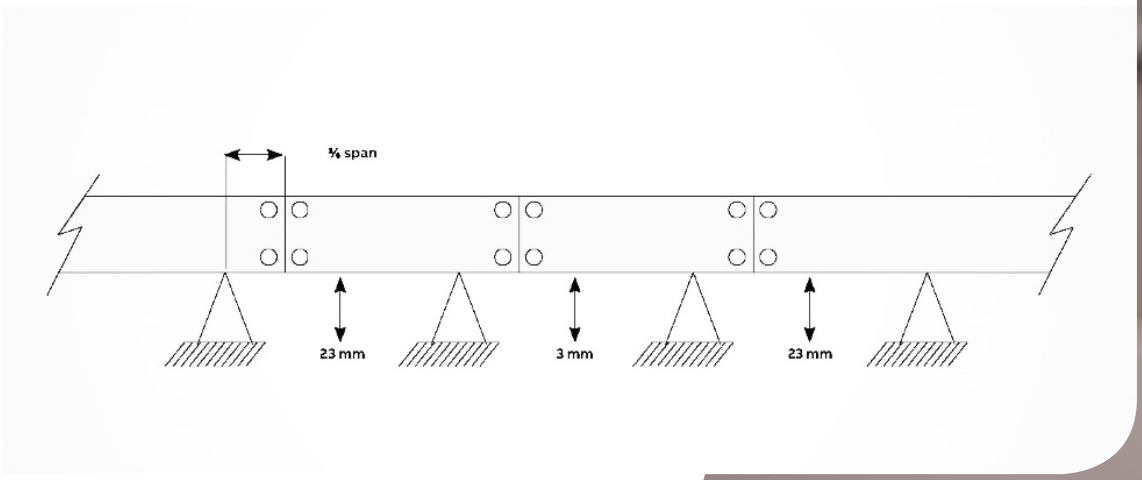
Location of couplings

Since different bending moments are created in each span, there is no simple factor to approximate deflection as the number of spans increases. It is possible to calculate these deflections at any given point by using second integration of the basic differential equation for beams. Testing shows that the center span of a three-tray continuous beam can deflect less than 10 % of its simple beam deflection.
The support span should not be greater than the straight section length, to ensure no more than one splice is located between supports.

Location of couplers

(See Figure below) The location of the coupler dramatically affects the deflection of a cable
tray system under equal loading conditions.
Testing indicates that the maximum deflection of the center span of a three-span tray run can
decrease four times if the couplers are moved to the one-quarter point from the above supports.
This can be a major concern for designers considering modular systems for tray and pipe racks.





Cable Ladders

Cable Ladders

Cable ladder is a more reliable, less expensive solution for supporting cable, which is easier to maintain, proves more adaptable to changing needs, and is more suitable for harsh and corrosive environments.

Low maintenance

Cable ladder wiring systems have a lower maintenance demand than conduit systems. When maintenance is necessary, it proves easier, less labour intensive, and requires less time to complete.

Straight Ladder

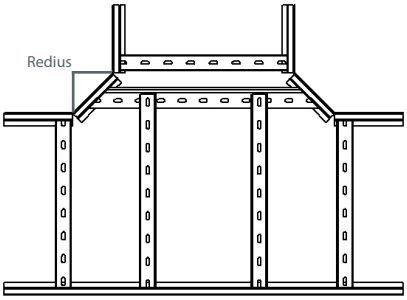
Example: L . 2000 . 80 . 100 . T 2 .300 . SS304 .I

Type	Width (mm)	Height (mm)	Length (mm)	Thickness (mm)	Rung Space (mm)	Material	Bend Orientation
L: Ladder	100 200 300 400 500 600	80 100 150	2000 3000	T1:1.5 T2:2 T3:2.5	250 300	HD : Hot Dip Galvanized SS304 : Stainless Steel 304 SS316 : Stainless Steel 316	O : Outside Rail Type I : Inside Rail Type

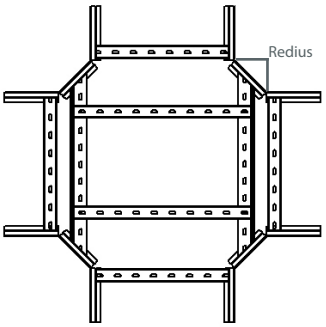
Cable Ladder Fitting

Including bends, reducers, wyes, tees and crosses, fittings enable a cable ladder system to change direction, elevation or size to meet building design/cable run constraints.

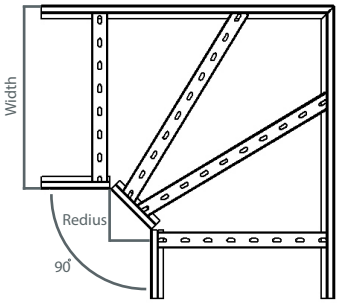
Ladder Tee



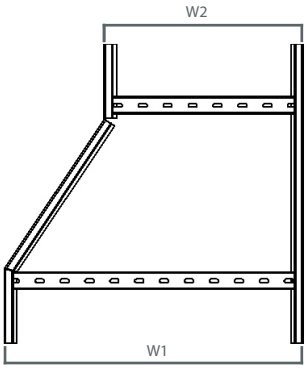
Ladder Cross



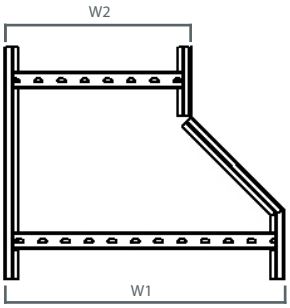
Ladder Horizontal Bend 90



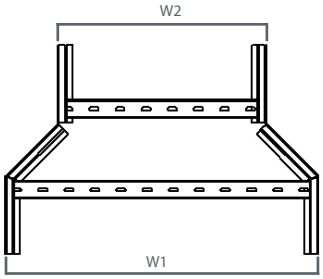
Ladder Right reducer



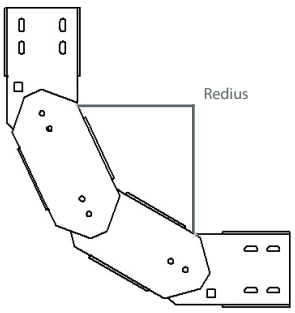
Ladder Left Reducer



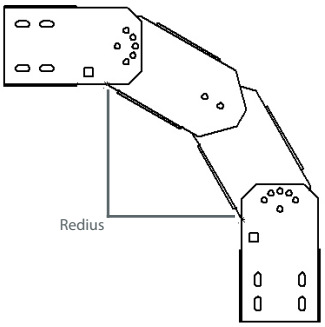
Ladder Straight Reducer



Ladder Vertical Bend Inside



Ladder Vertical Bend Outside



Cable Ladder Accessoreis (Equal Width Bends, Tee, Cross)

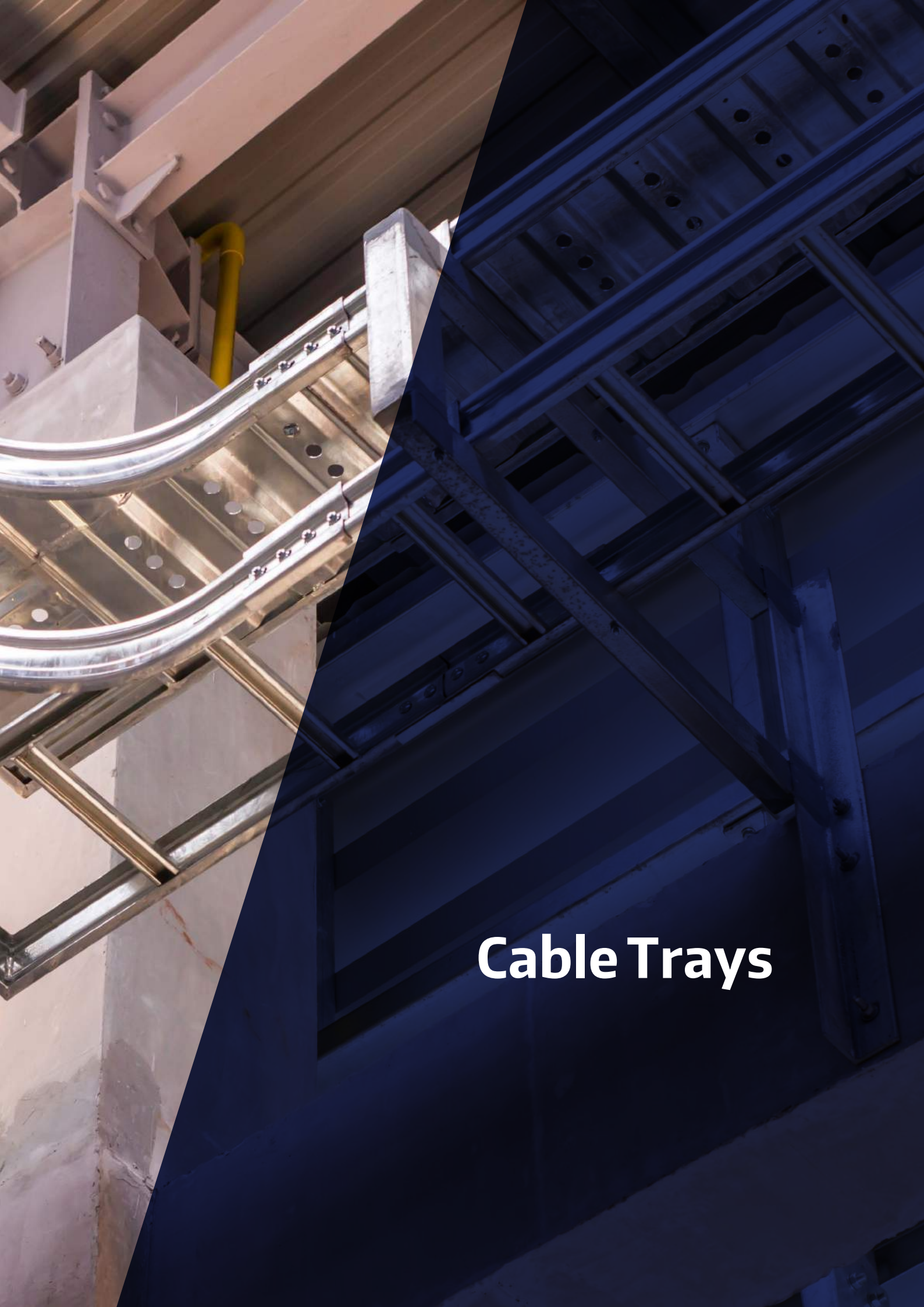
Example: LHB . 80 . 100 . T2 . 90 . SS304 .I

Type		Width (mm)	Height (mm)	Thickness (mm)	Angle (Degree)	Material	Bend Orientation
LHB	Ladder Horizontal Bend	100 200 300 400 500 600	80 100 150	T1:1.5 T2:2 T3:2.5	30 45 60 90	HD : Hot Dip Galvanized SS304 : Stainless Steel 304 SS316 : Stainless Steel 316	O : Outside Rail Type I : Inside Rail Type
LT	Ladder tee						
LC	Ladder Cross						
LIVB	Ladder Inside Vertical Bend						
LOVB	Ladder Outside Vertical Bend						

(Unequal Width Bends, Tee, Cross,Reducers)

Example: LUT . 80 . 200 . 100 . T2 . 90 . SS304 .I

Type		Width (mm)	Width 2 (mm)	Height (mm)	Thickness (mm)	Angle (Degree)	Material	Bend Orientation
LUT	Ladder Unequal Tee	100 200 300 400 500 600	200 300 400 500 600 700	80 100 150	T1:1.5 T2:2 T3:2.5	30 45 60 90	HD : Hot Dip Galvanized SS304 : Stainless Steel 304 SS316 : Stainless Steel 316	O : Outside Rail Type I : Inside Rail Type
LUC	Ladder Unequal Croos							
LSR	Ladder Straight Reducer							
LRR	Ladder Right Reducer							
LLR	Ladder Left Reducer							



Cable Trays

Cable Trays

Our perforated tray is a durable and cost effective solution for supporting cable, which is easy to install, modify and maintain. Suitable for a wide variety of industries and installations, our perforated tray offers the sure choice for high quality, high performance cable management.

Straight Tray

Example: T . 2000 . 80 . 100 . T2 . SS304 .I

Type	Width (mm)	Height (mm)	Length (mm)	Thickness (mm)	Material	Bend Orientation
T: Tray	100 200 300 400 500 600	80 100 150	2000 3000	T1:1.5 T2:2 T3:2.5	HD : Hot Dip Galvanized SS304 : Stainless Steel 304 SS316 : Stainless Steel 316	O : Outside Rail Type I : Inside Rail Type

Cable Tray Fitting

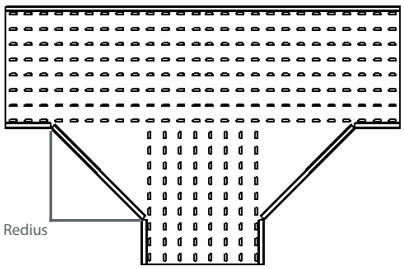
Fittings enable a perforated tray system to change direction, elevation or size in order to meet building design and cable run constraints.

- All fittings follow a simple, functional design with connection points at all siderail ends for attachment to straight sections/couplers.

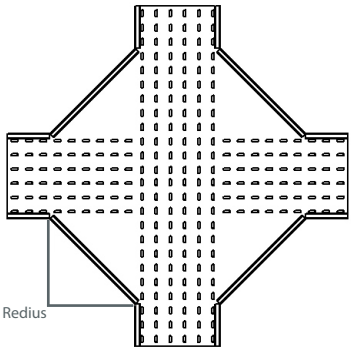
-Easy to install with straightforward alignment between straight sections and Fittings.

-A full suite of fittings ensures the cable tray system can be planned to fit building and cable run constraints within all types of installation.

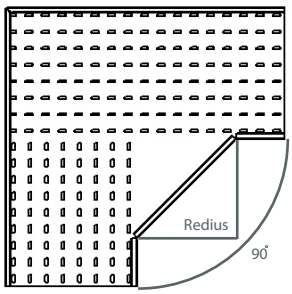
Tray Tee



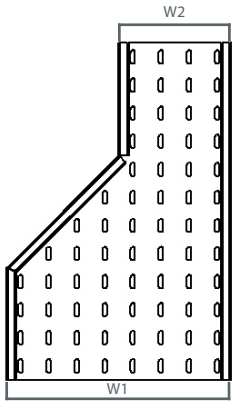
Tray Cross



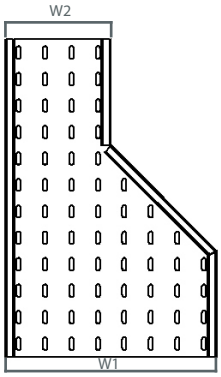
Tray Horizontal Bend 90



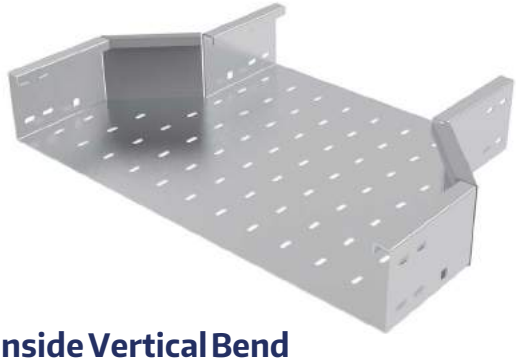
Tray Right Reducer

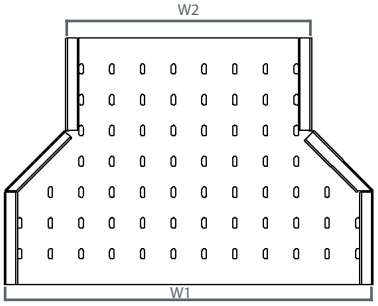


Tray Left Reducer

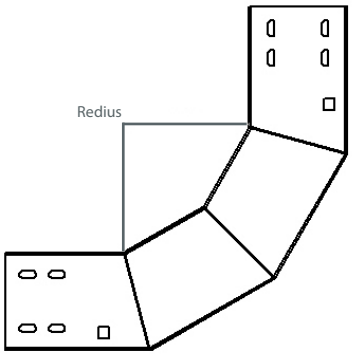


Tray Straight Reducer

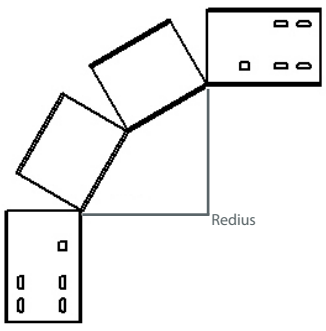




Tray Inside Vertical Bend



Tray Outside Vertical Bend



Cable Tray Accessoreis

(Equal Width Bends, Tee, Cross)

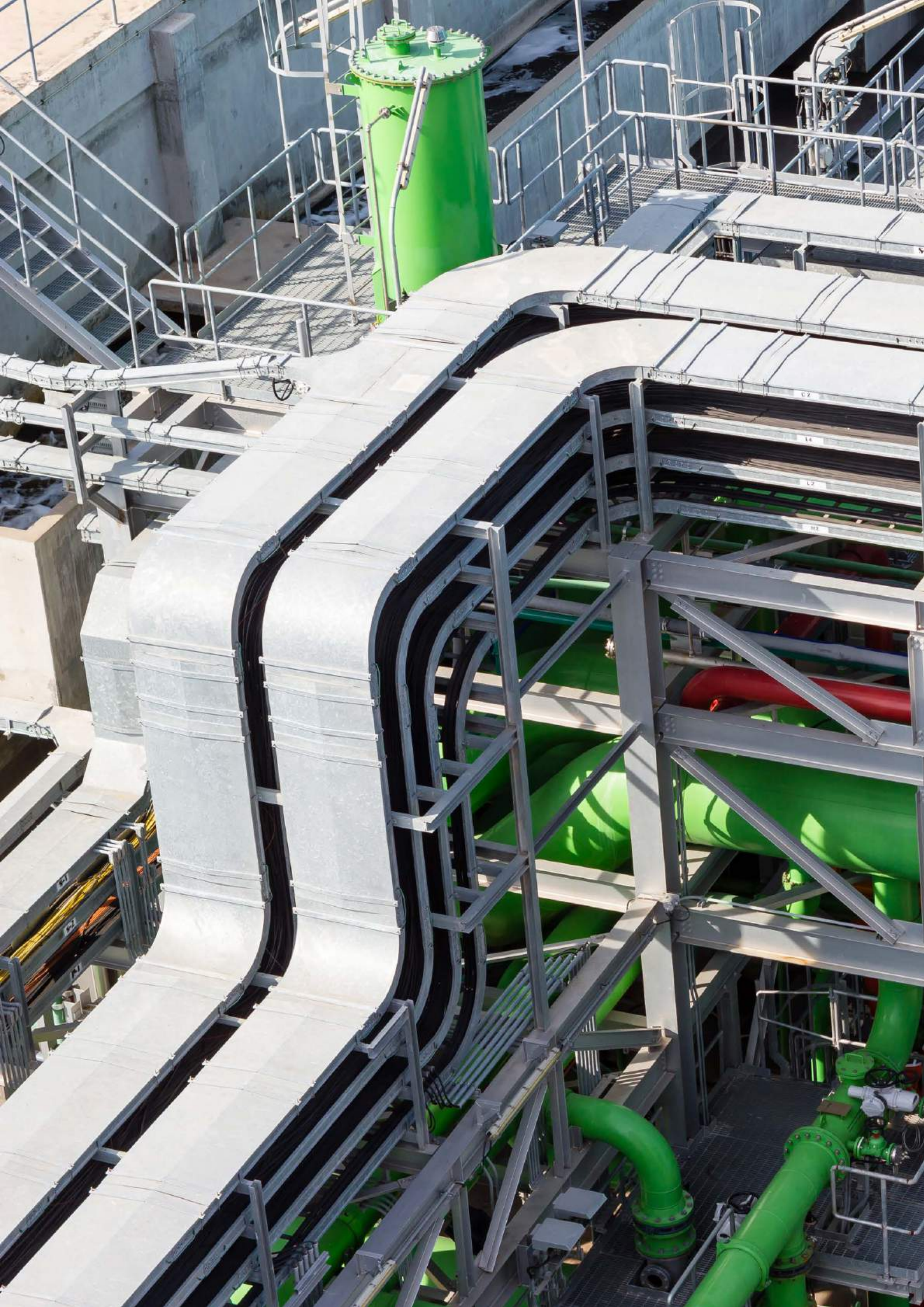
Example: THB . 80 . 100 . T2 . 90 . SS304 .I

Type		Width (mm)	Height (mm)	Thickness (mm)	Angle (Degree)	Material	Bend Orientation
THB	Tray Horizontal Bend	100 200 300 400 500 600	80 100 150	T1:1.5 T2:2 T3:2.5	30 45 60 90	HD : Hot Dip Galvanized SS304 : Stainless Steel 304 SS316 : Stainless Steel 316	O : Outside Rail Type I : Inside Rail Type
TT	Tray tee						
TC	Tray Cross						
TIVB	Tray Inside Vertical Bend						
TOVB	Tray Outside Vertical Bend						

(Unequal Width Bends, Tee, Cross,Reducers)

Example: TUT . 80 . 200 . 100 . T2 .90 . SS304 .I

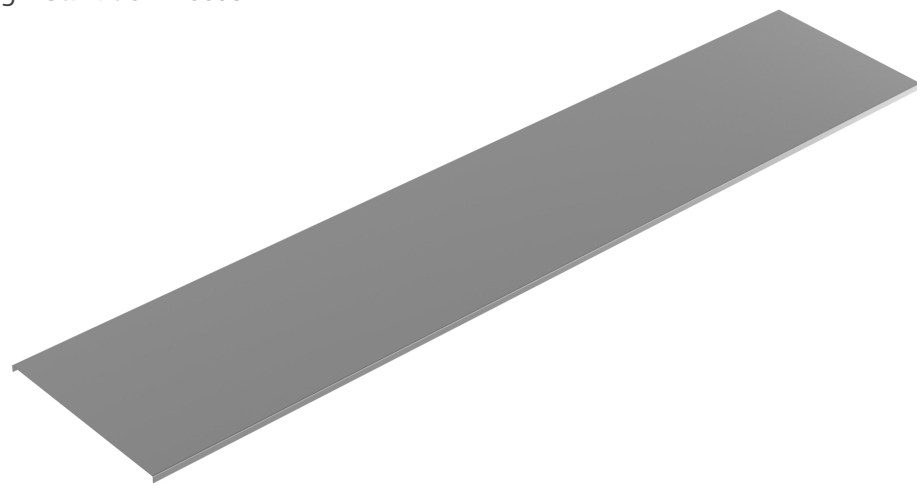
Type		Width (mm)	Width 2 (mm)	Height (mm)	Thickness (mm)	Angle (Degree)	Material	Bend Orientation
TUT	Tray Unequal Tee	100 200 300 400 500 600	200 300 400 500 600 700	80 100 150	T1:1.5 T2:2 T3:2.5	30 45 60 90	HD : Hot Dip Galvanized SS304 : Stainless Steel 304 SS316 : Stainless Steel 316	O : Outside Rail Type I : Inside Rail Type
TUC	Tray Unequal Croos							
TSR	Tray Straight Reducer							
TRR	Tray Right Reducer							
TLR	Tray Left Reducer							



Cable Tray & Ladder Covers

Cable Tray and Ladder Covers

Available for all cable ladder widths and material types, covers provide mechanical protection and should be installed where falling objects may damage cables or where vertical cable adder runs are accessible by pedestrian or vehicular traffic. Styled as solid, ventilated or peaked, for varying installation Needs.

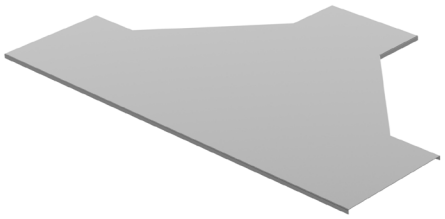


Straight Cover For Tray and Ladder

Example: C . 2000 . 100 . T2 . SS304

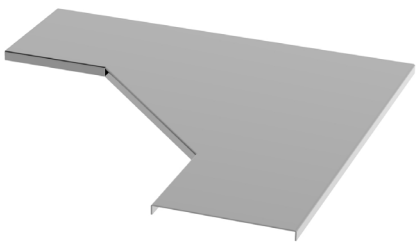
Type	Width (mm)	Length (mm)	Thickness (mm)	Material
C: Cover	100 200 300 400 500 600	2000 3000	T1:1.5 T2:2 T3:2.5	HD : Hot Dip Galvanized SS304 : Stainless Steel 304 SS316 : Stainless Steel 316

Cover For Tee

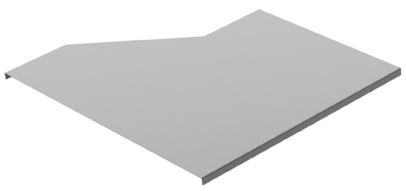


Cover For Cross

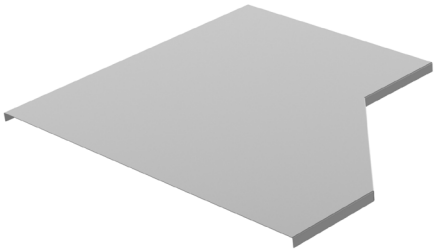
Cover For Horizontal Bend 90



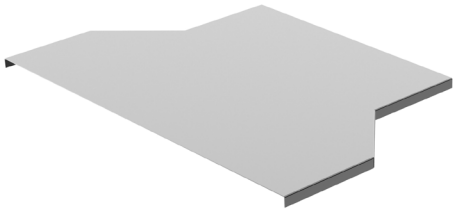
Cover For Right Reducer



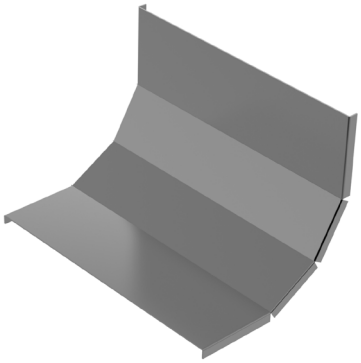
Cover For Left Reducer



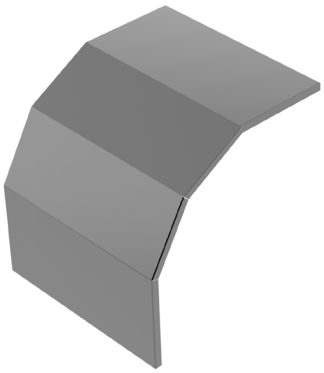
Cover For Straight Reducer



Cover For Inside Vertical Bend



Cover For Outside Vertical Bend



Cover For Tray and Ladder Accessoreis

(Equal Width Bends, Tee, Cross)

Example: CHB . 100. T2 . 90 . SS304

Type		Width (mm)	Thickness (mm)	Angle (Degree)	Material
CHB	Cover For Horizontal Bend	100 200 300 400 500 600	T1:1.5 T2:2 T3:2.5	30 45 60 90	HD : Hot Dip Galvanized SS304 : Stainless Steel 304 SS316 : Stainless Steel 316
CT	Cover For Tee				
CC	Cover For Cross				
CIVB	Cover For Inside Vertical Bend				
COVB	Cover For Outside Vertical Bend				

(Unequal Width Bends, Tee, Cross,Reducers)

Example: CUT . 80 . 200 . 100 . T2 . 90 . SS304

Type		Width (mm)	Width 2 (mm)	Thickness (mm)	Angle (Degree)	Material
CUT	Cover For Unequal Tee	100 200 300 400 500 600	200 300 400 500 600 700	T1:1.5 T2:2 T3:2.5	30 45 60 90	HD : Hot Dip Galvanized SS304 : Stainless Steel 304 SS316 : Stainless Steel 316
CUC	Cover For Unequal Croos					
CSR	Cover For Straight Reducer					
CRR	Cover For Right Reducer					
CLR	Cover For Left Reducer					

Cable Tray & Ladder Accessories

Cable Tray & Ladder Accessories

A complete line of accessories and supports to supplement the function of straight sections and fittings, including drop-outs, hold down clamps, splice plates, barrier strips, and Superstrut support solutions.

Straight Coupler

For connecting straight sections to fittings and other straight sections.hardware included as standard.

Horizontal Adjustable Coupler

For connecting straight sections to fittings and other straight sections at an angle in the horizontal plane. Electro-galvanized hardware included as standard.

Vertical Adjustable Coupler

For connecting straight sections to fittings and other straight sections at an angle in the vertical plane. Electro-galvanized hardware included as standard.

Heavy Duty Cover Clamp and Clips

Wraparound design offers added protection for rugged applications .hardware included.

Hold Down Clamp and Holding Clamp

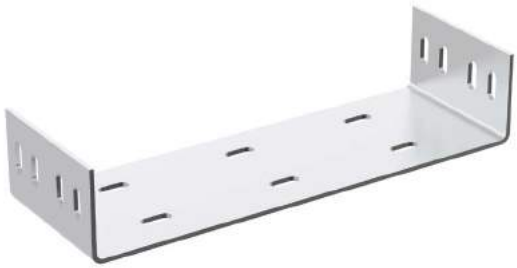
Designed to secure perforated cable tray and Ladder to support system hardware included as standard.

Straight Coupler

Vertical adjustable coupler

Horizontal adjustable coupler

U Type Straight Coupler



Example : VACO . 45 .2

Type	Width (mm)	Height (mm)	Thickness (mm)
SCO	Straight Coupler	30 45 87	1.5 2 2.5
VACO	Vertical Adjustable Coupler		
HACO	Horizontal Adjustable Coupler		
UTHC	U Type Straight Coupler		

End Plat

Example : VACO . 45 .2

Type	Width (mm)	Height (mm)	Thickness (mm)
END	End Plate	30	1.5
		45	2
		87	2.5

Holding Calmp

Example : HOC .2

Type	Width (mm)	Thickness (mm)
HOC	Holding Clamp	1.5
		2
		2.5

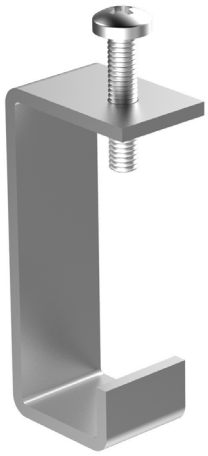
Hold Down Calmp

Example : HODC .2

Type	Width (mm)	Thickness (mm)
HODC	Holding Down Clamp	1.5
		2
		2.5

Installing Holding CALMP

Cover Clips



Example : COCS .2

Type	Width (mm)	Thickness (mm)
COCS	Cover Clips	1.5 2

Cover Clamp

Example : COCP .2

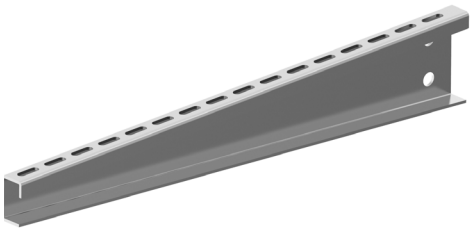
Type	Width (mm)	Thickness (mm)
COCP	Cover Clamp	1.5 2

Supporting Systems

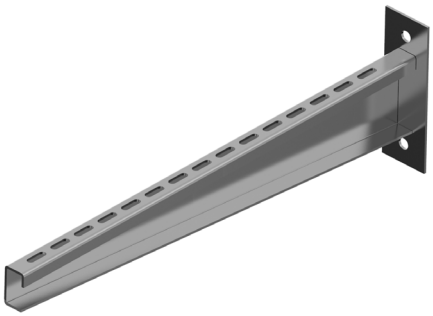
BRACKETS

We considered 3 type of brackets that can install on U,L and I support.

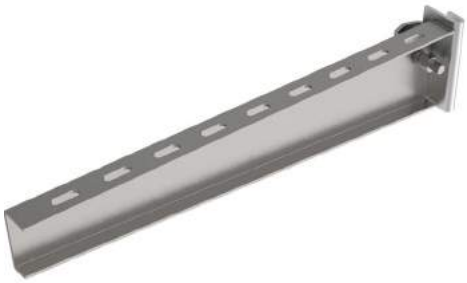
Simple Bracket



Wall Mounting Bracket



Bracket With Clamp



Installing Bracket With Clamp on I- Support

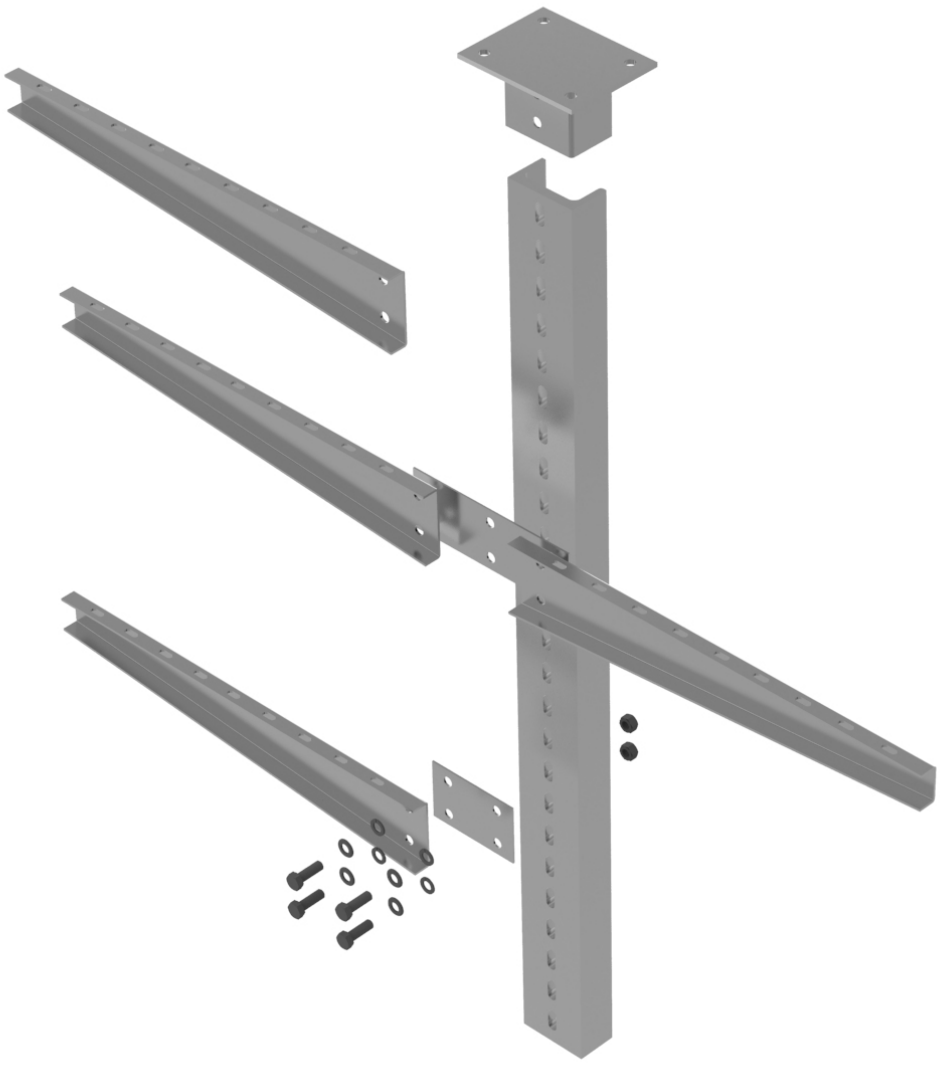
Example : WMB . 650 .3

Type		Length (mm)	Thickness (mm)
SB	Simple Bracket	150 250 350 450 550 650	2 2.5 3
WMB	Wall Mounting Bracket		
BC	Bracket With Clamp		

3 Type of Support

Example : US . 50 . 5

Type		Width (mm)	Thickness (mm)
US	U Support	50	5
		60	6
		80	6
		100	6



L- Supports

Example : LS . 50 .5

Type		Width (mm)	Thickness (mm)
LS	L Support	50	5
LSB	L Support With base plate		

I- Supports

Example : I S . 100 .6

Type		Width (mm)	Thickness (mm)
IS	I Support	80	3.8
		100	6
		120	6.5

Head Plate

Example : HP . 5

Type		Thickness (mm)
HP	Head Plate	5

Rail Channel

Rail channel available in 2.5 mm and 2 mm thickness. hot dip galvanized are recommended to support of brackets. Offered in lengths, 3 m or 6 m.

Example : SRC . 41. 41 .2

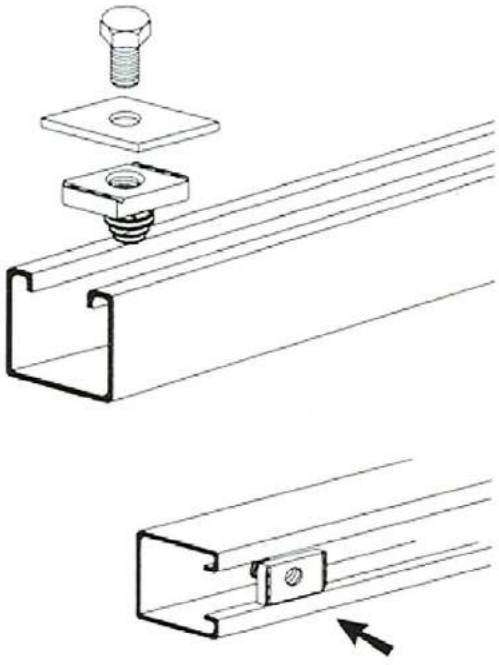
Type		Width (mm)	Height (mm)	Thickness (mm)
SRC	Simple Rail Channel	41	41	2 2.5
PRS	Perforated Rail Channel	41	41	

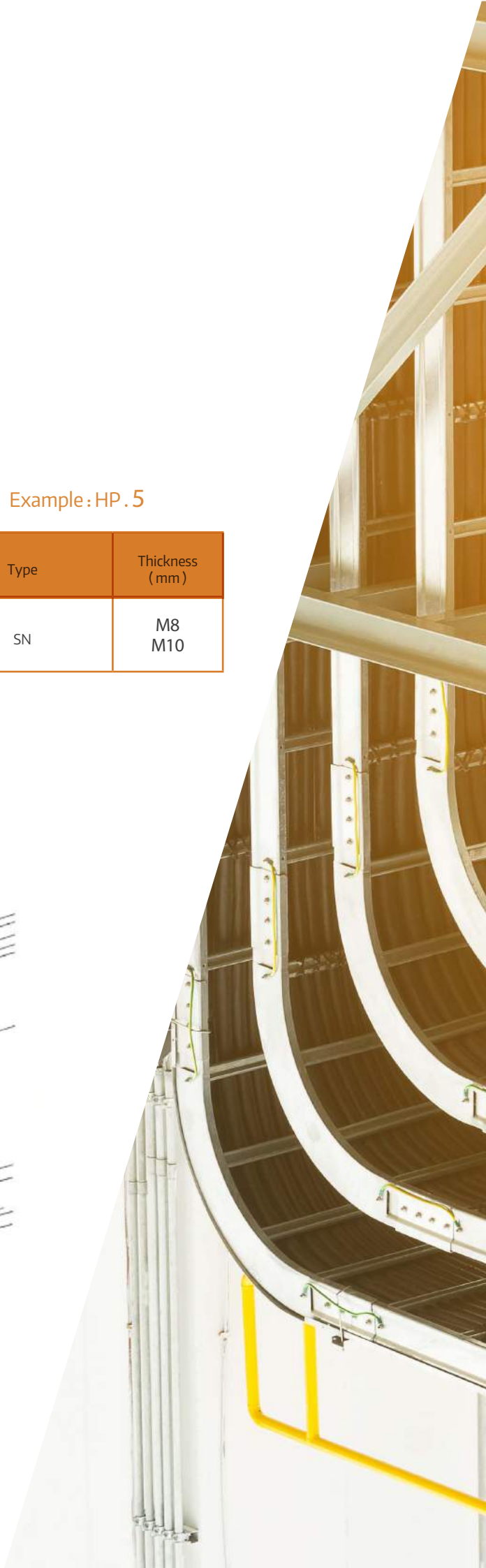
Accessories For Rails

Spring Nut

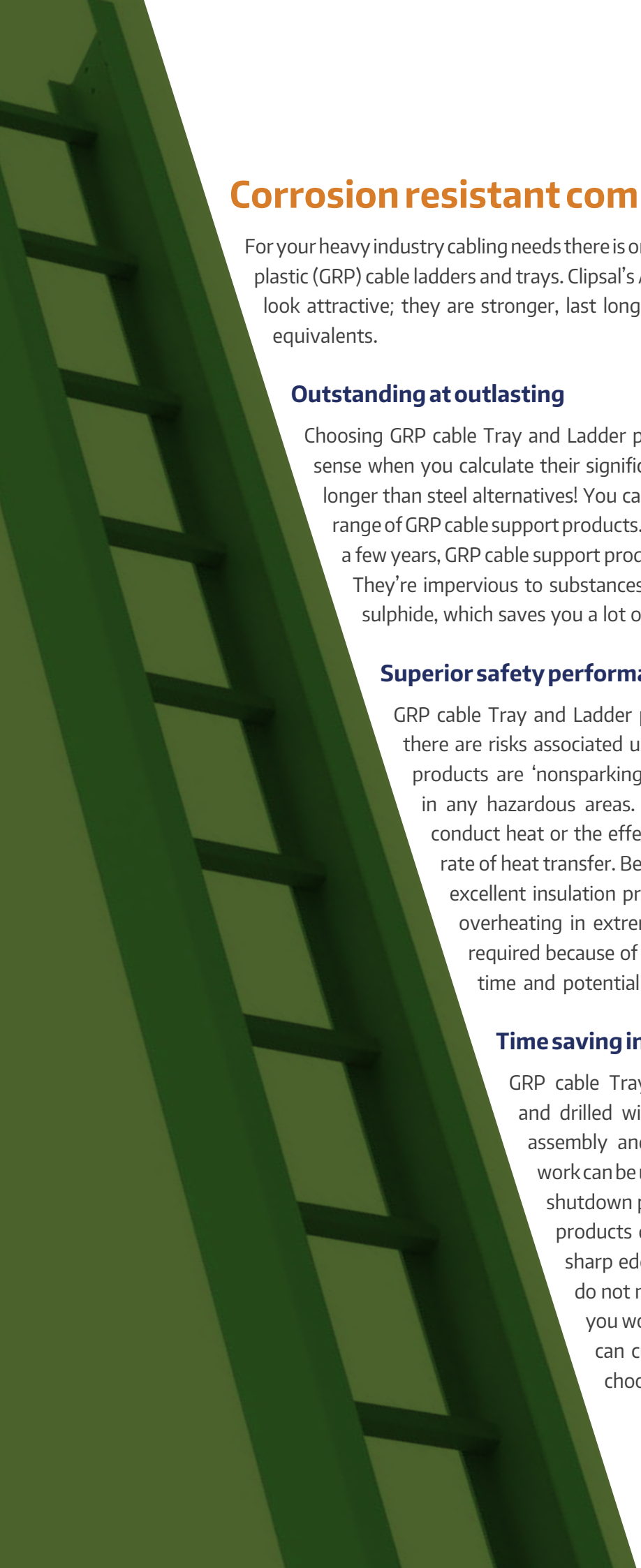
Example : HP . 5

Type	Thickness (mm)
SN	M8 M10





GRP Cable Tray & Ladder



Corrosion resistant composite technology

For your heavy industry cabling needs there is one clear winner... Clipsal glass-reinforced plastic (GRP) cable ladders and trays. Clipsal's Australian-made GRP products not only look attractive; they are stronger, last longer and are simpler to install than steel equivalents.

Outstanding at outlasting

Choosing GRP cable Tray and Ladder products ahead of steel variants makes sense when you calculate their significantly longer lifespan; over three times longer than steel alternatives! You can expect up to ۳۰ years of use from our range of GRP cable support products. Where steel is prone to corrosion within a few years, GRP cable support products are completely corrosion resistant. They're impervious to substances such as saline, chlorine and hydrogen sulphide, which saves you a lot of money on maintenance costs.

Superior safety performance

GRP cable Tray and Ladder products can be safely installed where there are risks associated using steel products. GRP cable support products are 'nonsparking' and can be installed and worked on in any hazardous areas. GRP cable ladders and trays will not conduct heat or the effects of a fire either, as they have a slow rate of heat transfer. Because GRP cable support products have excellent insulation properties they protect the cabling from overheating in extreme heat environments. No Earthing is required because of their high insulation value, which saves time and potentially lives.

Time saving installation

GRP cable Tray and Ladder products are easily cut and drilled with hand tools, accommodating onsite assembly and configuration. In most applications, work can be undertaken without the need for a costly shutdown process. Unlike steel, GRP cable support products do not need to be deburred or require sharp edges to be filed down. And drilled edges do not need repairing with galvanising paint, as you would need to do with steel products. You can cut your installation time up to %40 by choosing Clipsal GRP cable ladders and trays.

Benefits

Saves you money

- Longer life cycle of product (up to ۳۰ years).
- No need to shut down business operations for installation.
- Faster installation.

Quicker installation

- Easily cut and drilled using metal-working tools.
- Onsite configuration.
- No deburring, painting or Earthing required.

Superior performance

- Superior corrosion resistance compared to stainless steel.
- Does not permanently deform under high loads.
- Excellent insulation to prevent heat transfer.

Unbeatable construction

Clipsal GRP cable support products are produced by means of the pultrusion process. This uses a combination of unidirectional and cross strand glass mat, which is resin impregnated and pulled through a heated die to produce a very solid, structurally sound profile. Lower quality systems may use only unidirectional strand glass, which can set up a weakness in the transverse direction or even short strand glass in a press moulding rather than a pultrusion. The composite is covered with a surface veil to protect against the effects of weathering and is fully protected against UV. Additional additives are included in the resin mix to provide mechanical protection for cut ends, slots and holes. Cable ladder rungs are constructed using corrosion resistant nuts, bolts and lock washers to ensure maximum mechanical strength. Unlike a resin glued system, the rungs will be unaffected by aggressive chemicals or high stresses in the vertical plane.

Material

Clipsal GRP cable Tray and Ladder products are manufactured from polyester isothalic resin. This material displays a good combination of corrosion and fire resistance. An optional modar resin is available to special order for areas where the following properties are required:

- Improved fire resistance
- Zero halogen and reduced smoke. All materials can also be supplied in options that provide anti-static properties if required.

Maintenance

As protection against weathering, the products contain UV stabilisers and surface veils, ensuring a long maintenance-free life.

Strength

GRP provides a higher tensile strengthto-weight ratio than equivalent steel products and does not permanently deform under heavy loads.

Thermal conductivity

The low thermal conductivity of GRP means the effects of fire are localised. GRP retains its integrity in situations where many metallic materials have degraded. GRP can also be effectively used in a wide temperature range from –°140C to °120+C.

The benefits of pultruded GRP

Whilst simpler GRP manufacturing processes exist, no other procedure offers the ideal combination of properties for cable management like the pultrusion manufacturing process; high load bearing, corrosion resistance, and fire and weathering resistance. Only the pultruded GRP manufacturing processes offers the structural strength and rigidity required for cable support systems. Pultrusion creates a material of consistently high density, which offers the very best protection against weathering. Pultruded composites remain largely impervious to corrosion regardless of application. Pultruded composites consist of four or, in some instances, five main elements:

1. Glass rovings (strands) and mats – approximately %50 by weight.
2. Resin – usually polyester.
3. Filler – usually calcium carbonate.
4. UV veil and UV additives
5. Fire retardants, as required.

Cable Ladder

GRP Straight Ladder

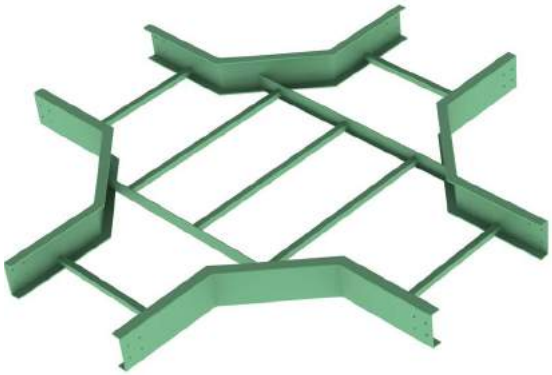
Example: L . 300 . 6 . 2000 . 50 . 100 . GRP

Type	Width (mm)	Height (mm)	Length (mm)	Thickness (mm)	Rung Space (mm)	Material
L: Ladder	100 200 300 400 500 600	50 100 150	2000 3000	6	250 300	GRP

Ladder Tee

Ladder Left Reducer

Ladder Cross



Ladder Straight Reducer

Ladder Horizontal Bend 90

Ladder Vertical Bend Inside

Ladder Right reducer

Ladder Vertical Bend Outside

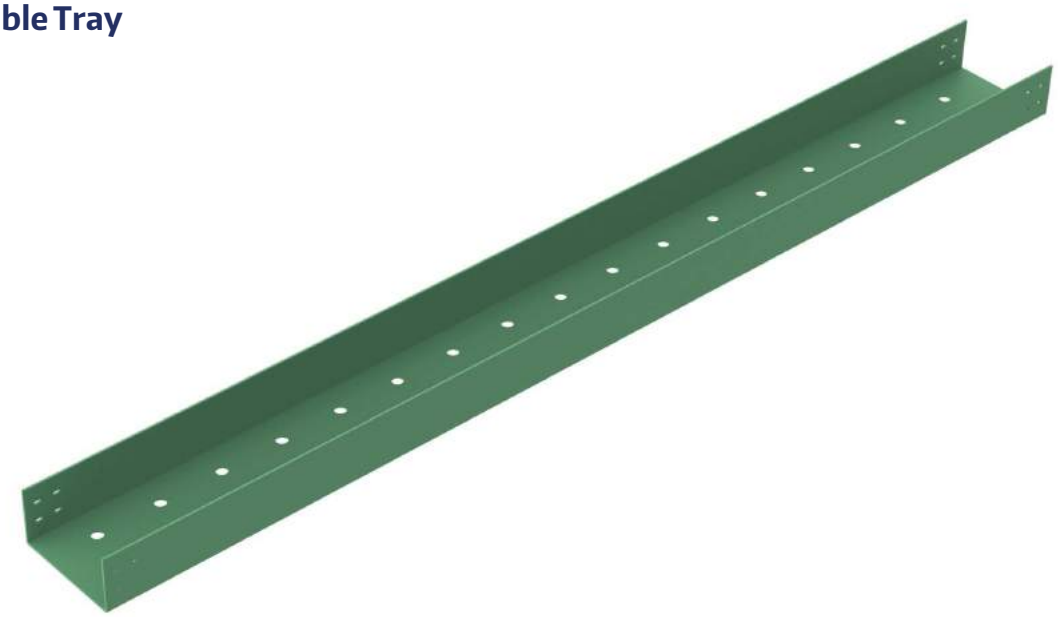
GRP Cable Ladder Accessoreis
(Equal Width Bends, Tee, Cross)
Example: LHB . 90 . 6 . 50 . 100 . GRP

Type		Width (mm)	Height (mm)	Thickness (mm)	Angle (Degree)	Material
LHB	Ladder For Horizontal Bend	100 200 300 400 500 600	50 100 150	6	30 45 60 90	GRP
LT	Ladder For Tee					
LC	Ladder For Cross					
LIVB	Ladder For Inside Vertical Bend					
LOVB	Ladder For Outside Vertical Bend					

(Unequal Width Bends, Tee, Cross,Reducers)
Example: LUT . 80 . 200 . 100 . T90 . 2 . SS304 .I

Type		Width (mm)	Width 2 (mm)	Height (mm)	Thickness (mm)	Angle (Degree)	Material
LUT	Ladder Unequal Tee	100 200 300 400 500 600	200 300 400 500 600 200	50 100 150	6	30 45 60 90	GRP
LUC	Ladder Unequal Cross						
LSR	Ladder Straight Reducer						
LRR	Ladder Right Reducer						
LLR	Ladder Left Reducer						

Cable Tray

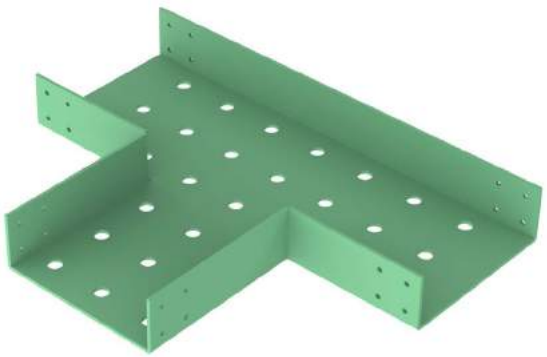


GRP Straight Tray

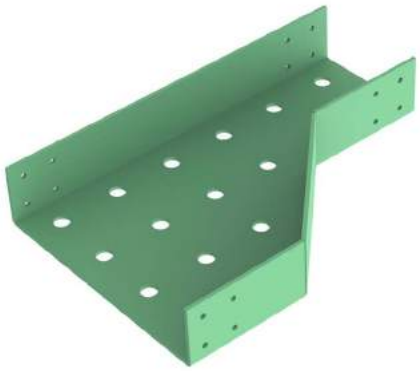
Example: T . 2000 . 50 . 100 . T1. GRP

Type	Width (mm)	Height (mm)	Length (mm)	Thickness (mm)	Material
T: Tray	50 100 200 300 400 500 600	50 100 150	2000 3000	T1:3 T2:4	GRP

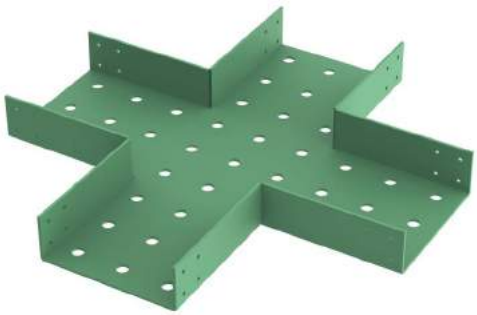
Tray Tee



Tray Left Reducer



Tray Cross

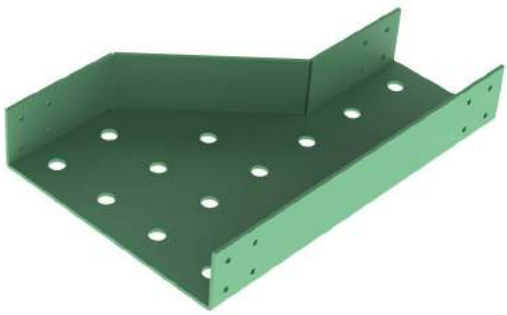


Tray Straight Reducer

Tray Horizontal Bend 90

Tray Vertical Bend Inside

Tray Right reducer



Tray Vertical Bend Outside

GRP Cable Tray Accessoreis

(Equal Width Bends, Tee, Cross)

Example: THB . 100 . 50 . T1 . 90 . GRP

Type		Width (mm)	Height (mm)	Thickness (mm)	Angle (Degree)	Material
THB	Tray Horizontal Bend	50 100 200 300 400 500 600	50 100 150	T1:3 T2:4	30 45 60 90	GRP
TT	Tray tee					
TC	Tray Cross					
TIVB	Tray Inside Vertical Bend					
TOVB	Tray Outside Vertical Bend					

(Unequal Width Bends, Tee, Cross,Reducers)

Example: TUT . 100 . 200 . 50 . T1 .90 . GRP

Type		Width (mm)	Width 2 (mm)	Height (mm)	Thickness (mm)	Angle (Degree)	Material
TUT	Tray Unequal Tee	100 200 300 400 500 600	200 300 400 500 600 700	50 100 150	T1:3 T2:4	30 45 60 90	GRP
TUC	Tray Unequal Croos						
TSR	Tray Straight Reducer						
TRR	Tray Right Reducer						
TLR	Tray Left Reducer						

GRP Straight Cover For Tray and Ladder

Example: C . 100 . 2000 . T2 . GRP

Type	Width (mm)	Length (mm)	Thickness (mm)	Material
C: Cover	100 200 300 400 500 600	2000 3000	T1:3 T2:4 T3:6	GRP

GRP Cover For Tray and Ladder Accessoreis

(Equal Width Bends, Tee, Cross)

Example: CHB . 100. T2 . 90 . GRP

Type		Width (mm)	Thickness (mm)	Angle (Degree)	Material
CHB	Cover For Horizontal Bend	100 200 300 400 500 600	T1:3 T2:4 T3:6	30 45 60 90	GRP
CT	Cover For Tee				
CC	Cover For Cross				
CIVB	Cover For Inside Vertical Bend				
COVB	Cover For Outside Vertical Bend				

(Unequal Width Bends, Tee, Cross,Reducers)

Example: CUT . 100 . 200 . T2 . 90 . GRP

Type		Width (mm)	Width 2 (mm)	Thickness (mm)	Angle (Degree)	Material
CUT	Cover For Unequal Tee	100 200 300 400 500 600	200 300 400 500 600 100	T1:3 T2:4 T3:6	30 45 60 90	GRP
CUC	Cover For Unequal Croos					
CSR	Cover For Straight Reducer					
CRR	Cover For Right Reducer					
CLR	Cover For Left Reducer					

Conduit & Fittings

Hot Dip Galvanized conduit

Hot Dip Galvanized Conduit Coupling

Flexible galvanized conduit with pvc cover

Factory Equipments

item	description	Manufacturing Country	Number
1	CNC Punch press TRUMPF	Germany	1 Device
2	CNC Punch press TRUMPF	Germany	1 Device
3	CNC Press break US AMADA	Japan	1 Device
4	CNC Cutting machine	Turkey	1 Device
5	Air Compressor 1000 litre	Iran	2 Device
6	CO2 Welding Set	Iran	3 Set
7	Argon Welding Set	Germany	1 Set
8	Welding Transformer	Iran	2 Set
9	Electrical Saw	Germany	1 Device
10	Liftruck 3 Ton	Japan (Toyota)	1
11	Overhead Cranes	Germany	1
12	Drill Machine	Iran	1
13	Computer Network System	Iran	25
14	Printer & Fax	Japan	5
15	Phone	Japan	20
16	Measuring Equipment (Include Digital Caliper, Manual Caliper, Thickness Gauge, Meter, Micrometer, …)	Iran	45

Clients

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P.O.G.C

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N.I.G.C.

شرکت ملی صنایع پتروشیمی
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