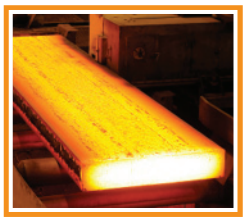
enduro

FRP Solutions for Cable Management Systems

Cable Tray • Instrumentation Tray • Accessories



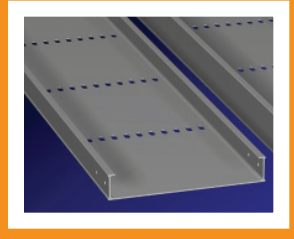
www.endurocomposites.com

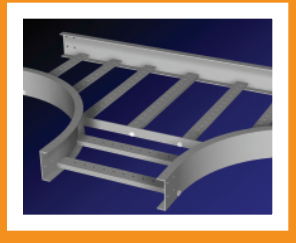
Welcome to Enduro.

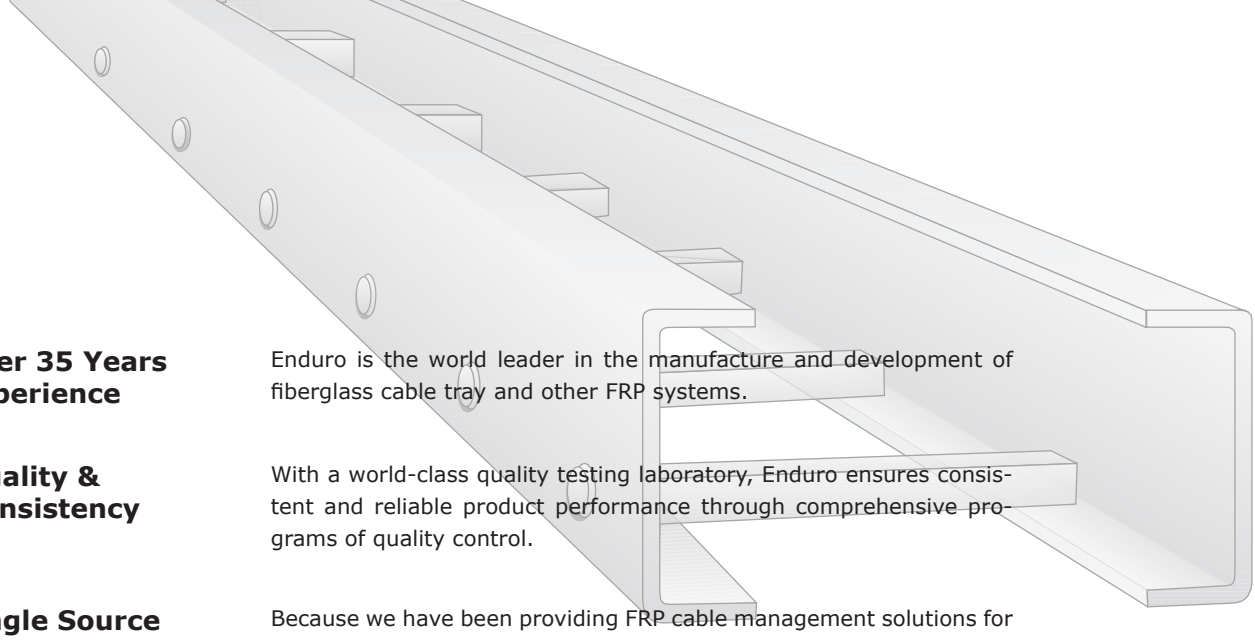
This product catalog and guide provides the information you need to design your cable management solution. Should you need additional information feel free to contact us at 800-231-7271 or at sales@endurocomposites.com.

Please also visit our website at www.endurocomposites.com

Thank you for your interest in Enduro cable tray systems. We look forward to working with you.







Over 35 Years Experience

Enduro is the world leader in the manufacture and development of fiberglass cable tray and other FRP systems.

Quality & Consistency

With a world-class quality testing laboratory, Enduro ensures consistent and reliable product performance through comprehensive programs of quality control.

Single Source Responsibility

Because we have been providing FRP cable management solutions for over three decades, our product offering is one of the broadest in the industry. Combined with our other manufacturing, engineering and design capabilities, this enables us to offer application-specific solutions to just about any design problem. And, since we are vertically integrated, we can deliver these solutions on time and on budget, at the quality level our customers expect.

Engineering & Design Assistance

Enduro's experienced technical staff can provide engineering and design assistance for your project. If you have a unique design problem, chances are good we have encountered something similar before.

Specification Assistance

The specification phase of a project is the most important to ensure the success of a composite cable management solution. With our broad history of installations in a wide variety of challenging environments, we can help you specify the best resin system and the right structural properties to ensure long life and low cost of ownership.

AutoCAD, PDMS

We can assist you in the design process with AutoCAD details. In addition, Enduro's cable tray offering is available in PDMS. Contact us today for more information.

Customer Service & Sales Support

Our Customer Service desk is available to assist with questions, product selection or quotes. Please call us today at 800-231-7271 or email sales@endurocomposites.com.

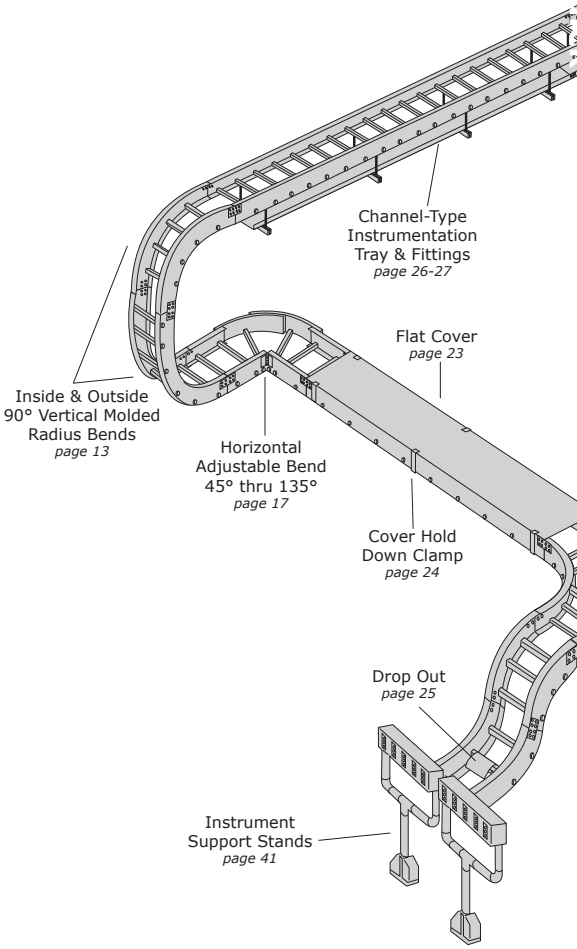
Our Broad Experience

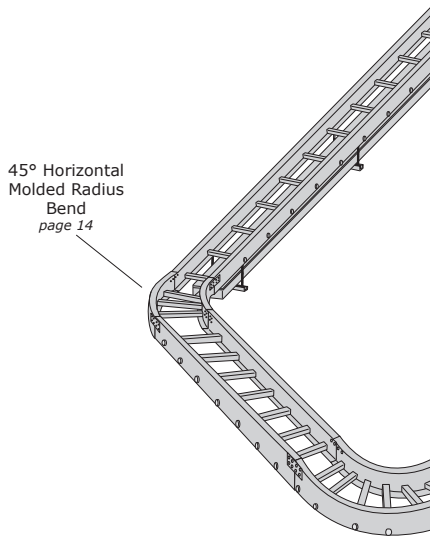
Offshore Platforms
Subsea Applications
Floating Offshore Systems
FPSOs & Other Vessels
Refineries
Liquified Natural Gas (LNG)
Chemical Plants

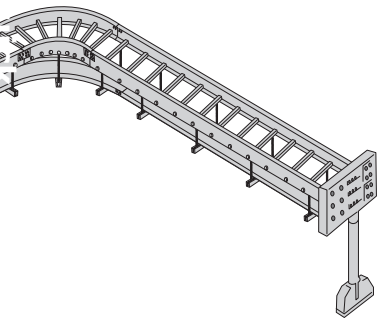
Petrochemical Complex
Fertilizer, Potash Plants
Pulp & Paper
Copper Refineries
Aluminum Refineries
Zinc Refineries
Metal Plating Facilities

Desalination Plants
Salt Processing
Grain Refining
Food Processing
Water & Wastewater Treatment
Electronics Etching/Clean Rooms
Tunnels, Bridges, Causeways
Non-Conductive Applications

Quick Find Index







Push Button
Support Stand
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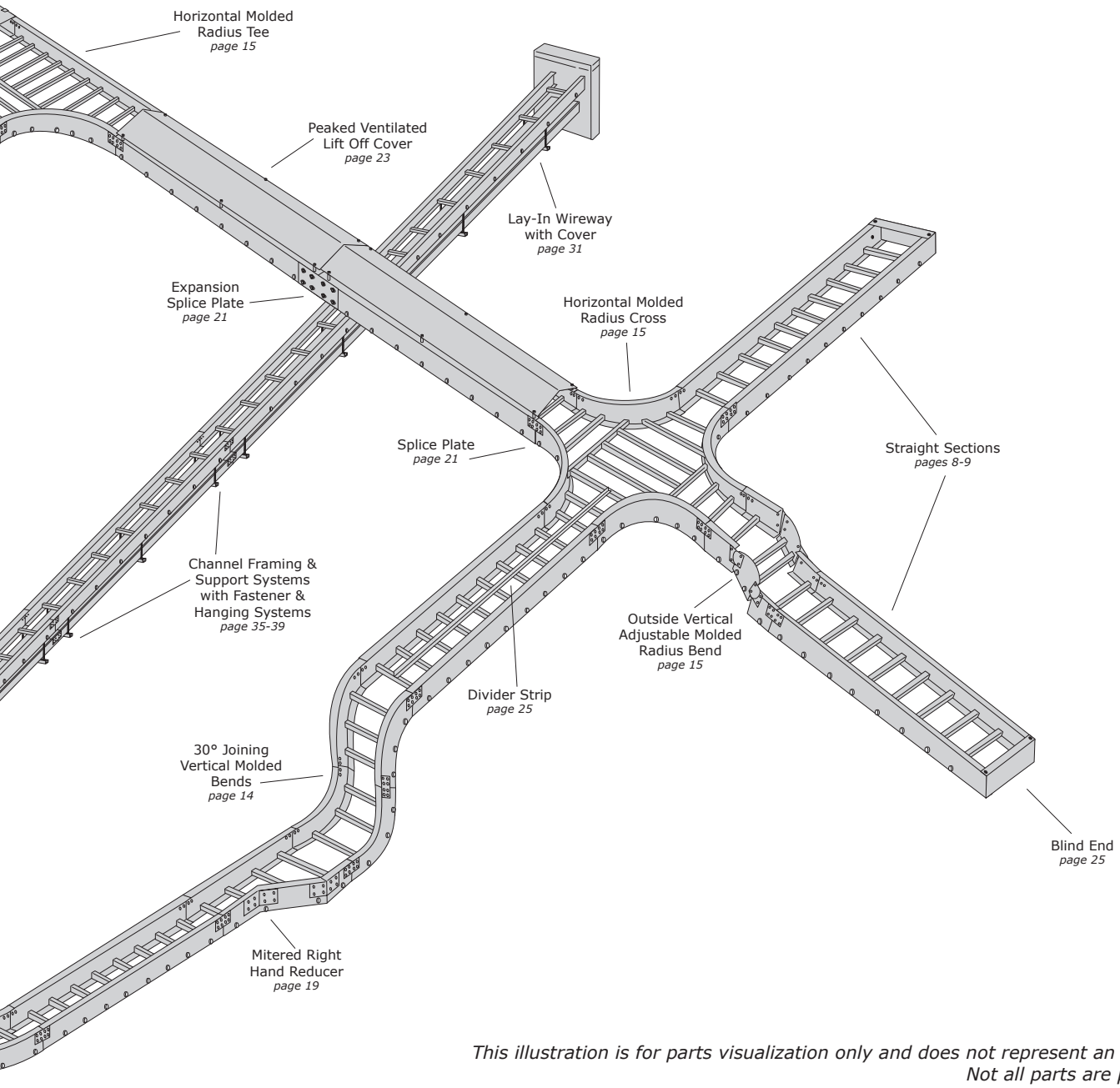


This illustration is for parts visualization only and does not represent an actual layout.
Not all parts are pictured here.

FRP Technical Data

Typical Properties of Structural FRP

Longitudinal Direction

Mechanical (coupon)	FR-P	FR-VE
Ultimate Tensile Strength, PSI (ASTM D638)	30,000	35,000
Ultimate Compressive Strength, PSI (ASTM D695)	30,000	35,000
Ultimate Flexural Strength, PSI (ASTM D790)	30,000	35,000
Tensile Modulus, PSI x 10^6	2.5	3.0
Compressive Modulus, PSI x 10^6	2.5	2.5
Flexural Modulus, PSI x 10^6	1.6	2.0
Ultimate Shear Strength, PSI	5,500	7,000
Ultimate Bearing Stress, PSI	30,000	35,000
Izod Impact Strength, Ft.-Lbs. per inch of notch (ASTM D256) (sample thickness ⅛" except ¼" for rod)	25	30

Transverse Direction

Mechanical (coupon)	FR-P	FR-VE
Ultimate Tensile Strength, PSI	7,000	10,000
Ultimate Compressive Strength, PSI	15,000	20,000
Ultimate Flexural Strength, PSI	10,000	14,000
Tensile Modulus, PSI x 10^6	0.8	1.0
Compressive Modulus, PSI x 10^6	1.0	1.2
Flexural Modulus, PSI x 10^6	0.8	1.0
Ultimate Shear Strength, PSI	5,500	6,000
Ultimate Bearing Stress, PSI	30,000	35,000
Izod Impact Strength, Ft.-Lbs. per inch of notch (ASTM D256)	4	5
Barcol Hardness (ASTM D2583-75	50	50

Electrical

Mechanical (coupon)	FR-P	FR-VE
Electric Strength, short term in oil, ⅛", vpm (ASTM D149)*	200	200
Electric Strength, short term in oil, KV per inch	35	35
Dielectric Constant, 60 Hz.(ASTM D150)*	5.6	5.2
Dissipation Factor, 60 Hz. (ASTM D150)*	0.03	0.03
Arc Resistance, seconds (ASTM D495)**	120	120

Full Section in Bending

Mechanical (coupon)	FR-P	FR-VE
Modulus of Elasticity, PSI x 10^6	2.5	3.0
Tensile Strength, PSI	20,000	25,000
Compressive Strength, PSI	20,000	25,000

Fire Retardant Properties

Mechanical (coupon)	FR-P	FR-VE
Flame Resistance, ign/burn, seconds (FTMS 406-2023)	75/75	75/75
Intermittent Flame Test, rating (HLT-15)	100	100
Flammability Test	average time of burning 5 seconds, average extent of burning 15mm (ASTM D635)	
Surface Burning Characteristics, maximum (ASTM E84)	25	25

Thermal

Mechanical (coupon)	FR-P	FR-VE
Thermal Coefficient of Expansion Inches/Inch/°F (ASTM D696)**	5 x 10^{-6}	5 x 10^{-6}
Thermal Conductivity, BTU per Sq. Ft./Ht./°F/In. (ASTM C-177-76)	4	4
Specific Heat, BTU/Lb./°F	0.28	0.28

Other

Mechanical (coupon)	FR-P	FR-VE
Density, Lbs./In.^{3} (ASTM D792)	0.065	0.065
Specific Gravity (ASTM D792)	1.80	1.80
Water Absorption, Max. % by weight (24 hour immersion) (ASTM D570)	.50	.50

Note: 1 PSI = 6.894 K Pa; 1 Ft.-Lb./In. = 5.443 kg-m/m; * Specimen tested perpendicular to laminate face ** Indicates reported value measured in logitudinal direction; Depending on the specific glass content and resin, the strength and stiffness properties may be significantly higher. Contact us for specific values on Halogen-Free Low Smoke Plus resin properties.

Concentric Static Load (if required)

A concentrated static load is not included in the table on page 9. Some user applications may require that a given concentrated static load be imposed over and above the working load. Such concentrated static load represents a static weight applied between the side rail at midspan. When so specified, the concentrated static load may be converted to an equivalent load (W_e) in pounds per linear foot (kg/m) using the formula to the below right and added to the static weight of cable in the tray. This combined load may be used to select a suitable load/span designation (table on page 9).

If the combined load exceeds the working load shown, please contact us. This data was obtained from the NEMA and NEC Standards Publications and other sources to assist in the proper selection of the most appropriate cable tray type offered by Enduro.

$$W_e = \frac{2 \times (\text{Concentrated Static Load})}{\text{span length (ft or m)}}$$

Thermal Contraction & Expansion

The table to the right compares the thermal contraction and expansion based on various temperature differentials for fiberglass, steel and aluminum cable trays. The values shown represent the length of cable tray that will produce a ⅝" movement between expansion connectors for the indicated temperature differential. Fiberglass has the least movement. Enduro has expansion connectors to provide for total movement of ⅝".

Fiberglass vs Steel vs Aluminum

Temp. Differential	Fiberglass Ft. (m)	Steel Ft. (m)	Aluminum Ft. (m)
25°F (14°C)	417 (126)	320 (97)	162 (49)
50°F (28°C)	208 (63)	160 (48)	81 (25)
75°F (42°C)	138 (42)	106 (32)	54 (16)
100°F (56°C)	104 (32)	80 (24)	40 (12)
125°F (69°C)	83 (25)	63 (19)	32 (10)
150°F (83°C)	69 (21)	53 (16)	26 (8)
175°F (97°C)	59 (17)	45 (13)	23 (6)

Effect of Temperature - FRP

Strength properties of reinforced plastics are reduced when continuously exposed to elevated temperatures. Working loads shall be reduced when based on the table to the right. Percentages shown are approximate. If unusual temperature conditions exist, please contact us for consultation. Below freezing temperatures do not adversely affect the load rating capability of the tray. Fiberglass does not become brittle at below freezing temperatures. Careful review should be made of applications involving service temperatures over 200°F.

Temp.	Polyester Strength %	Vinyl Ester Strength %
75°F (24°C)	100%	100%
100°F (38°C)	90%	100%
125°F (52°C)	78%	100%
150°F (66°C)	68%	90%
175°F (79°C)	60%	90%
200°F (93°C)	52%	75%

The test values in the chart below were obtained from tests conducted by Enduro's vinyl ester resin supplier. The values shown, although obtained from an actual coupon test, are intended for illustrative purposes only, and not for use in design calculations. The values for polyester are slightly lower.

Test Temp. °F (°C)	-100° (-73°)	-50° (-46°)	0° (-18°)	50° (10°)	77° (25°)	100° (38°)	150° (66°)	200° (93°)	250° (121°)	300° (149°)
Flex. St., PSI, ASTM D790	101,500	86,400	79,500	72,300	68,100	66,300	58,700	27,400	13,200	9,200
Flex. Mod., PSI x 10^6, ASTM D790	3.36	3.32	3.42	3.38	3.24	3.29	3.07	1.98	0.98	0.83
Tensile St., PSI, ASTM D638	84,100	70,400	63,900	58,000	56,100	54,600	49,900	41,800	29,600	22,000

Corrosion Resistance of Resin Systems

Enduro offers a variety of resin systems which are listed in more detail on page 9. The two resin systems most often used are isophthalic polyester fire-retardant (FR-P) and vinyl ester fire-retardant (FR-VE). Polyester is more widely used and sufficient for most applications while vinyl ester is recommended where strong acids (such as hydrochloric acid), strong alkalies (such as caustic soda), organic solvents and organic conditions exist. An abbreviated guide is provided below to assist in the selection of the proper standard resin system for individual application.

Polyester and vinyl ester resin systems are available in conductive formulation. Contact us for corrosion resistance information for halogen-free and halogen-free low smoke plus resins.

All composite materials have an ultra-violet light inhibiting chemical additive and has a maximum flame spread of 25 or less, per ASTM E-84 (Class 1 flame spread). All pultruded products have complete synthetic veil coverage (outer surfacing fabric) to provide maximum chemical and UV protection.

Chemicals	75°F (24°C)	160F° (71°C)	Chemicals	75°F (24°C)	160°F (71°C)
Acetic Acid 5%	FR-P	FR-P	Magnesium Chloride	FR-P	FR-P
Acetic Acid 25%	FR-P	FR-VE-210° (*)	Methyl Alcohol 10%	FR-P	FR-VE-150° (*)
Aluminum Potassium Sulfate 5%	FR-P	FR-P	Naphtha	FR-P	FR-P
Ammonium Hydroxide 10%	FR-P	FR-VE-150°	Nitric Acid 5%	FR-P	FR-P
Ammonium Nitrate	FR-P	FR-P	Nitric Acid 20%	FR-VE	FR-VE-120° (*)
Benzenesulfonic Acid 5%	FR-P	FR-P	Phosphoric Acid 10%	FR-P	FR-P
Calcium Chloride	FR-P	FR-P	Phosphoric Acid 30%	FR-P	FR-P
Carbon Tetrachloride	FR-VE	FR-VE-100° (*)	Phosphoric Acid 85%	FR-P	FR-P
Chlorine Dioxide 15%	FR-P	FR-VE-150° (*)	Sodium Bicarbonate 10%	FR-P	FR-P
Chromic Acid 5%	FR-P	FR-VE-150° (*call)	Sodium Bisulfate	FR-P	FR-P
Copper Sulfate	FR-P	FR-P	Sodium Carbonate	FR-P	FR-VE
Diesel Fuel No. 1	FR-P	FR-P	Sodium Chloride	FR-P	FR-P
Diesel Fuel No. 2	FR-P	FR-P	Sodium Hydroxide 1-50%	FR-VE	FR-VE-120° (*)
Ethylene Glycol	FR-P	FR-P	Sodium Hypochlorite 5%	FR-P	FR-VE-120° (*)
Fatty Acids 100%	FR-P	FR-P	Sodium Nitrate	FR-P	FR-P
Ferrous Sulfate	FR-P	FR-P	Sodium Silicate	FR-P	FR-VE-210° (*)
Fluosilicic Acid 0-20%	FR-VE	FR-VE (call)	Sodium Sulfate	FR-P	FR-P
Hydrochloric Acid 1%	FR-P	FR-P	Sulfuric Acid 0-30%	FR-P	FR-P
Hydrochloric Acid 15%	FR-P	FR-VE-180° (*)	Sulfuric Acid 30-50%	FR-VE	FR-VE
Hydrochloric Acid 37%	FR-P	FR-VE-150° (*)	Sulfuric Acid 50-70%	FR-VE	FR-VE-180° (*)
Hydrogen Sulfide	FR-P-140°	FR-VE-210°	Trisodium Phosphate 25%	FR-P	FR-VE-210° (*)
Kerosene	FR-P	FR-P	Trisodium Phosphate - All	FR-VE	FR-VE-210° (*)
			Water, Distilled	FR-P	FR-P

FR = Fire-Retardant; P = Polyester Resin; VE = Vinyl Ester Resin; (*) = Not recommended to exceed this temperature; call = Call for recommendations

Information contained in this chart is based on data from raw material suppliers and collected from several years of actual industrial applications. Temperaturers are not the minimum nor the maximum (except where specifically stated) but represent standard test conditions. The products may be suitable at higher temperatures, but individual test data should be required to establish such suitability. The recommendations or suggestions contained in this chart are made without guarantee or representation as to results. We suggest that you evaluate these recommendations and suggestions in your own laboratory or by actual field trial prior to use.

Ladder Cable Tray Selection Guide

Imperial Straight Section Part Numbers

Example: **ELL3 - 06 - 06 - 20 - MR**

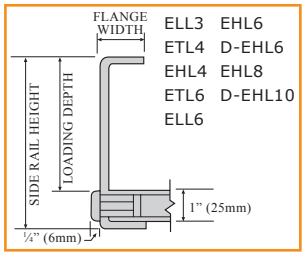
System No.	Side Rail Height	Width*	Rung Spacing	Length	Rung
See Ladder Cable Tray Selection Guide Below	3=3″ 4=4″ 6=6″ 8=8″ 10=10″	06=6″ 09=9″ 12=12″ 18=18″ 24=24″ 30=30″ 36=36″	06=6″ 09=9.25″ 12=12″ 18=18.5″	10=10 Ft. 20=20 Ft.	SR=Strut Rung MR=Marine Rung MR2=Marine Rung every other (for standard rung, leave rung space in product number blank, example: ELL3-06-06-20)

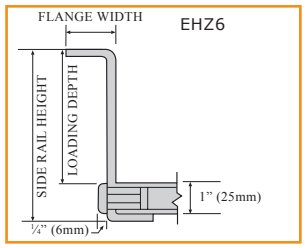
Metric Straight Section Part Numbers

Example: **ELL3 - 150 - 150 - 6M - MR**

System No.	Side Rail Height	Width*	Rung Spacing	Length	Rung
See Ladder Cable Tray Selection Guide Below	3=3″ 4=4″ 6=6″ 8=8″ 10=10″	150=150mm 225=225mm 300=300mm 450=450mm 600=600mm 750=750mm 900=900mm	150=150mm 235=235mm 300=300mm 470=470mm	3M=3m 6M=6m	SR=Strut Rung MR=Marine Rung MR2=Marine Rung every other (for standard rung, leave rung space in product number blank, example: ELL3-150-150-6M)

System Diagrams





***Width represents inside dimensions.**

Solid bottom available upon request. Rung connections are made with a mechanical and chemical lock. See specification page 12, item 5.1.2 for details.

Please contact us for any other custom modifications.

18.5″ (470mm) rung spacing not available for 30″ (750mm) and 36″ (900mm) widths.

Ladder Cable Tray Selection Guide

Standard System No. (polyester resin)	Optional System No. (Δ) = insert code; see bottom of pg.	Side Rail Height In. (mm)*	Loading Depth In. (mm)	Flange Width In. (mm)	Min. Channel Thickness In. (mm)	NEMA Class FG-1	Safety Factor	UL Listing
ELL3	EL(Δ)3	3″ (75)	1 13/16″ (46)	1″ (25)	3/16″ (4.8)	8A	1.5	-
ETL4	ET(Δ)4	4″ (100)	2 7/8″ (73)	1 1/8″ (28)	3/16″ (4.8)	8A	1.5	-
EHL4	EH(Δ)4	4″ (100)	2 3/4″ (70)	1 1/8″ (28)	1/4″ (6.4)	12A	1.5	Class A
ETL6	ET(Δ)6	6″ (150)	4 13/16″ (122)	1 5/8″ (41)	5/32″ (4.0)	18A	1.5	-
ELL6	EL(Δ)6	6″ (150)	4 13/16″ (122)	1 5/8″ (41)	3/16″ (4.8)	20A	2.0	Class A
EHL6	EH(Δ)6	6″ (150)	4 3/4″ (121)	1 5/8″ (41)	1/4″ (6.4)	20B 20C	2.0 1.5	Class C
D-EHL6	D-EH(Δ)6	6″ (150)	4 11/16″ (119)	1 5/8″ (41)	5/16″ (8.0)	20C	2.0	Class C
EHZ6	EHZ(Δ)6	6″ (150)	4 11/16″ (119)	2″ (51)	5/16″ (8.0)	20C	1.5	-
EHL8	EH(Δ)8	8″ (200)	6 11/16″ (170)	1 3/4″ (44)	5/16″ (8.0)	20C	1.5	Class C
D-EHL10	D-EH(Δ)10	10″ (250)	8 5/8″ (219)	2 3/4″ (70)	3/8″ (9.5)	30C	2.0	-

(Δ) = Insert one of the following letters for resin designation
V = Vinyl Ester; S = Halogen-Free Polyester; VS = Halogen-Free Vinyl Ester;
Y = Halogen-Free Low Smoke Plus; RT = Conductive

* (mm) value is nominal
Please note: Custom resin systems may require additional lead times.

Resin Systems

Below is an overview of the common resin systems we offer. When choosing a resin type for your application, we highly recommend consulting with us regarding the application to be sure the proper resin is specified. Considerations include corrosion environment, temperature, fire resistance, smoke and smoke toxicity requirements and conductivity / resistivity requirements. Regarding the corrosion environment, certain chemical concentrations and temperatures will dictate whether a polyester or epoxy vinyl ester system is preferred for optimum durability.

Isophthalic Polyester

This industrial-grade polyester resin system offers very good weathering performance (resistance to UV) and corrosion resistance. This system is especially suitable for seawater environments.

Vinyl Ester

This resin system also delivers good weathering performance, but is superior to a polyester with respect to corrosion resistance and high heat environments. Epoxy vinyl ester resins provide greater toughness and considerably higher strength at elevated temperatures. They also provide superior resistance to chemical attack in corrosive chemical service.

Conductive

This Isophthalic Polyester-based resin is formulated to comply with ABS requirements for conductivity. To provide superior resistance to chemical attack, the conductive formulation is also available in a Vinyl Ester base.

Halogen-Free Polyester

This system offers similar performance attributes as our standard Isophthalic Polyester, but without the use of halogens.

Halogen-Free Vinyl Ester

This system offers similar performance attributes as our Vinyl Ester, but without the use of halogens.

Halogen-Free Low Smoke Plus

This modified-acrylic based resin is suitable for applications which require extremely low-smoke development in the case of fire. This resin system is commonly used in tunnel applications.

	Tray Weight Lbs/Ft. (kg/m) 12" width, 12" rung spacing	Working (Allowable) Load Lbs./Ft. (kg/m)							
		8' (2.4m)	10' (3m)	12' (3.7m)	14' (4.3m)	16' (4.9m)	18' (5.5m)	20' (6.1m)	30' (9.1m)
	2.0 (3.0)	50 (74)							
	3.0 (4.5)	50 (74)							
	3.0 (4.5)	113 (167)	72 (107)	50 (74)					
	2.9 (4.3)	253 (377)	162 (241)	113 (167)	83 (123)	63 (94)	50 (74)		
	4.5 (6.7)		200 (298)	139 (207)	102 (152)	78 (116)	62 (92)	50 (74)	
	4.5 (6.7)				204 (304)	156 (233)	123 (184)	100 (149)	
	4.9 (7.3)				204 (304)	156 (233)	123 (184)	100 (149)	
	4.8 (7.1)				204 (304)	156 (233)	123 (184)	100 (149)	
	6.4 (9.5)				204 (304)	156 (233)	123 (184)	100 (149)	
	9.4 (14.1)						278 (413)	225 (335)	100 (149)

The Enduro straight sections listed above that are UL Listed are for 10 Ft. and 20 Ft. lengths. All molded and mitered fittings associated with these tray types are also UL listed. NEMA classes and UL listings in this table are for polyester and vinyl ester resin systems only. Values in Working (Allowable) Load are applicable to all resin systems, where possible. For more tray weight values, please contact us. For CSA class, please contact us.

Installation Guide - Ladder Cable Tray

Installation

The installation of Enduro Cable Tray should be made in compliance with the standards set forth by the National Electric Code and NEMA Publications VE-2 (current issue). Enduro supplies made to order, pre-fabricated cable ladder tray and fittings as specified by the purchaser.

Always observe common safety practices when assembling tray and fittings in the field. Assemble in well-ventilated areas as dust from field cuts can accumulate. This presents no serious health hazard but can cause skin irritation and, if allowed to accumulate with grease and other machining lubricants, can become abrasive. Personnel should wear safety goggles, dust mask, coveralls or a shop coat when sawing, machining and/or sanding. Caution should also be noted when cutting as dust from carbon fiber is also electrically conductive and additional considerations apply.

Avoid generating excessive heat in any machining operation, as heat softens the bonding resin in the fiberglass, resulting in a ragged rather than a clean-cut edge.

Avoid excessive pressure when sawing, drilling, routing, etc. Use carbide-tipped drill bits and saw blades for extended tool life.

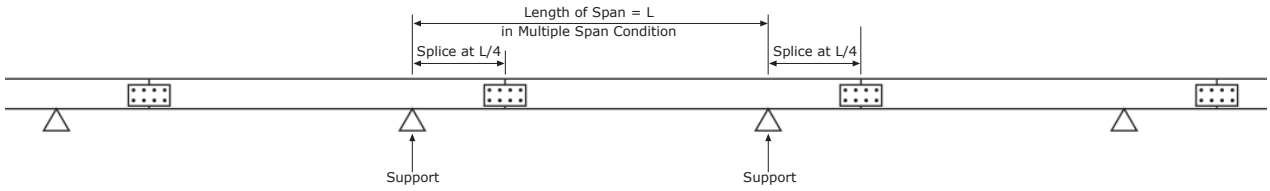
The use of lubricant during machining is not recommended.

To avoid chipping of material at cut edges, secure cable tray and fittings properly during field cut operations. We recommend the use of Enduro sealant (pg. 25) for sealing surfaces and cut edges after field cuts are made.

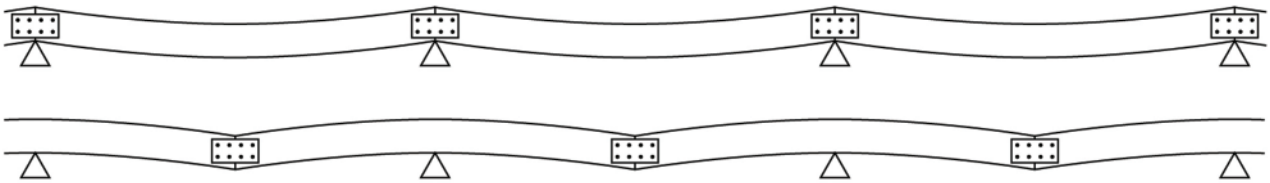
When using adhesives, be sure to prepare the surface properly before applying. Follow label instructions carefully. A combination of mechanical fasteners and adhesives make the strongest most reliable connections.

Support Location Guidelines*

Correct



Incorrect



*These guidelines apply when using standard splice plates. For location flexibility, heavy duty splice plates (pg. 22) allow for support location anywhere in the span.

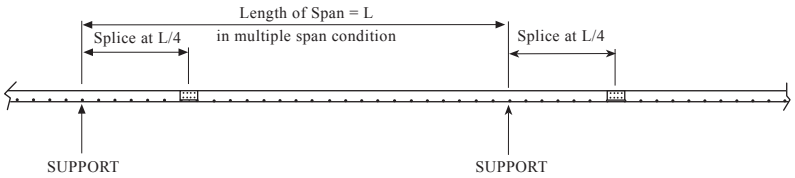
Actual Size Label

WARNING! CABLE TRAYS ARE NOT DESIGNED FOR USE AS WALKWAYS

Reference NEMA VE-2 (current issue)
In as much as fiberglass cable tray is designed as a support for power or control cables, or both; it is not intended or designed to be a walkway for personnel. The user is urged to display appropriate warning cautioning against the use of this support as a walkway.

Straight Sections

Supports must be located so that connector (splice joints) between horizontal runs fall between the support point and the quarter point of the span.



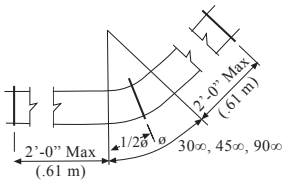
Standard engineering practice requires that the splice joints be located where they will resist little or no bending moment. This allows the cable tray system to act as a continuous member with spans working in conjunction with one another to resist loading. When a cable tray system is installed with the splice joints located directly over the support, the previous continuous span condition is changed to one of a number of simple spans. These spans act independently of each other and excessive stress will occur at substantially less loading.

Vertical straight lengths should be supported at intervals dictated by the building structure not exceeding 24 Ft. on centers.

A support should be located 2 Ft. on each side of an expansion connection.

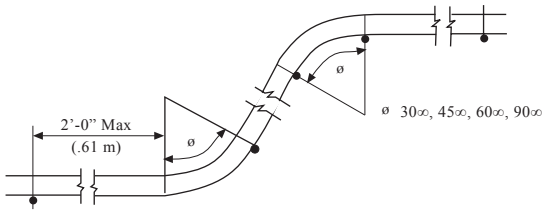
Horizontal Fitting Supports

Supports should should be placed within 2 Ft. (.61m) of each fitting extremity, and as follows: 90 degree supports at the 45 degree point of the arc, 45 degree supports at the 22.5 degree point of the arc (except for the 12" radii), 30 degree supports at the 15 degree point of the arc (except for the 12" radii).



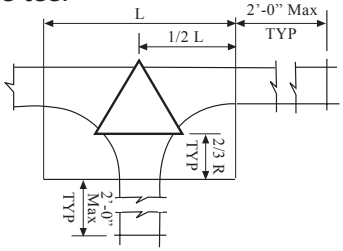
Vertical Fitting Supports

Vertical fittings at the top runs should be supported at each end. Fittings at the bottom of runs should be supported at the top of the fitting, and within 2 Ft. (.61m) of the lower extremity of the fitting.



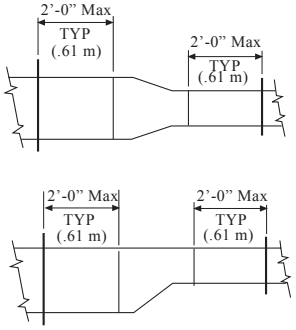
Horizontal Tee Supports

Supports should be placed within 2 Ft. (.61m) of each of the three openings connected to other cable tray items for 12" (305mm) radius. On all other radii, at least one support should also be placed under each side rail of the tee.



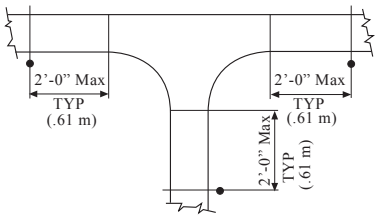
Reducer Fitting Supports

Straight reducer and right/left hand reducer fittings should be supported within 2 Ft. (.61m) of each fitting extremity.



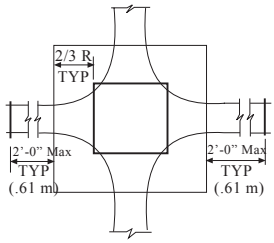
Vertical Tee Supports

Vertical tee fittings should be supported within 2 Ft. (.61m) of each fitting extremity.



Horizontal Cross Supports

Supports should be placed within 2 Ft. (.61m) of the four openings connected to other cable tray items for the 12" (305mm) radius. On all other radii, at least one support should also be placed under each side rail of the cross.



Specification - Ladder Cable Tray

1.0 Scope

1.1 The cable tray system shall conform to the material and fabrication requirements as per this specification.

2.0 Standards

2.1 The cable tray system shall conform to applicable sections of:

- 2.1.1 NEMA Standard FG-1 (latest edition)
- 2.1.2 National Electric Code (NEC)
- 2.1.3 ASTM E-84 (Class 1 Rating)
- 2.1.4 UL (Underwriters Laboratories, Inc.) Standards for Non-Metallic Cable Trays.
- 2.1.5 CSA INTERNATIONAL (National Standard of Canada) CAN/CSA-C22.2 No. 126 Cable Tray Systems

3.0 General

3.1 Tray Requirements

- 3.1.1 Tray widths 6" (152mm), 9" (229mm), 12"(305mm), 18" (457mm), 24" (610mm), 30" (762mm), and 36" (914mm)
- 3.1.2 Lengths (as required): 10 ft, 20 ft, 3m, and 6m
- 3.1.3 Rung spacing (as required): 6" (152mm), 9.25" (235mm), 12" (305mm), and 18.5" (470mm)
  Rung Type (as required): Standard Rung, Marine Rung or Strut Rung
- 3.1.4 Radius of fittings (as required): 12" (305mm), 24" (610mm), and 36" (914mm)
- 3.1.5 Resin Systems (as required): Isophthalic Polyester, Vinyl Ester, Conductive, Halogen-Free Polyester, Halogen-Free Vinyl Ester, or Halogen-Free Low Smoke Plus

3.2 Loading Requirements

- 3.2.1 There shall be three working load classifications of fiberglass cable tray based on 20 Ft. (6m) support span:

Class	Working Load	FOS
A	50 Lbs./Lineal Ft.	1.5
B	75 Lbs./Lineal Ft.	1.5
C	100 Lbs./Lineal Ft.	1.5

- 3.2.2 Span support criteria shall be as specified (Reference the following table)

Support Span (Ft.)	Working Load in Lbs./Lineal Ft. Class A	Class B	Class C
30	-	-	100
20	50	75	100
18	62	92	123
16	78	117	156
14	102	150	200
12	139	208	-
10	200	-	-

• Independent test reports in conformance to NEMA FG-1 are required.

- 3.2.3 Nominal loading depth (as required): 2" (51mm), 3" (76mm), 5" (127mm), 7" (178mm) and 9" (229mm)

4.0 Materials

4.1 The glass fiber to resin content shall be maintained between 45 to 55 percent by weight in all pultruded components except flat sheet which shall be 35 to 45 percent; and, 25 to 45 percent by weight in all molded components.

4.2 All composite material shall have an ultraviolet light inhibiting chemical additive to resist UV degradation.

4.3 All composite material shall be fire retardant and have a flame spread rating of 25 or less (Class 1 Rating) when tested in accordance with ASTM E-84.

4.4 All pultruded products shall have a complete surfacing veil to provide maximum chemical and UV protection.

5.0 Construction

5.1 Straight section tray shall be fiberglass reinforced meeting all the requirements herein described.

- 5.1.1 The side rail members must turn in.
- 5.1.2 All rung to side member connections shall have both a mechanical and a chemical (adhesive) lock. The tray shall be assembled by the use of a locking pin made of fiberglass reinforced thermoplastic. The locking pin shall be inserted under pressure with a high strength, chemical resistant adhesive.
- 5.1.3 All bonded connections must be sanded to maximize adhesion and structural integrity.
- 5.1.4 The tray interior shall be clear of all projections or sharp objects.
- 5.1.5 All straight section lengths shall be pre-drilled to accept connector plates.
- 5.1.6 All cut ends and drilled holes (factory and field) shall be resin coated.

5.2 Fittings are to be pre-fabricated and shall meet all the requirements herein described.

- 5.2.1 All fittings shall have a nominal 9.25" rung spacing.
- 5.2.2 All fittings shall be pre-drilled to accept connector plates.
- 5.2.3 All fittings shall be designed and installed so as to have the same load carrying capacity as the straight sections.
- 5.2.4 Rung to side member connections shall have both a mechanical and/or chemical (adhesive) lock. Fittings shall be assembled by use of a locking pin made of fiberglass reinforced thermoplastic and/or a stainless steel rivet. The locking pin shall be inserted under pressure with a high strength chemical resistant adhesive.

• All radius 90° and 45° horizontal and vertical bends, all tees and crosses for tray types using 6" (152mm), and most 4" (101mm) and 8" (202mm), C-channel members shall be of concentric curved molded design and made by resin transfer molding.

5.3 Connector Plates and Fasteners:

- 5.3.1 Connector plates shall be fiberglass and designed with sufficient strength so they may be installed between 0.2 and 0.3 of the length of the span from the support without derating the load carrying capacity of the tray.
- 5.3.2 Connector plates for conductive tray shall be stainless steel.
- 5.3.3 Fasteners for connector plates shall be 3/8" (9.5mm) diameter Type 316 Stainless Steel, Monel, Silicon, Bronze, or FRP studs & hex nuts as required.

5.4 Accessories

- 5.4.1 The manufacturer shall be capable of providing all necessary parts (i.e. clamps, support assemblies, etc.) for the installation of a complete fiberglass tray system.

6.0 Acceptable Manufacturer

6.1 The fiberglass ladder-type cable tray system shall be manufactured - pultrusion, compression molded, resin transfer molded and/or fabricated by Enduro Composites, Inc., of Houston, Texas USA.

Ladder Cable Tray - Molded Fittings

Enduro concentric curved molded fittings are available in polyester and vinyl ester. ***For conductive and halogen-free formulations, please contact us for product codes, availability and lead time.*** It is recommended to use expansion splice plates and 1¼" long assembly fasteners when connecting to other fittings or straight lengths. Refer to page 11 in the Recommended Support Locations section. Rung connections are made with a mechanical and/or chemical lock. Please see page 12, item 5.2.4 for details.

Standards & Listings

NEMA: All 6" and 8" molded fittings = Class C. EHL 4" molded fittings = Class 20A

UL: All the following molded fittings are UL listed in 4", 6", and 8" in Polyester/Vinyl Ester.

Imperial Molded Fittings Part Numbers

Example: **EHB - MC6 - 90 - 24 - 24**

Type	Resin (Δ)	Side Rail Height (H)	Angle	Width (W)	Radius (R)
EHB = Horizontal Bend	MC = Polyester	4 = 4"	30 = 30°	06 = 6"	12 = 12"
EIV = Vertical Inside	MV = Vinyl Ester	6 = 6"	45 = 45°	09 = 9"	24 = 24"
EOV = Vertical Outside	✓ Conductive	8 = 8"	60 = 60°	12 = 12"	36 = 36"
EHT = Horizontal Tee	✓ Poly Halogen-Free		90 = 90°	18 = 18"	
EHC = Horizontal Cross	✓ VE Halogen-Free			24 = 24"	
EVT = Vertical Tee	✓= For Conductive and Halogen-Free formulations, please contact us for product codes.			30 = 30"	
				36 = 36"	

For vertical tee specify "up" or "down" at end of catalog code

Covers = EC *before* part number; example EC-EHB-MC6-90-24-24.

Fasteners for covers are separate order item, see page 39.

Strut Rung = SR *after* part number; example EHB-MC6-90-24-24-SR

Marine Rung = MR *after* part number; example EHB-MC6-90-24-24-MR

Metric Molded Fittings Part Numbers

Example: **EHB - MC6 - 90 - 600 - 600**

Type	Resin (Δ)	Side Rail Height* (H)	Angle	Width (W)	Radius (R)
EHB=Horizontal Bend	MC=Polyester	4=100mm	30=30°	150=150mm	300=300mm
EIV=Vertical Inside	MV=Vinyl Ester	6=150mm	45=45°	225=225mm	600=600mm
EOV=Vertical Outside	✓ Conductive	8=200mm	60=60°	300=300mm	900=900mm
EHT=Horizontal Tee	✓ Poly Halogen-Free		90=90°	450=450mm	
EHC= Horizontal Cross	✓ VE Halogen-Free			600=600mm	
EVT=Vertical Tee	✓= For Conductive and Halogen-Free formulations, please contact us for product codes.			750=750mm	
				900=900mm	

* = (mm) values are nominal

For vertical tee specify "up" or "down" at end of catalog code

Covers = EC *before* part number; example EC-EHB-MC6-90-600-600.

Fasteners for covers are separate order item, see page 39.

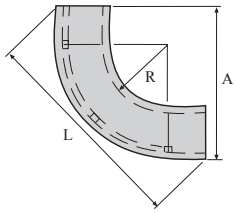
Strut Rung = SR *after* part number; example EHB-MC6-90-600-600-SR

Marine Rung = MR *after* part number; example EHB-MC6-90-600-600-MR

90° Vertical Bend

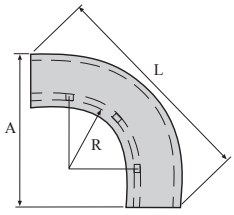
Part No. Key*

INSIDE: EIV-(Δ)(H)-90-(W)-(R)



Part No. Key*

OUTSIDE: EOV-(Δ)(H)-90-(W)-(R)



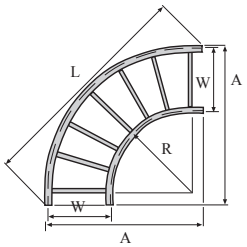
Channel Depth Inches (mm)

Radius	4" Tray A	4" Tray L	6" Tray A	6" Tray L	8" Tray A	8" Tray L
12 (305)	NA	NA	22¾ (578)	32³⁄₁₆ (818)	NA	NA
24 (610)	32¹³⁄₁₆ (833)	46⅜ (1178)	34¾ (883)	49⅛ (1356)	36¹¹⁄₁₆ (932)	51⅞ (1318)
36 (914)	NA	NA	46¾ (1187)	66⅛ (1680)	NA	NA

90° Horizontal Bend

Part No. Key*

EHB-(Δ)(H)-90-(W)-(R)



Dimension Inches (mm)

Width	12" (305) Radius A	12" (305) Radius L	24" (610) Radius A	24" (610) Radius L	36" (914) Radius A	36" (914) Radius L
6 (152)	22¾ (578)	32³⁄₁₆ (818)	34¾*** (882)	49⅛ (1248)	46¾ (1187)	66⅛ (1680)
9 (229)	25¾ (654)	36⁷⁄₁₆ (926)	37¾ (959)	53⅜ (1356)	49¾ (1264)	70⅜ (1787)
12 (305)	28¾ (405)	40¹¹⁄₁₆ (1033)	40¾** (1035)	57⅝ (1464)	52¾ (1340)	74⅝ (1895)
18 (457)	34¾ (883)	49⅛ (1248)	46¾** (1187)	66⅛ (1680)	58¾ (1492)	83⅛ (2111)
24 (610)	40¾ (1035)	57⅝ (1464)	52¾** (1340)	74⅝ (1895)	64¾ (1645)	91½ (2324)
30 (762)	46¾ (1187)	66⅛ (1680)	58¾† (1492)	83⅛ (2111)	NA	NA
36 (914)	52¾ (1340)	74⅝ (1895)	64¾ † (1645)	91½ (2324)	NA	NA

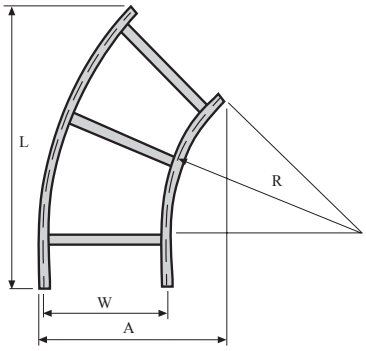
* In Part No. Key, parentheses ( ) = insert corresponding option code; Δ = Resin; H = Side Rail Height; R = Radius; W = Width of the *inside* distance from tray wall to tray wall; **Also available in 4" and 8" side rail; *** Also available in 4" side rail; † Also available in 8" side rail

Molded Fittings - Ladder Cable Tray

45° Horizontal Bend

Part No. Key*

EHB-(Δ)(H)-45-(W)-(R)



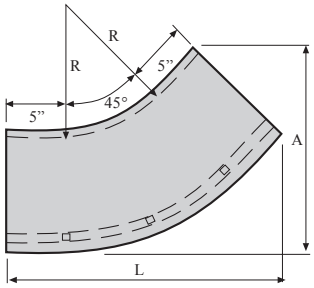
Dimension Inches (mm)

Width	12" (305) Radius		24" (610) Radius		36" (914) Radius	
	A	L	A	L	A	L
6 (152)	9 15/16 (227)	17 3/8 (441)	13 7/16*** (341)	25 7/8 (657)	17 (432)	34 3/8 (873)
9 (229)	12 15/16 (329)	19 1/2 (495)	16 7/16 (418)	28 (711)	20 (508)	36 1/2 (927)
12 (305)	15 15/16 (405)	21 5/8 (549)	19 7/16** (494)	30 1/8 (765)	23 (584)	38 5/8 (981)
18 (457)	21 15/16 (557)	25 7/8 (657)	25 7/16** (646)	34 3/8 (873)	29 (737)	42 7/8 (1089)
24 (610)	27 15/16 (710)	30 1/8 (765)	31 7/16** (798)	38 5/8 (981)	35 (889)	47 1/8 (1197)
30 (762)	33 15/16 (862)	34 3/8 (873)	37 7/16† (951)	42 7/8 (1089)	NA	NA
36 (914)	39 15/16 (1014)	38 5/8 (981)	43 7/16† (1103)	47 1/8 (1197)	NA	NA

45° Vertical Bend

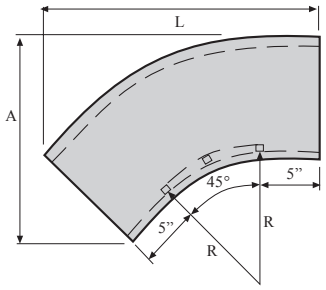
Part No. Key*

INSIDE: EIV-(Δ)(H)-45-(W)-(R)



Part No. Key*

OUTSIDE: EOV-(Δ)(H)-45-(W)-(R)



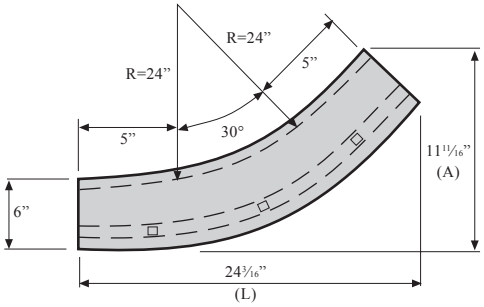
Channel Depth Inches (mm)

Radius	4" Tray		6" Tray		8" Tray	
	A	L	A	L	A	L
12 (305)	NA	NA	13 (330)	21 1/16 (535)	NA	NA
24 (610)	NA	NA	16 1/2 (419)	29 9/16 (751)	18 1/2 (470)	30 15/16 (786)
36 (914)	NA	NA	NA	NA	NA	NA

30° Vertical Bend

Part No. Key*

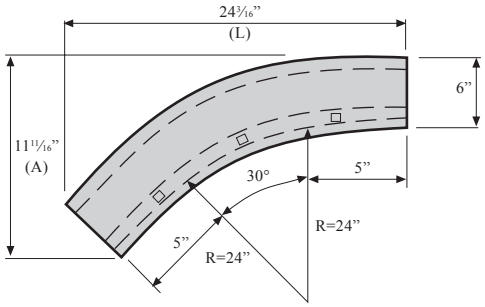
INSIDE: EIV-(Δ)6-30-(W)-24



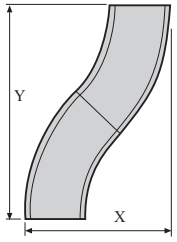
Available in 6" and 24" radius depth channel.

Part No. Key*

OUTSIDE: EOV-(Δ)6-30-(W)-24



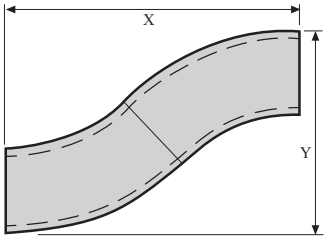
Joining 45° Horizontal Bends



X = 2A - .707 (W + .5)
Y = 2L - .707 (W + .5)

Contact us for assembly method.

Joining 45° Vertical Bends

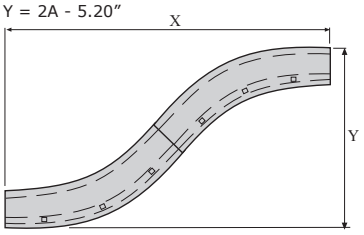


6" Side Rail
X = 2L - 4.24"
Y = 2A - 4.24"

8" Side Rail
X = 2L - 5.66"
Y = 2A - 5.66"

Joining 30° Vertical Bends

X = 2L - 3"
Y = 2A - 5.20"



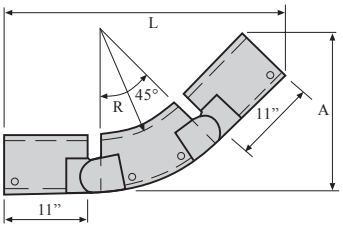
* In Part No. Key, any parentheses ( ) = insert corresponding option code; Δ = Resin; H = Side Rail Height; R = Radius; W = Width of the *inside* distance from tray wall to tray wall; ** Also available in 4" and 8" side rail; *** Also available in 4" side rail; † Also available in 8" side rail

Ladder Cable Tray - Molded Fittings

Vertical Adjustable Bend

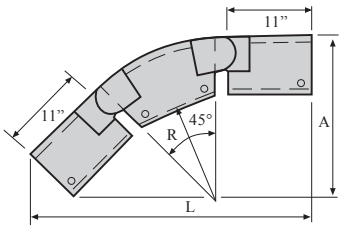
Part No. Key*

INSIDE: EIVA-(Δ)(H)-45-(W)-(R)



Part No. Key*

OUTSIDE: EOVA-(Δ)(H)-45-(W)-(R)



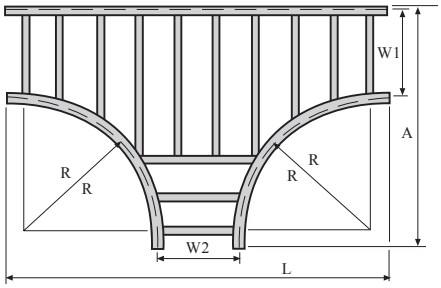
	Dimensions Inches (mm)	
Radius	A	L
12 (305)	18 (457)	35 (889)
24 (610)	21 (533)	43 (1092)
36 (914)	25 (635)	52 (1321)

Dimensions apply at 45° setting.
For travel dimensions, contact us.

Horizontal Tee

Part No. Key*

EHT-(Δ)(H)-(W1)-(W2)-(R)



Contact us for dimensions on reducing tee.

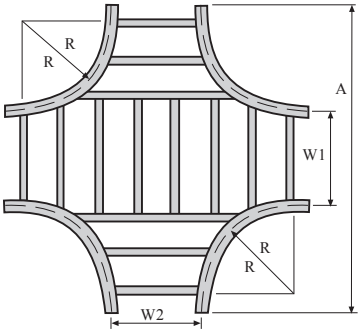
Dimension Inches (mm)

	12" (305) Radius		24" (610) Radius**		36" (914) Radius	
Width	A	L	A	L	A	L
6 (152)	22¾ (578)	39 (991)	34¾ (883)	63 (1600)	46¾ (1187)	87 (2210)
9 (229)	25¾ (654)	42 (1067)	37¾ (959)	66 (1676)	49¾ (1264)	90 (2286)
12 (305)	28¾ (730)	45 (1143)	40¾ (1035)	69 (1753)	52¾ (1340)	93 (2362)
18 (457)	34¾ (883)	51 (1295)	46¾ (1187)	75 (1905)	58¾ (1492)	99 (2515)
24 (610)	40¾ (1035)	57 (1448)	52¾ (1340)	81 (2057)	64¾ (1645)	105 (2667)
30 (762)	46¾ (1187)	63 (1600)	58¾ (1492)	87 (2210)	70¾ (1797)	111 (2819)
36 (914)	52¾ (1340)	69 (1753)	64¾ (1645)	93 (2362)	76¾ (1949)	117 (2972)

Horizontal Cross

Part No. Key*

EHC-(Δ)(H)-(W1)-(W2)-(R)



Contact us for dimensions on reducing cross.

Due to overall size of the 24" wide thru 36" wide, 36" radius cross assemblies are unable to be shipped via regular motor freight lines.

Dimension Inches (mm)

	12" Radius	24" Radius	36" Radius
Width	A	A**	A
6 (152)	39 (991)	63 (1600)	87 (2210)
9 (229)	42 (1067)	66 (1676)	90 (2286)
12 (305)	45 (1143)	69 (1753)	93 (2362)
18 (457)	51 (1295)	75 (1905)	99 (2515)
24 (610)	57 (1448)	81 (2057)	105 (2667)
30 (762)	63 (1600)	87 (2210)	111 (2819)
36 (914)	69 (1753)	93 (2362)	117 (2972)

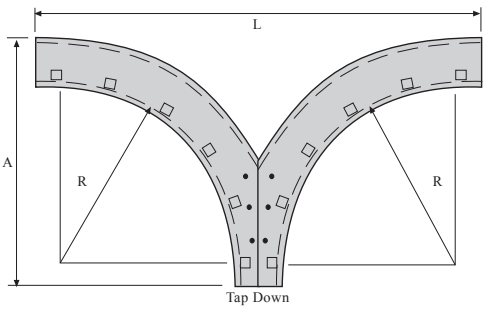
90° Vertical Tee

Part No. Key*

Up: EVT-(Δ)(H)-90-(W)-(R)-Up

Down: EVT-(Δ)(H)-90-(W)-(R)-Down

Tap up and tap down have the same dimensions.



	Dimensions Inches (mm)	
Radius	A	L
12 (305)	22¾ (578)	39½ (1003)
24 (610)	34¾** (833)	63½ (1613)
36 (914)	46¾ (1187)	87½ (2223)

* In Part No. Key, any parentheses ( ) = insert corresponding option code; Δ = Resin; H = Side Rail Height; R = Radius;
W = Width of the *inside* distance from tray wall to tray wall; ** Also available in 4", 6" and 8" side rail

Mitered Fittings - Ladder Cable Tray

Pre-assembled mitered fittings are available for all tray types. Fittings are assembled using 316 SS fasteners unless specified otherwise. When connecting to molded fittings or straight sections, expansion splice plates are recommended. For conductive and halogen-free low smoke plus cable tray, splice plates must be stainless steel. Rung connections are made with a mechanical and/or chemical lock (see specification, pg. 12, item 5.2.4). For assistance with other sizes and widths including 10" mitered fittings, please contact us.

Listings & Approvals

UL: All the following mitered fittings are UL listed in 4", 6", and 8" in Polyester/Vinyl Ester.

Imperial Mitered Fittings Part Numbers

Example: **EHB - HL6 - 90 - 24 - 24**

Type of Fitting	Tray Type/Resin (Δ)	Side Rail Height (H)	Angle	Width (W)	Radius (R)
EHB = Horizontal Bend	See Selection Table to the Right	3 = 3"	30 = 30°	06 = 6"	12 = 12"
EIV = Vertical Inside		4 = 4"	45 = 45°	09 = 9"	24 = 24"
EOV = Vertical Outside		6 = 6"	60 = 60°	12 = 12"	36 = 36"
EHT = Horizontal Tee		8 = 8"	90 = 90°	18 = 18"	
EHC = Horizontal Cross		10 = 10"		24 = 24"	
EVT = Vertical Tee				30 = 30"	
ER = Right Reducer				36 = 36"	
EL = Left Reducer					
ESR = Straight Reducer					
EHBD = Horiz. Direct Bend					

For vertical tee specify "up" or "down" at end of part code
Covers = EC *before* catalog number; example EC-EHB-MC6-90-24-24.
Fasteners for covers are separate order item, see page 39.
Strut Rung = SR *after* part number; example EHB-MC6-90-24-24-SR
Marine Rung = MR *after* part number; example EHB-MC6-90-24-24-MR

Tray Type/Resin Selection Table

Resin	Tray Type (see page 8)			
	ELL3 ELL6	ETL4 ETL6	EHL4 EHL6 EHL8 D-EHL6 D-EHL10	EHZ6
Polyester	LL	TL	HL	MZ
Vinyl Ester	LV	TV	HV	HVZ
Poly Halogen-Free	LS	TS	HS	HSZ
VE Halogen-Free	LVS	TVS	HVS	HVSZ
Halogen-Free Low Smoke Plus	LY	TY	HY	HYZ
Conductive	LRT	TRT	HRT	HRTZ

Look at left column to select resin, then look at top row to select tray type. Then, insert corresponding letters into fitting part no.

Metric Mitered Fittings Part Numbers

Example: **EHB - HL6 - 90 - 600 - 600**

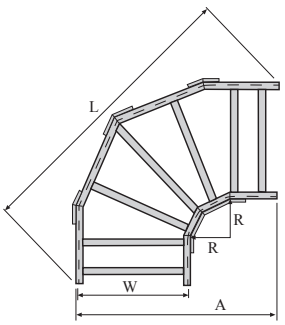
Type of Fitting	Tray Type/Resin (Δ)	Side Rail Height* (H)	Angle	Width (W)	Radius (R)
EHB = Horizontal Bend	See Selection Table to the Upper Right	3 = 75mm	30 = 30°	150 = 150mm	300 = 300mm
EIV = Vertical Inside		4 = 100mm	45 = 45°	225 = 225mm	600 = 600mm
EOV = Vertical Outside		6 = 150mm	60 = 60°	300 = 300mm	900 = 900mm
EHT = Horizontal Tee		8 = 200mm	90 = 90°	450 = 450mm	
EHC = Horizontal Cross		10 = 250mm		600 = 600mm	
EVT = Vertical Tee				750 = 750mm	
ER = Right Reducer				900 = 900mm	
EL = Left Reducer					
ESR = Straight Reducer					
EHBD = Horiz. Direct Bend					

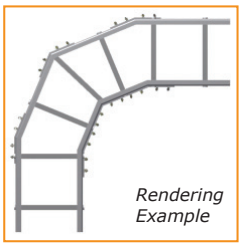
* (mm) value is nominal
For vertical tee specify "up" or "down" at end of part code
Covers = EC *before* part number; example EC-EHB-MC6-90-600-600.
Fasteners for covers are separate order item, see page 39.
Strut Rung = SR *after* part number; example EHB-MC6-90-600-600-SR
Marine Rung = MR *after* part number; example EHB-MC6-90-600-600-MR

90° Horizontal Bend

Part No. Key*

EHB-(Δ)(H)-90-(W)-(R)





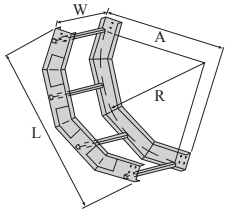
Dimension Inches (mm)

Width	12" (305) Radius		24" (610) Radius		36" (914) Radius	
	A	L	A	L	A	L
6 (152)	33⅝ (854)	47½ (1207)	45⅝ (1159)	64½ (1638)	57⅝ (1464)	81½ (2070)
9 (229)	36⅝ (930)	51¾ (1314)	48⅝ (1235)	68¾ (1746)	60⅝ (1540)	85¾ (2178)
12 (305)	39⅝ (1006)	56 (1422)	51⅝ (1311)	73 (1854)	63⅝ (1616)	90 (2286)
18 (457)	45⅝ (1159)	64½ (1638)	57⅝ (1464)	81½ (2070)	69⅝ (1768)	98½ (2502)
24 (610)	51⅝ (1311)	73 (1854)	63⅝ (1616)	90 (2286)	75⅝ (1921)	107 (2718)
30 (762)	57⅝ (1464)	81½ (2070)	69⅝ (1768)	98½ (2502)	81⅝ (2073)	115⅜ (2931)
36 (914)	63⅝ (1616)	90 (2286)	75⅝ (1921)	107 (2718)	87⅝ (2226)	123⅞ (3146)

90° Vertical Inside Bend

Part No. Key*

EIV-(Δ)(H)-90-(W)-(R)



Dim. Inches (mm)	12" Radius			24" Radius			36" Radius		
	Depth** 4"	6"	8"	4"	6"	8"	4"	6"	8"
A	20⅞ (530)	20⅞ (530)	20⅞ (530)	32⅞ (835)	32⅞ (835)	32⅞ (835)	44⅝ (1133)	44⅝ (1133)	44⅝ (1133)
L	29½ (749)	29½ (749)	29½ (749)	46½ (1181)	46½ (1181)	46½ (1181)	63 5/16 (1608)	63 5/16 (1608)	63 5/16 (1608)

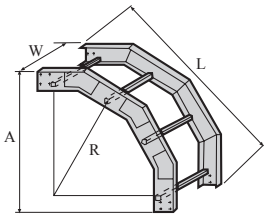
* In Part No. Key, parentheses ( ) = insert corresponding option code; Δ = Resin; H = Side Rail Height; R = Radius; W = Width of the *inside* distance from tray wall to tray wall; ** Contact us for availability of 3" (76mm)

Ladder Cable Tray - Mitered Fittings

90° Vertical Outside Bend

Part No. Key*

EOV-(Δ)(H)-90-(W)-(R)

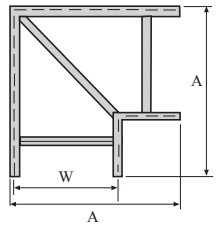


Dim. Inches (mm)	12" Radius			24" Radius			36" Radius		
	Depth**			Depth**			Depth**		
	4"	6"	8"	4"	6"	8"	4"	6"	8"
A	19⅞ (505)	21⅞ (555)	23⅞ (606)	31⅞ (810)	33⅞ (860)	35⅞ (911)	43⅞ (1114)	45⅞ (1165)	47⅞ (1216)
L	28⅛ (714)	30¹⁵⁄₁₆ (786)	33¾ (857)	45¹⁄₁₆ (1145)	47¹⁵⁄₁₆ (1218)	50¾ (1289)	62¹⁄₁₆ (1576)	64⅞ (1648)	67¾ (1721)

90° Horizontal Direct Bend

Part No. Key*

EHBD-(Δ)(H)-90-(W)

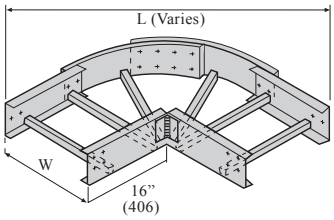


Dimensions Inches (mm)	
W	A
6 (152)	13 (330)
9 (229)	16 (406)
12 (305)	19 (483)
18 (457)	25 (635)
24 (610)	31 (787)
30 (762)	37 (940)
36 (914)	43 (1092)

Horizontal Adjustable Bend 45°-135°

Part No. Key*

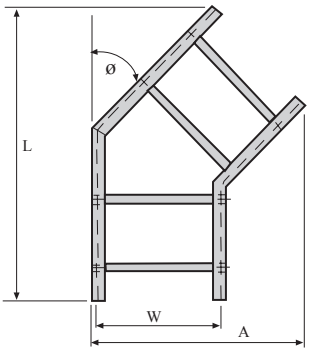
EHAB-(Δ)(H)-(W)



30°, 45°, 60° Horizontal Direct Bend

Part No. Key*

EHBD-(Δ)(H)-30/45/60-(W)



The 60° fitting is fabricated with the horizontal adjustable splice plates.

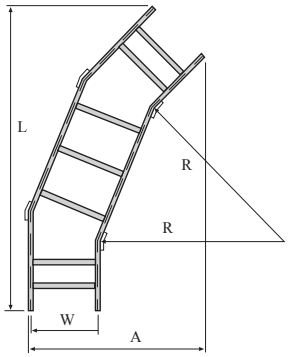
Dimension Inches (mm)

Width	30° Angle (ø)		45° Angle (ø)		60° Angle (ø)	
	A	L	A	L	A	L
6 (152)	14¹⁄₁₆ (357)	31½ (800)	17 (432)	30 (762)	19³⁄₁₆ (487)	27⁹⁄₁₆ (700)
9 (229)	17¹⁄₁₆ (433)	33 (838)	20 (508)	32¹⁄₁₆ (814)	22³⁄₁₆ (564)	30³⁄₁₆ (767)
12 (305)	20¹⁄₁₆ (510)	34½ (876)	23 (584)	34¼ (870)	25³⁄₁₆ (640)	32¾ (832)
18 (457)	26⁹⁄₁₆ (675)	39⁵⁄₁₆ (999)	29¾ (756)	40³⁄₁₆ (1021)	32 (813)	39⁷⁄₁₆ (1002)
24 (610)	32⁹⁄₁₆ (827)	42⁵⁄₁₆ (1075)	36¾ (933)	44⁷⁄₁₆ (1129)	38 (965)	44⅝ (1133)
30 (762)	38⁹⁄₁₆ (979)	45⁵⁄₁₆ (1151)	41¾ (1060)	48¹¹⁄₁₆ (1237)	44 (1118)	49⅞ (1267)
36 (914)	44⁹⁄₁₆ (1132)	48⁵⁄₁₆ (1227)	47¾ (1213)	52¹⁵⁄₁₆ (1345)	50 (1270)	55¹⁄₁₆ (1399)

45° Horizontal Bend

Part No. Key*

EHB-(Δ)(H)-45-(W)-(R)



Please contact us for other 30°/60° radius mitered fittings.

Joining 45° Horizontal Bend
X = 2A - .707 (W + .5)
Y = 2L - .707 (W + .5)

Dimension Inches (mm)

Width	12" (305) Radius		24" (610) Radius		36" (914) Radius	
	A	L	A	L	A	L
6 (152)	20¹¹⁄₁₆ (525)	38⅞ (987)	24¼ (616)	47⅜ (1203)	27¾ (705)	55⅞ (1419)
9 (229)	23¹¹⁄₁₆ (602)	41 (1041)	27¼ (692)	49½ (1257)	30¾ (781)	58 (1473)
12 (305)	26¹¹⁄₁₆ (678)	43⅛ (1095)	30¼ (768)	51⅝ (1311)	33¾ (857)	60⅛ (1527)
18 (457)	32¹¹⁄₁₆ (830)	47⅜ (1203)	36¼ (921)	55⅞ (1419)	39¾ (1010)	64⅜ (1635)
24 (610)	38¹¹⁄₁₆ (983)	51⅝ (1311)	42¼ (1073)	60⅛ (1527)	45¾ (1162)	68⅝ (1743)
30 (762)	44¹¹⁄₁₆ (1135)	55⅞ (1419)	48¼ (1226)	64⅜ (1635)	51¾ (1314)	72¹³⁄₁₆ (1846)
36 (914)	50¹¹⁄₁₆ (1287)	60⅛ (1527)	54¼ (1378)	68⅝ (1743)	57¾ (1467)	77¹⁄₁₆ (1957)

* In Part No. Key, parentheses ( ) = insert corresponding option code; Δ = Resin; H = Side Rail Height; R = Radius;
W = Width of the *inside* distance from tray wall to tray wall; ** Contact us for availability of 3" (76mm)

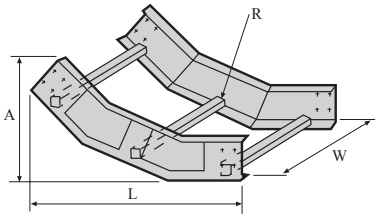
Mitered Fittings - Ladder Cable Tray

30°/45° Vertical Inside Bend

Part No. Key*

EIV-(Δ)(H)-30 or 45-(W)-(R)

All dimensions are to the nearest 1/4"



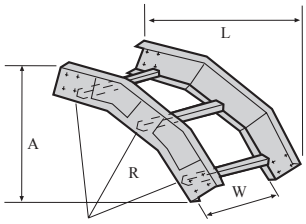
Dim. Inches (mm)		12" Radius Depth 3"	4"	6"	8"	24" Radius Depth 3"	4"	6"	8"	36" Radius Depth 3"	4"	6"	8"
30°	A	8 (203)	9 (229)	10 (254)	12 (305)	9 (229)	10 (254)	12 (305)	14 (356)	11 (279)	12 (305)	14 (356)	15 (381)
	L	18 (457)	18 (457)	18 (457)	18 (457)	24 (610)	24 (610)	24 (610)	24 (610)	30 (762)	30 (762)	30 (762)	30 (762)
45°	A	**	11 1/16 (281)	12 1/2 (318)	13 7/8 (352)	**	14 9/16 (370)	16 (406)	17 7/16 (443)	**	18 1/8 (470)	19 1/2 (495)	20 15/16 (532)
	L	**	19 7/8 (505)	19 7/8 (505)	19 7/8 (505)	**	28 3/8 (721)	28 3/8 (721)	28 3/8 (721)	**	36 7/8 (937)	36 7/8 (937)	36 7/8 (937)

30°/45° Vertical Outside Bend

Part No. Key*

EOV-(Δ)(H)-30 or 45-(W)-(R)

All dimensions are to the nearest 1/4"

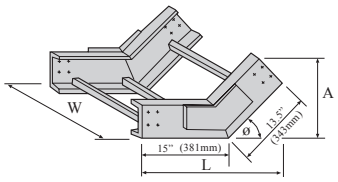


Dim. Inches (mm)		12" Radius Depth 3"	4"	6"	8"	24" Radius Depth 3"	4"	6"	8"	36" Radius Depth 3"	4"	6"	8"
30°	A	7 (178)	8 (203)	10 (254)	10 (254)	9 (229)	10 (254)	12 (305)	12 (305)	11 (279)	12 (305)	14 (356)	14 (356)
	L	17 (432)	17 (432)	18 (457)	18 (457)	23 (584)	23 (584)	24 (610)	24 (610)	29 (737)	29 (737)	30 (762)	30 (762)
45°	A	**	10 3/4 (273)	12 3/4 (324)	14 3/4 (375)	**	14 5/16 (364)	16 5/16 (414)	18 5/16 (465)	**	17 13/16 (452)	19 13/16 (503)	21 13/16 (554)
	L	**	19 3/16 (487)	20 9/16 (522)	22 (559)	**	27 11/16 (703)	29 1/16 (738)	30 1/2 (775)	**	36 1/8 (918)	37 9/16 (954)	39 (991)

30°/45° Vertical Inside Direct Bend

Part No. Key*

EIVD-(Δ)(H)-30 or 45-(W)

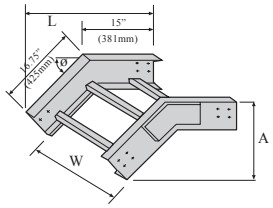


Dim. Inches (mm)	30° Angle (ø) Depth** 4"	6"	8"	45° Angle (ø) Depth** 4"	6"	8"
A	10 3/16 (259)	11 15/16 (303)	13 11/16 (348)	12 3/8 (314)	13 13/16 (351)	15 3/16 (386)
L	26 11/16 (678)	26 11/16 (678)	26 11/16 (678)	24 9/16 (624)	24 9/16 (624)	24 9/16 (624)

30°/45° Vertical Outside Direct Bend

Part No. Key*

EOVD-(Δ)(H)-30 or 45-(W)

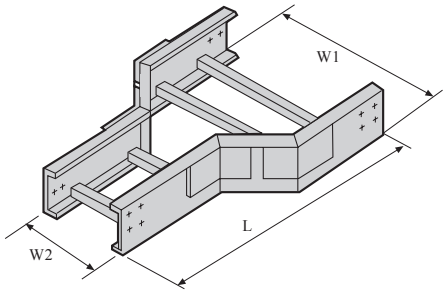


Dim. Inches (mm)	30° Angle (ø) Depth** 4"	6"	8"	45° Angle (ø) Depth** 4"	6"	8"
A	11 13/16 (300)	13 9/16 (344)	16 1/16 (408)	14 11/16 (357)	16 1/16 (408)	18 5/8 (473)
L	29 1/2 (749)	29 1/2 (749)	30 7/8 (784)	26 7/8 (683)	26 7/8 (683)	27 15/16 (710)

Straight Reducer

Part No. Key*

ESR-(Δ)(H)-(W1)x(W2)



W2 Inches (mm)	W1 Inches (mm) 36 (914)	30 (762)	24 (610)	18 (457)	12 (305)	9 (229)
6 (152)	43 1/2 (1105)	40 1/2 (1029)	37 1/2 (953)	34 1/2 (876)	26 3/4 (679)	26 3/8 (670)
9 (229)	42 (1067)	39 (991)	36 (914)	33 (838)	26 3/8 (670)	—
12 (305)	40 1/2 (1029)	37 1/2 (953)	36 (914)	26 3/4 (679)	—	—
18 (457)	37 1/2 (953)	35 3/4 (908)	26 3/4 (679)	—	—	—
24 (610)	35 3/4 (908)	26 3/4 (679)	—	—	—	—
30 (762)	26 3/4 (679)	—	—	—	—	—
	Dimension "L" Inches (mm)					

* In Part No. Key, parentheses ( ) = insert corresponding option code; Δ = Resin; H = Side Rail Height; R = Radius; W = Width of the *inside* distance from tray wall to tray wall; ** Contact us for availability of 3" (76mm)

Ladder Cable Tray - Mitered Fittings

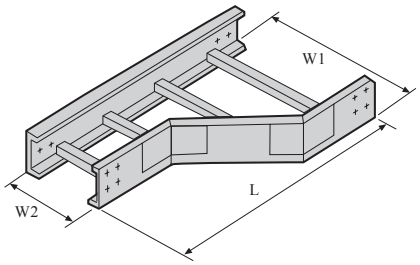
Right or Left Hand Reducer

Part No. Key*

RIGHT: ER-(Δ)(H)-(W1)x(W2)

LEFT: EL-(Δ)(H)-(W1)x(W2)

Right hand reducer is shown

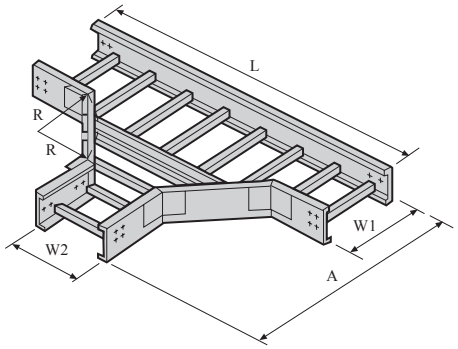


W2 Inches (mm)	W1 Inches (mm) 36 (914)	30 (762)	24 (610)	18 (457)	12 (305)	9 (229)
6 (152)	55½ (1410)	46¼ (1175)	46¼ (1175)	37 (940)	37 (940)	27¾ (705)
9 (229)	46¼ (1175)	46¼ (1175)	37 (940)	37 (940)	27¾ (705)	—
12 (305)	46¼ (1175)	37 (940)	37 (940)	27¾ (705)	—	—
18 (457)	37 (940)	37 (940)	27¾ (705)	—	—	—
24 (610)	37 (940)	27¾ (705)	—	—	—	—
30 (762)	27¾ (705)	—	—	—	—	—
	Dimension "L" Inches (mm)					

Horizontal Tee

Part No. Key*

EHT-(Δ)(H)-(W1)-(W2)-(R)



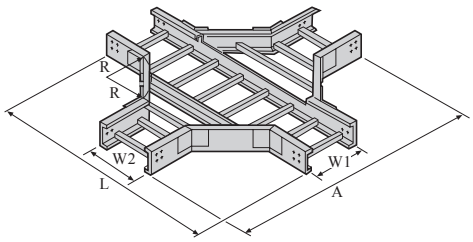
Dimension Inches (mm)

Width	12" (305) Radius A	L	24" (610) Radius A	L	36" (914) Radius A	L
6 (152)	30⅝ (780)	55½ (1410)	42⅝ (1080)	74 (1880)	54⅝ (1390)	101¾ (2580)
9 (229)	33⅝ (850)	55½ (1410)	45⅝ (1160)	83¼ (2110)	57⅝ (1460)	101¾ (2580)
12 (305)	36⅝ (930)	55½ (1410)	48⅝ (1240)	83¼ (2110)	60⅝ (1540)	111 (2820)
18 (457)	42⅝ (1080)	64¾ (1640)	54⅝ (1390)	92½ (2350)	66⅝ (1690)	111 (2820)
24 (610)	48⅝ (1240)	74 (1880)	60⅝ (1540)	92½ (2350)	72⅝ (1840)	120¼ (3050)
30 (762)	54⅝ (1390)	74 (1880)	66⅝ (1690)	101¾ (2580)	78⅝ (2000)	129½ (3290)
36 (914)	60⅝ (1540)	83¼ (2110)	72⅝ (1840)	111 (2820)	84⅝ (2150)	129½ (3290)

Horizontal Cross

Part No. Key*

EHC-(Δ)(H)-(W1)-(W2)-(R)



Dimension Inches (mm)

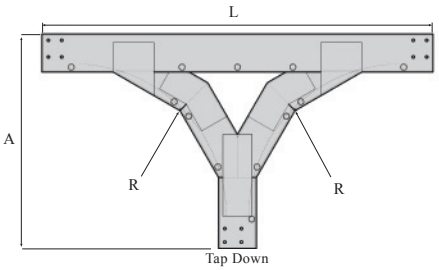
Width	12" (305) Radius A	L	24" (610) Radius A	L	36" (914) Radius A	L
6 (152)	54¾ (1390)	55½ (1410)	78¾ (2000)	74 (1880)	102¾ (2610)	101¾ (2580)
9 (229)	57¾ (1470)	55½ (1410)	81¾ (2080)	83¼ (2110)	105¾ (2690)	101¾ (2580)
12 (305)	60¾ (1540)	55½ (1410)	84¾ (2150)	83¼ (2110)	108¾ (2760)	111 (2820)
18 (457)	66¾ (1700)	64¾ (1640)	90¾ (2310)	92½ (2350)	114¾ (2910)	111 (2820)
24 (610)	72¾ (1850)	74 (1880)	96¾ (2460)	92½ (2350)	120¾ (3070)	120¼ (3050)
30 (762)	78¾ (2000)	74 (1880)	102¾ (2610)	101¾ (2580)	126¾ (3220)	129½ (3290)
36 (914)	84¾ (2150)	83¼ (2110)	108¾ (2760)	111 (2820)	132¾ (3370)	129½ (3290)

Vertical Tee

Part No. Key*

EVT-(Δ)(H)-90-(W)-(R)

Specify "up" or "down" at the end of the part number. For tap up, dimensions different than tap down, contact us for dimensions.



Radius	Dimensions Inches (mm) A	L
24 (610)	33⅞ (860)	61¾ (1568)
36 (914)	45⅞ (1165)	85¾ (2178)

* In Part No. Key, parentheses ( ) = insert corresponding option code; Δ = Resin; H = Side Rail Height; R = Radius; W = Width of the *inside* distance from tray wall to tray wall

Splice Plates - Ladder Cable Tray

Enduro offers a full line of fiberglass splice plates designed to provide a structural transition between straight sections and fittings. Enduro splice plates and hardware are sold separately and are not provided as standard with straight sections or fittings due to the many hardware options. All plates have 7/16" pre-drilled bolt holes.

NEMA FG-1

Please refer to NEMA FG-1 regarding proper tray installation as it pertains to support and splice plate locations for straight sections and fittings. Refer to page 11 for recommended support locations. NEMA

Ladder Cable Tray Splice Plate Part Numbers

Example: **ESP - 6C - 180**

Type	Side Rail Height	Material	Degree
ESP = Straight	3 = 3" (75mm)*	C = Polyester	180 = Straight, Expansion
EEP = Expansion	4 = 4" (100mm)*	V = Vinyl Ester	90 = 90°
EVS = Vertical	6 = 6" (150mm)*	SS = Stainless Steel	45 = 45°
EHS = Horizontal	8 = 8" (200mm)*	S = Halogen-Free	30 = 30°
	10 = 10" (250mm)*		22.5 = 22.5°
			HA = Horiz. Adjustable**
			VA = Vert. Adjustable**

* (mm) value is nominal. ** For Horiz. and Vert. Adjustable part number use "ESP" for Type, example: ESP-6C-HA. Expansion plates have 1" slotted holes allowing 5/8" total contraction and expansion. Refer to thermal contraction table on page 6 for maximum spacing between expansion joints. Side rail height of 3" and 4" requires 4 bolt sets per plate. Side rail height of 6" and 8" requires 8 bolt sets per plate. Side rail height of 10" requires 12 bolt sets per plate. For 6" and 8" channel heavy duty splice plates, see page 22.

Splice Plate and Hardware Options

Tray Resin	Splice Plate Material				Hardware Material Sets			
	Polyester	Vinyl Ester	Halogen-Free Polyester	316 Stainless Steel	316 Stainless Steel	Monel	Silicon Bronze	Isoplast
Polyester	Standard	Optional		Optional	Standard	Optional	Optional	Optional
Vinyl Ester		Standard		Optional	Standard	Optional	Optional	Optional
Halogen-Free Polyester		Optional	Optional	Standard	Standard	Optional	Optional	Optional
Halogen-Free Vinyl Ester				Standard	Standard	Optional	Optional	Optional
Halogen-Free Low Smoke Plus				Standard	Standard	Optional	Optional	Optional
Conductive				Standard	Standard	Optional	Optional	Optional

Hardware

Type	Set Includes	Size	For Use With Tray Types	Part No.
316 Stainless Steel Bolt Set	Bolt, nut, 2 flat washers, 1 lock washer	3/8"-16 x 1"	All tray types (except 10" Channel***)	505166SS
316 Stainless Steel Bolt Set	Bolt, nut, 2 flat washers, 1 lock washer	3/8"-16 x 1½"	All tray types (except 10" Channel***)	505168SS
Monel Bolt Set	Bolt, nut, 2 flat washers, 1 lock washer	3/8"-16 x 1¼"	All tray types (except 10" Channel***)	606167M
FRP Studs & Nuts	Stud and 2 nuts	3/8"-16 x 2"	ELL3, ELL4, ETL6, EHZ6	707166F
FRP Studs & Nuts	Stud and 2 nuts	3/8"-16 x 2½"	EHL6, EHL8, EHV6	707167F
Silicon Bronze Bolt Set	Bolt, nut, 2 flat washers, 1 lock washer	3/8"-16 x 1¼"	All tray types (except 10" Channel***)	808167SB

*** Contact us for hardware; It is recommended that expansion splice plates and 1½" long assembly fasteners be used when connecting mitered fittings to molded fittings or straight lengths.

Fastener Torque

Inch: GRD. 2 UNC		Metric: Class 5.8	
Size	Ft-Lbs	Size	N-m
1/4 - 20	4-6	M8 x 1.25	14-16
3/8 - 16	17-23	M10 x 1.5	26-33
1/2 - 13	42-56	M12 x 1.78	45-58

Ladder Cable Tray - Splice Plates

Typical Dimensions for FRP Splice Plates

Typical Dimensions Inches (mm)

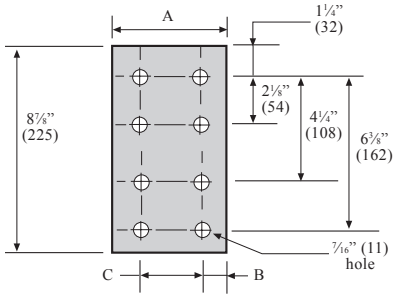
Channel Depth Inches (mm)	A	B	C
3 (76)	1¾ (44)	1 (25)	-0-
4 (102)	2 (51)	1 (25)	-0-
6 (152)	4⅝ (117)	1 (25)	2⅝ (67)
8 (203)	6 (152)	1 11⁄16 (43)	2⅝ (67)

Typical Dimensions for Stainless Splice Plates

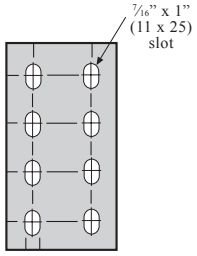
Typical Dimensions Inches (mm)

Channel Depth Inches (mm)	A	B	C
3 (76)	1¼ (32)	⅝ (16)	-0-
4 (102)	1¼ (32)	⅝ (16)	-0-
6 (152)	4⅛ (105)	¾ (19)	2⅝ (67)
8 (203)	4⅛ (105)	¾ (19)	2⅝ (67)

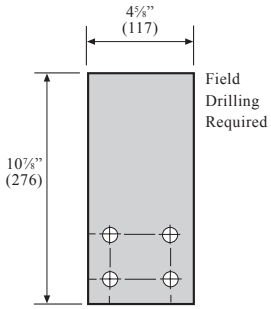
Straight Section



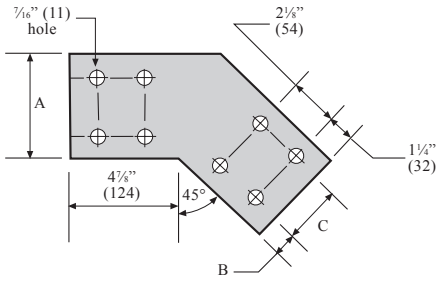
Expansion



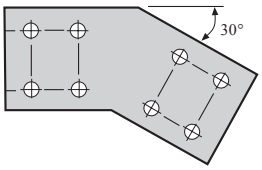
90° Vertical



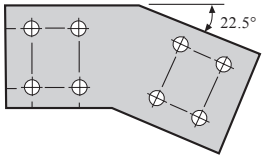
45° Vertical



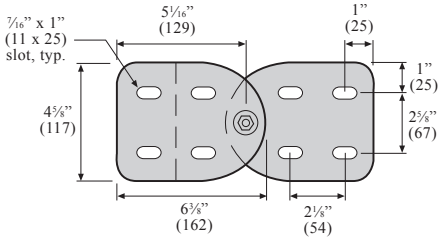
30° Vertical



22.5° Vertical

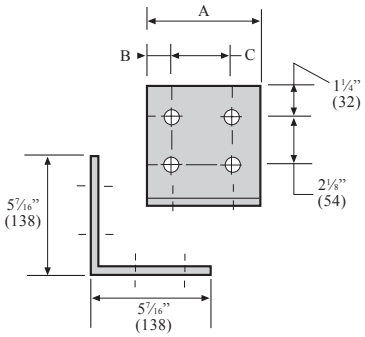


Adjustable Vertical

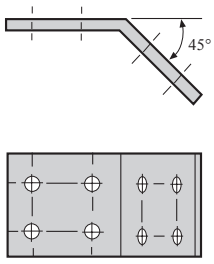


For adjustable vertical plate hardware, use catalog number 505168SS. For travel dimensions, contact us.

90° Horizontal



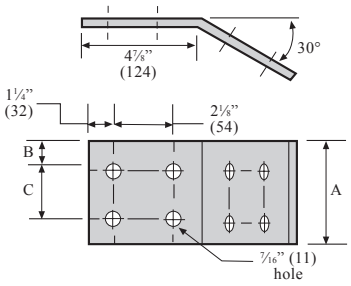
45° Horizontal



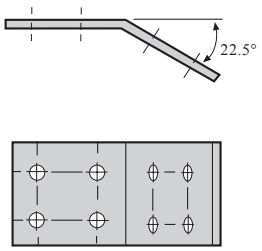
Splice Plates

Splice Plates - Ladder Cable Tray

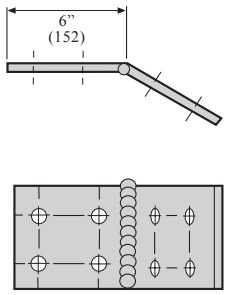
30° Horizontal



22.5° Horizontal



Adjustable Horizontal



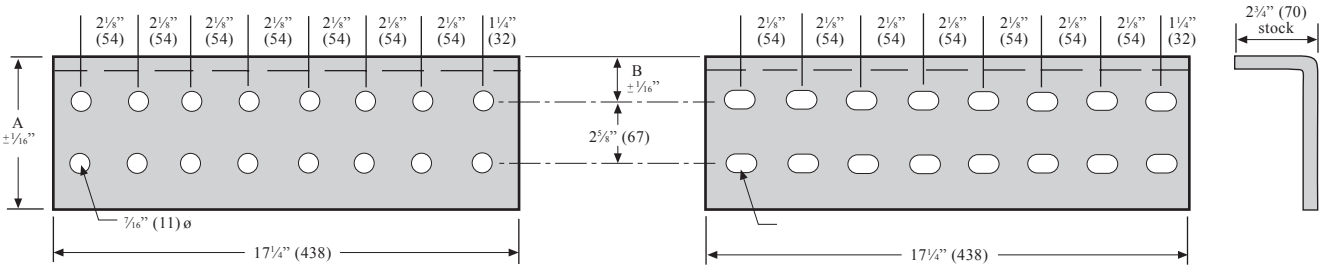
Heavy Duty Splice Plates

Part No. Key*

ESP-(H) HP-180 Splice Plate

Part No. Key*

EEP-(H) HP-180 Splice Plate



Side Rail Height Inches (mm)	A Inches (mm)	B Inches (mm)
4 (102)	3 (76)	1⅜ (35)
6 (152)	5 (127)	1⅜ (35)
8 (204)	6⅜ (162)	2 1⁄16 (52)

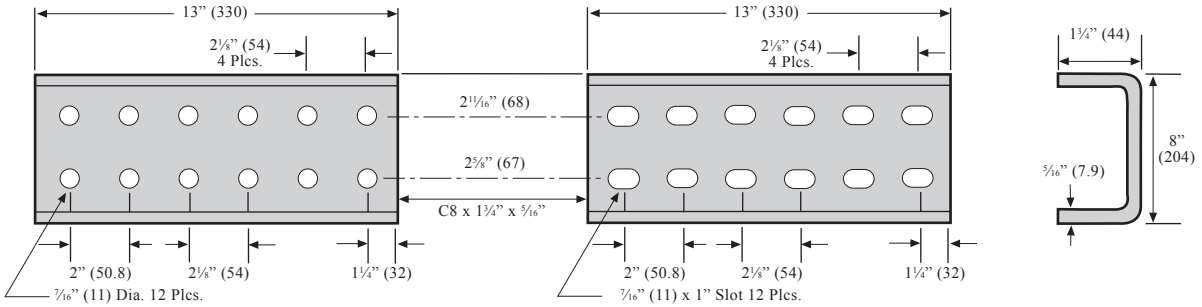
10" Channel Splice Plates

Part No.

ESP-10C-180 Splice Plate

Part No.

EEP-10C-180 Splice Plate



* In Part No. Key, parentheses ( ) = insert corresponding option code; H = Side Rail Height - 4, 6, 8 (inches)

Ladder Cable Tray - Accessories

Enduro offers a full line of accessories for our electrical products including cable tray covers, divider strips, drop outs, blind ends, adapters, hold-down clips, marine rungs, strut rungs, swivel clamps and a wide variety of stainless steel or FRP cable tray fasteners appropriate for any application.

Resin Designation

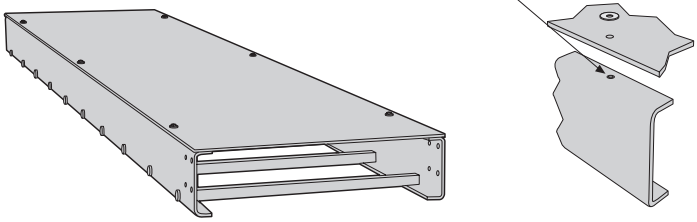
(Δ) = Insert one of the following letters for resin designations when required.

P = Polyester (Example: EPC-CL-12-P)
V = Vinyl Ester (Example: EPC-CL-12-V)
Y = Halogen-Free Low Smoke Plus (Example: EPC-CL-12-Y)
RT = Conductive (Example: EPC-CL-12-RT)
S = Poly Halogen-Free (Example: EPC-CL-12-S)
VS = VE Halogen-Free (Example: EPC-CL-12-VS)

Cable tray covers are recommended for those areas where the cable needs protection from falling objects, adverse weather conditions, etc. Available in 10ft. (3m) sections in both flat and peaked design. In addition to cover, solid bottom is also available. See page 24 for cover accessories.

Clampless Flat Cover

Part No. Key*
EPC-CL-(W)-(Δ)



Easiest & Lowest Installation Cost

Eliminates the need for Cover Hold Down Clamp for a quicker and easier field installation.

Recommended to be purchased with a cable tray straight section matching the clampless flat cover section.

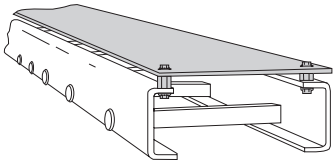
A total of three pairs of stainless embedded nuts are pre-installed to the cable tray channels by Enduro. Contact us for metal types available on embedded nuts. ¼" diameter stainless fasteners and flat washers are also included and shipped separately.

Contact us regarding fittings availability on this type of cover system.

Available tray widths (inches): 6, 9, 12, 18, 24, 30, 36

Flat Cover

Part No. Key*
"C" Tray: E(Δ)C-(W)
"Z" Tray: EZC-(W)



Installation Methods for Flat Cover: Thermo-plastic Drive Rivets (part no. R-25) are the most economical method, but do require field drilling.

It is recommended rivets be installed on 24" centers along both side rails.

Cover Hold Down Clamps and Enduro Stand Offs allow cover to be removed for easy access to cables - see page 24.

It is recommended to use seven pair at 1'6" on center per 10 Ft. length of cover.

Add ventilation height 2" for Flat Cover.

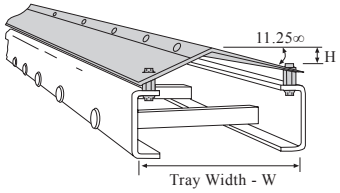
Flat covers can be ventilated or non-ventilated. Diagram shown is ventilated.

Tray Width Inches (mm)	"C" Tray Type	Wt./LF	"Z" Tray Type	Wt./LF
6 (152)	EPC-06	0.57	EZC-06	0.95
9 (229)	EPC-09	0.86	EZC-09	1.24
12 (305)	EPC-12	1.14	EZC-12	1.52
18 (457)	EPC-18	1.71	EZC-18	2.09
24 (610)	EPC-24	2.28	EZC-24	2.66
30 (762)	EPC-30	2.85	EZC-30	3.23
36 (914)	EPC-36	3.42	NA	NA

To order Flat Cover for ladder cable tray fittings, add "EC" before fitting part number.
Example: EC-EHB-MC6-90-24-24

Peaked Cover

Part No. Key*
EPC22-(W)



Installation Methods for Peaked Cover: Use three pair of Enduro Stand Offs - Peaked for each 10 ft. length of tray.

Peaked cover is not available for fittings.

Contact us for information on 22.5°, 30° and 45° peaked covers.

Add ventilation height 1¾" for peaked cover.

Peaked covers can be ventilated or non-ventilated. Diagram shown is ventilated.

"C" Tray Type	Dimensions In. (mm) W	H	Wt./LF
EPC22-06	6 (152)	0.6 (15)	0.77
EPC22-09	9 (229)	0.9 (23)	0.77
EPC22-12	12 (305)	1.2 (31)	1.3
EPC22-18	18 (457)	1.8 (46)	1.5
EPC22-24	24 (610)	2.4 (61)	1.9
EPC22-30	30 (762)	3.0 (76)	2.1
EPC22-36	36 (914)	3.6 (91)	2.4

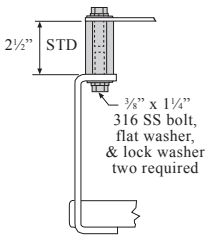
* In Part No. Key, parentheses ( ) = insert corresponding option code; Δ = Insert resin designation, see gray box at top;
W = Width of the *inside* distance from tray wall to tray wall

Accessories - Ladder Cable Tray

Stand Off

Part No.
ESO

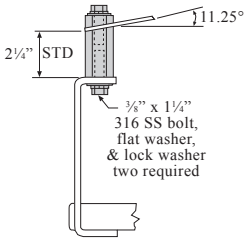
Vinyl Ester resin is the standard. Includes mounting hardware



Stand Off Peaked

Part No.
ESOP

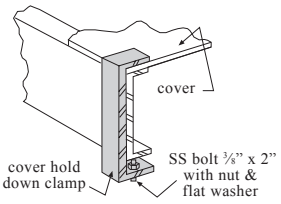
Vinyl Ester resin is the standard. Includes mounting hardware



Cover Hold Down Clamp

Part No. Key*
ECHD-(H)(Δ)

Not available for EHZ6 tray



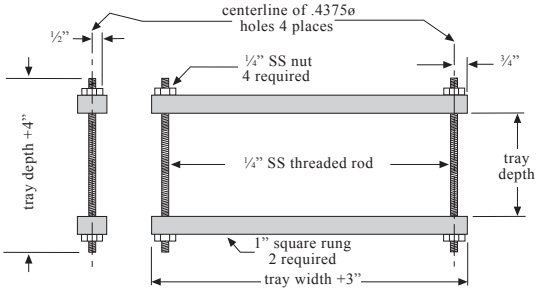
Complete Cover Hold Down

Part No. Key*
CCHD-(H)(Δ) x (W)

Recommended Usage: To secure cover to tray in an outdoor application.

Best suited for a high wind situation.

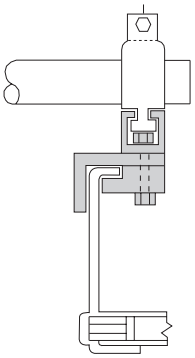
Available in stainless steel, contact us for dimensions.



Conduit Swivel Clamp

Part No. Key*
ECTC-(TD)

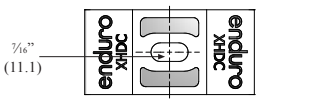
This allows an easy transition to/from conduit and FRP cable tray. Please substitute cable tray designation when ordering (Example TD = EHL6). Pipe clamps are separate order item, see page 37. For Vinyl Ester add "VE" to end of part number - example: ECTC-(TD)-VE.

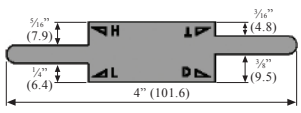


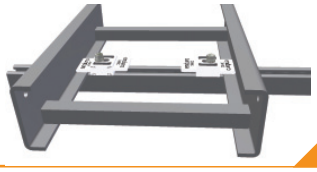
Hold Down Clamp & Expansion Guide

Enduro's XHDC serves as both a Hold Down Clip and Expansion Guide for all Enduro ladder tray types. This new design eliminates the need for ordering or tracking multiple products for securing ladder tray to structural supports.
Installation: To determine the appropriate orientation for installation, rotate the XHDC to the corresponding letter indicator (etched into side profile) as shown in the table below. Each row shows which letter indicator to use for each series, for use as either Hold Down Clip, or Expansion Guide. See example below.

Part No. XHDC		Tray Type
Hold Down Clamp	Expansion Guide	
T	L	ELL3
L	H	ETL4
L	H	EHL4
T	L	ETL6
L	H	ELL6
L	H	EHL6
H	D	D-EHL6
H	D	EHZ6
H	D	EHL8
D	Contact Us	D-EHL10





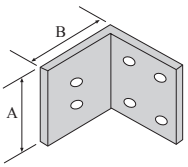


NEW

Floor / Panel Flange Plate

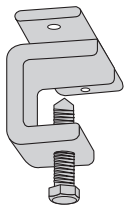
Part No. Key*	Side Rail Height	Dim. A	Dim. B
FP-3(Δ)	3" (76)	1¾"	5 7/16"
FP-4(Δ)	4" (102)	2¼"	5 7/16"
FP-6(Δ)	6" (152)	4⅝"	5 7/16"
FP-8(Δ)	8" (203)	6"	5 7/16"
FP-10(Δ)	10" (254)	8"	5 7/16"

Please contact us for stainless steel dimensions. See bottom of page for (Δ) code. All drilled holes are 7/16" in diameter. Hole pattern varies with tray type.

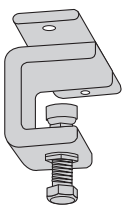


Beam Hold Down Guide

Part No.
BCHDG-MP-CP



Part No.
BCHDG-MP-LV



Eliminates the Need to Drill or Punch Holes While Allowing for Normal Expansion

A stainless steel guide that secures the position of cable tray on a support rack or structure.

Guide becomes a clamp with use of a 316 SS set screw on top. Set screw is included with part.

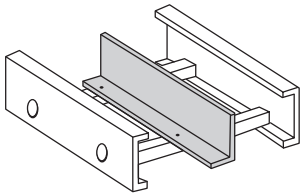
Guide is also easily adaptable for right or left sided installations.

* In Part No. Key, parentheses ( ) = insert corresponding option code; Δ = Insert resin designation, see gray box on page 23;
H = Side Rail Height, available heights (inches): 3, 4, 6, or 8; W = Width of the *inside* distance from tray wall to tray wall; TD = Tray Designation

Ladder Cable Tray - Accessories

Divider Strip

Part No. Key*
Loose: EDS-(Δ)-1
Installed: EDS-(Δ)-2



Divider strips are supplied in ten foot lengths.

Unless indicated otherwise, dividers are intended for field installation. Please indicate installation position if required.

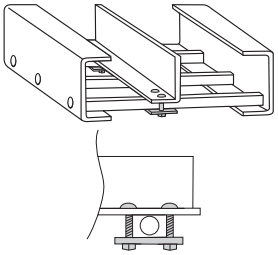
For easier installation, dividers can be furnished with factory-drilled notching with additional cost.

Divider strips are available for fittings, please contact us for part numbers.

For securing riveted divider to tray we use 3/16" SS rivets. We also have available thermoplastic drive rivets (directly below) which require field drilling.

Adjustable Clamp for Divider Strip

Part No. Key*
For ⌐ Side Rail: ADC-1(Δ)
For ⌐ Side Rail: ADC-2(Δ)



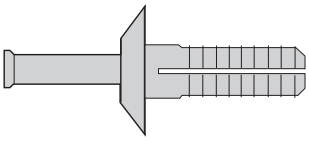
This part number is only for the adjustable clamp, does not include divider strip.

⌐ side rail only available in 3" (76), 4" (102), 6" (152) and 8" (203)

Nylon Thermoplastic Drive Rivet

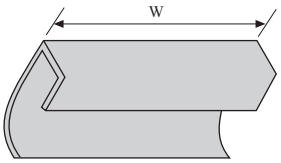
Part No. Key*
R-25-(Δ)

For securing cover material and divider strip. Pigmented to match resin type.



Drop Out

Part No. Key*
For ⌐ Side Rail: EDO-1-(W)
For ⌐ Side Rail: EDO-2-(W)
For 10" ⌐ Side Rail: EDO-3-(W)



Actual width of Drop Out is less than width of tray to allow for placement inside channel flange. R-25 drive rivets (left) are a separate order item.

For Vinyl Ester, add "VE" to the end of part number. For Halogen-Free Low Smoke Plus resin add "Y" to part number.

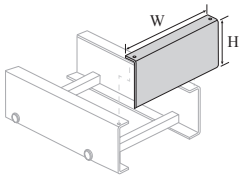
Drop Out installation for less than 12" width: Drill two 1/4" holes 1" from each end. Insert R-25 rivet into each opening.

Drop Out installation for more than 12" width: Drill three 1/4" holes 1" from each end and in the middle. Insert R-25 rivet into each opening.

Blind End

Part No. Key*
EBE-(H)(Δ)-(W)

316 SS fasteners included



Standard Field Install Rung

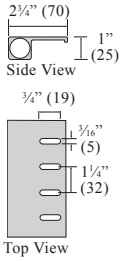
Part No. Key*
EFIR-(W)-(PE or VE)

Rung is standard 1" x 1" rung.
PE = Polyester; VE = Vinyl Ester;
Example for a 6" wide rung, polyester resin: EFIR-06-PE
Hardware included.

Marine Field Install Rung

Part No. Key*
EFIR-MR-(W)-(PE or VE)

PE = Polyester; VE = Vinyl Ester;
Example for a 6" wide rung, polyester resin: EFIR-MR-06-PE
Hardward included.



Strut Field Install Rung

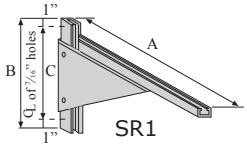
Part No. Key*
EFSR-(W)-(PE or VE)

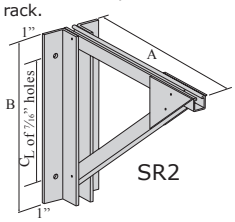
PE = Polyester; VE = Vinyl Ester;
Example for a 6" wide rung, polyester resin: EFSR-06-PE

Cable Tray Support Racks

Part No. Key*	Dimension In. A	B	C	Allowable Load Lbs.
SR1-6(Δ)	10"	12"	10"	1,600
SR1-9(Δ)	13"	12"	10"	1,100
SR1-12(Δ)	16"	12"	10"	850
SR1-18(Δ)	22"	12"	10"	725
SR1-24(Δ)	28"	12"	10"	480
SR2-24(Δ)	26"	21"	15"	750
SR2-30(Δ)	32"	21"	15"	750
SR2-36(Δ)	38"	21"	15"	750

Allowable load is based on a total load, uniformly distributed over the length of the rack.
Safety factor = 2.0

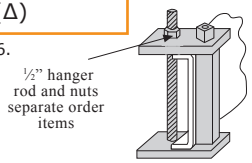




Vertical Tray Hanger Support

Part No. Key*
VH-(H)(Δ)

Not available for EHZ6.



SemKit Adhesive

Part No.
SEMKIT

Fiberglass to fiberglass adhesive for custom fabrication or repair. Meets NTSA and UPS requirements for sea and ground transportation.

Field Cutting Sealant

Part No.
Quart Can: ES-Q
Gallon Can: ES-G

Seals exposed fibers after any field cuts. Restores gloss and luster to weathered fiberglass.

Seals exposed FRP threads after installation of fiberglass threaded rod and hex nuts. For polyester and vinyl ester resin products. Clear color.

Meets NSTA and UPS requirements for sea and ground transportation.

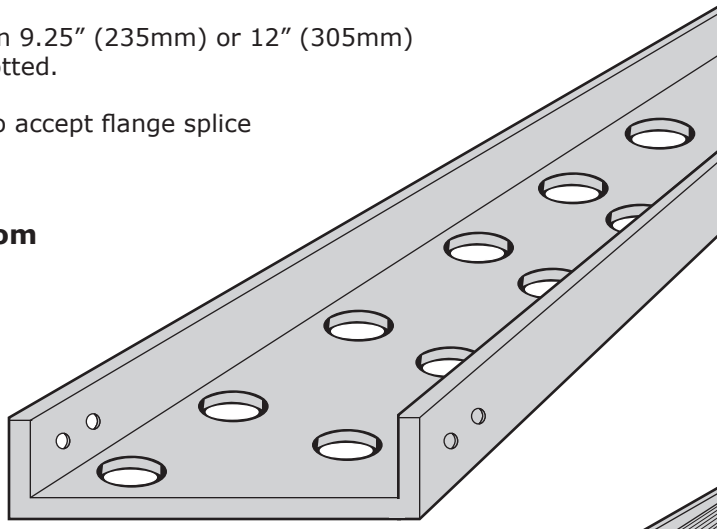
* In Part No. Key, parentheses ( ) = insert corresponding option code; Δ = Insert resin designation, see gray box on page 23;
H = Side Rail Height, available heights (inches): 3, 4, 6, or 8; W = Width of the *inside* distance from tray wall to tray wall

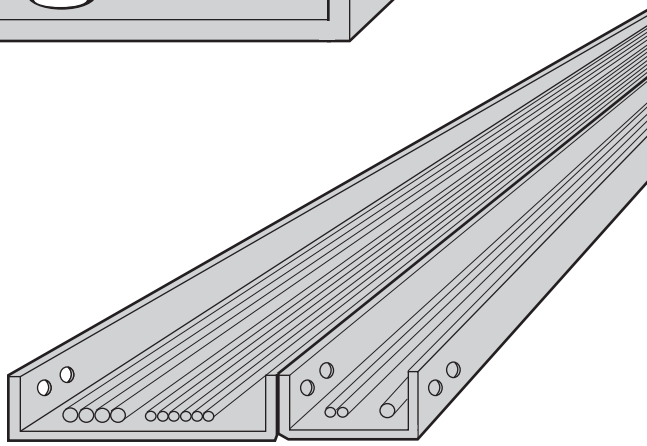
Channel-Type Instrumentation Tray

Enduro channel-type instrumentation tray is designed for light loads of individual wiring and pneumatic tubing. As illustrated, it is offered in solid or ventilated construction.

Ventilated channel-type tray has .75" (19mm) diameter holes on 9.25" (235mm) or 12" (305mm) centers staggered left and right in the web. Also available as slotted.

All straight sections and pre-assembled fittings are pre-drilled to accept flange splice plates. All splice plates and hardware are separate order items.





Part Numbers - Polyester Resin System, Solid Bottom

Part No. Key*	Channel Size Width x Depth	Lbs./Ft.
EIS-200 x (L)	2" x 1" (51 x 25)	0.35
EIS-300 x (L)	3" x 1" (76 x 25)	0.68
EIS-400 x (L)	4" x 1⅛" (102 x 35)	0.94
EIS-600 x (L)	6" x 1⅜" (152 x 35)	1.34
EIS-600D x (L)	6" x 2" (152 x 51)	1.50
EIS-800 x (L)	8" x 1¾" (203 x 35)	2.60
EIS-1000 x (L)	10" x 2¾" (254 x 70)	4.10

Width represents outside dimensions.

Part Numbers - Other Resin Systems, Solid Bottom

Part No. Key*	Resin System
EIS-VE-200 x (L)	Vinyl Ester
EIS-S-200 x (L)	Poly Halogen-Free
Contact Us	VE Halogen-Free
EIS-Y-200 x (L)	Halogen-Free Low Smoke Plus
EIS-RT-200 x (L)	Conductive

For slotted tray, replace the "S" in the part number with "PS".

L = Length; Available in 10', 20', 3m, and 6m sections, substitute "L" for 10, 20, 3M, or 6M.
Examples: EIS-400 x 10
EIS-400 x 3M

Technical Data - Channel-Type Instrumentation Tray

Maxium Loading & Maximum Deflection

Part No.	Span Ft. (m)	Max Loading Lbs./Ft. (N/m)	Max Deflection In. (mm)
EIS-200 x (L)	5 (1.5)	4.0 (5.94)	0.5 (12.7)
EIS-300 x (L)	5 (1.5)	3.9 (5.79)	0.5 (12.7)
	8 (2.4)	1.0 (1.48)	0.8 (20.3)
EIS-400 x (L)	8 (2.4)	2.8 (4.16)	0.8 (20.3)
	10 (3.0)	1.5 (2.23)	1.0 (25.4)
EIS-600 x (L)	10 (3.0)	2.8 (4.16)	1.0 (25.4)
EIS-800 x (L)	10 (3.0)	5.2 (7.73)	1.0 (25.4)
EIS-1000 x (L)	10 (3.0)	20.0 (29.73)	1.0 (25.4)
	15 (4.5)	3.9 (5.79)	1.0 (25.4)

Loads are based on limiting the deflection to a value equal to $^{1}/_{120}$ of the span.

For ventilated tray, max loading reduced by 10%.

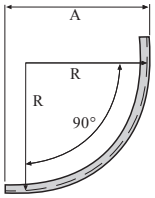
* In Part No. Key, parentheses ( ) = insert corresponding option code; (L) = Length, see note above

Channel-Type Inst. Tray - Fittings & Accessories

The following fitting part numbers are for polyester, solid bottom channel-type fittings. Molded fittings also available in vinyl ester, add "VE", in halogen-free, add "S", and in conductive, add "RT". Vinyl ester example: EIS-VE-MC90IV-18-600. Mitered fittings also available in vinyl ester, add "VE" Example: EIS-90IV-12-600 and also available in halogen-free low smoke plus, add "Y" Example: EIS-Y-90IV-12-600. For ventilated fitting, replace the "S" with a "P".

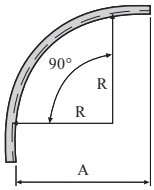
90° Vertical Inside Molded

Part No.	Radius	A
EIS-MC90IV-18-600	18" (457)	22¾" (578)
EIS-MC90IV-24-400	24" (610)	28¹¹⁄₁₆" (729)
EIS-MC90IV-24-600	24" (610)	28¾" (730)



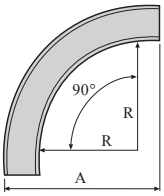
90° Vertical Outside Molded

Part No.	Radius	A
EIS-MC90OV-12-600	12" (305)	16¼" (413)
EIS-MC90OV-24-400	24" (610)	28⁵⁄₁₆" (719)
EIS-MC90OV-24-600	24" (610)	28¼" (718)
EIS-MC90OV-24-800	24" (610)	28³⁄₁₆" (716)



90° Horizontal Molded

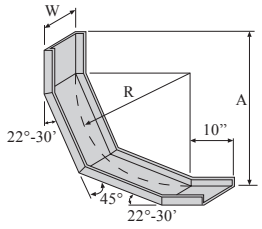
Part No.	Radius	A
EIS-MC90HB-12-600	12" (305)	22¾" (578)
EIS-MC90HB-24-400	24" (610)	32¹³⁄₁₆" (833)
EIS-MC90HB-24-600	24" (610)	34¾" (883)
EIS-MC90HB-24-800	24" (610)	36¹¹⁄₁₆" (932)



90° Vertical Inside Mitered

Part No. Key*	A
EIS-90IV-(R)-(W)00	22¼" (565)
EIS-90IV-(R)-(W)00	34¼" (820)

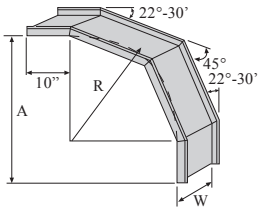
R = Radius which can be 12" (305) or 24" (610); W = Width which can be 2", 3", 4", 6", 8" or 10"; For 10" dimensions contact us. Substitute "P" for "S" for punched channel.



90° Vertical Outside Mitered

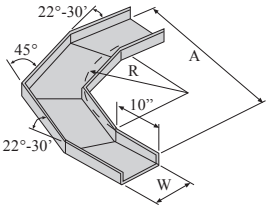
Part No. Key*	A
EIS-90OV-(R)-(W)00	22" (559)
EIS-90OV-(R)-(W)00	34" (864)

R = Radius which can be 12" (305) or 24" (610); W = Width which can be 2", 3", 4", 6", 8" or 10"; For 10" dimensions contact us. Substitute "P" for "S" for punched channel.



90° Horizontal Bend

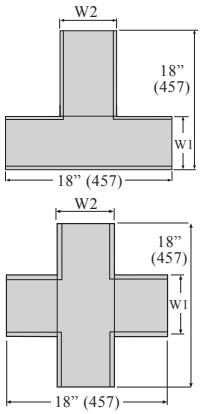
	Part No.	A
12" (305) Radius	EIS-90HB-12-200	24" (610)
	EIS-90HB-12-300	25" (635)
	EIS-90HB-12-400	26" (660)
	EIS-90HB-12-600	28" (711)
	EIS-90HB-12-800	30" (762)
	EIS-90HB-12-1000	32" (813)
24" (610) Radius	EIS-90HB-24-200	36" (914)
	EIS-90HB-24-300	37" (940)
	EIS-90HB-24-400	38" (965)
	EIS-90HB-24-600	40" (1016)
	EIS-90HB-24-800	42" (1067)
	EIS-90HB-24-1000	44" (1118)



Horizontal Tee & Horizontal Cross

Part No. Key*	W1	W2
EIS-HT or HC-200	2" (51)	2" (51)
EIS-HT or HC-300	3" (76)	3" (76)
EIS-HT or HC-400	4" (102)	4" (102)
EIS-HT or HC-600	6" (154)	6" (152)
EIS-HT or HC-800	8" (203)	8" (203)
EIS-HT or HC-1000	10" (255)	10" (255)

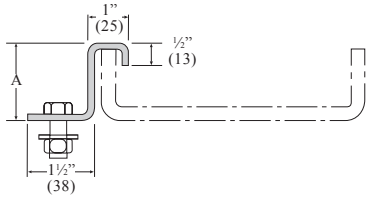
HT = Horizontal Tee; HC = Horizontal Cross; Substitute "P" for "S" for punched channel



Channel Hold Down Clip

Part No.	W	A
IHDC-3	3" (76)	1⅛" (28)
IHDC-4	4" (102)	1¼" (33)
IHDC-6	6" (154)	1¾" (44)
IHDC-6D	6" (154)	1¾" (44)
IHDC-8	8" (203)	1⅞" (47)
IHDC-10	10" (255)	2⅞" (72)

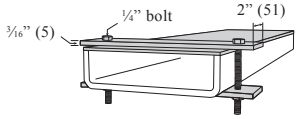
10 Ga. 316 SS



Channel Tray Cover

Part No. Key*
EPC-(W)00-(Δ)

Δ = Resin - insert "P" for polyester resin, insert "Y" for halogen-free low smoke plus resin. Hardware and clamp not included. For other resin part numbers, contact us.



Channel Cover Clamp

Part No. Key*
CCC-(W)00-(Δ)

Δ = Resin - insert "PE" for polyester resin, insert "Y" for halogen-free low smoke plus resin. 316 SS hardware included. For other resin part numbers, contact us.

* In Part No. Key, parentheses ( ) = insert corresponding option code; Δ = Resin; R = Radius; W = Width of the *inside* distance from tray wall to tray wall

Splice Plates - Channel-Type Inst. Tray

Channel-Type Splice Plate Part Numbers

Example: **EISP - 90V - 600**

Degree
180 = Straight
90 = 90°
45 = 45°
30 = 30°
22.5 = 22.5°

Direction
V = Vertical
H = Horizontal
(for straight, leave direction space in product number blank, example: EISP-180-600)

Channel Size
200 = 2" (50mm)*
300 = 3" (75mm)*
400 = 4" (100mm)*
600 = 6" (150mm)*
800 = 8" (200mm)*
1000 = 10" (250mm)*

These part numbers are for Polyester resin.

* (mm) values are nominal

Splice plates and hardware are sold individually and are not provided with straight sections or fittings.

For expansion insert "X" between "EISP" and Degree, example: EISP-X-180-200.

For Vinyl Ester Resin, add "VE" Example: EISP-VE-90V-600

For Halogen-Free Polyester Resin, add "HS" - Example EISP-HS-90V-600

For Stainless Steel, add "316SS" Example: EISP-90V-600-316SS

See page 20 for splice plate and hardware options.

Dimensions

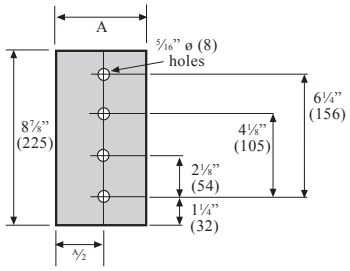
Channel Depth Inches (mm)	A Inches (mm)	B Inches (mm)
2" (51)	1" (25)	¼" (6.35)
3" (76)	1" (25)	¼" (6.35)
4" (102)	1" (25)	¼" (6.35)
6" (152)	1¼" (32)	⅝" (15.875)
8" (203)	1¼" (32)	⅝" (15.875)
10" (254)	2¼" (57)	1⅛" (28.575)

Hardware

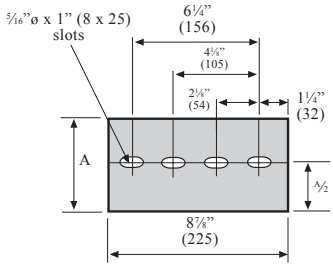
Part No.	
505139SS	¼" - 20 x ¾"
505138SS	¼" - 20 x ¾"
505141SS	¼" - 20 x 1"

Part No. 505141SS for EIS-800 channel tray only. Contact us for bolt sets for 10" channel.

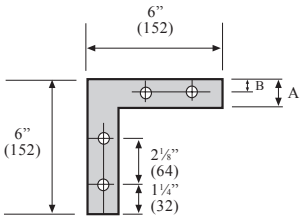
Straight Section



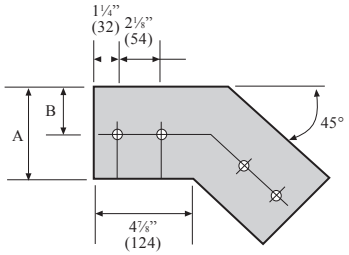
Expansion



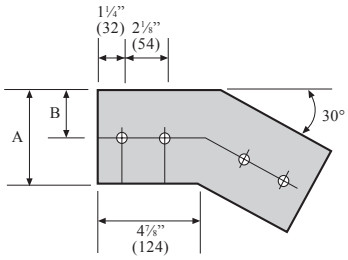
90° Vertical



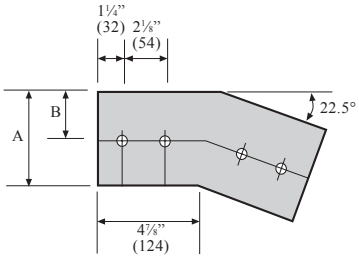
45° Vertical



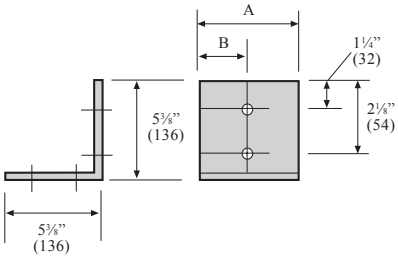
30° Vertical



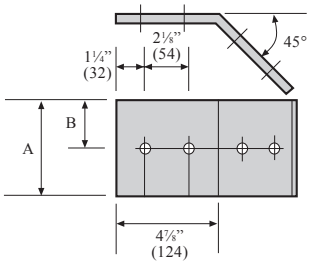
22.5° Vertical



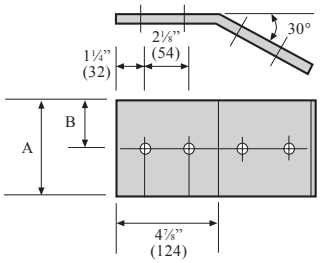
90° Horizontal



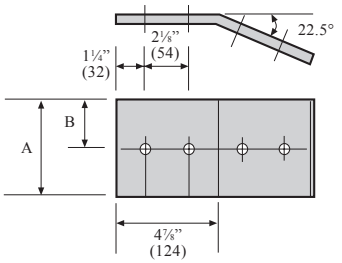
45° Horizontal



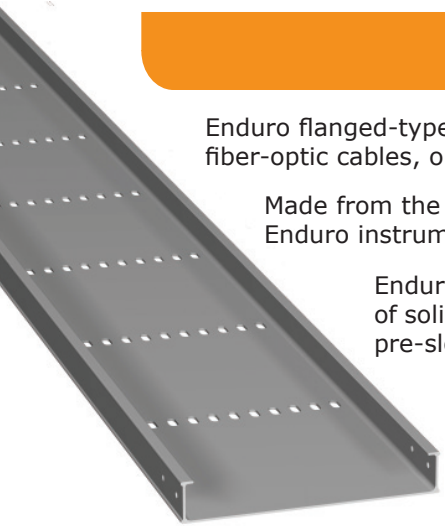
30° Horizontal



22.5° Horizontal



Flanged-Type Instrumentation Tray



Enduro flanged-type instrumentation tray is ideal for low-voltage or communications cables, including fiber-optic cables, or to support hydraulic or pneumatic tubing.

Made from the same high-strength, corrosion-resistant pultruded materials as our ladder-type tray, Enduro instrumentation tray is tough and made to stand up to the most demanding environments.

Enduro flanged tray comes in multiple options, including different resin systems, your choice of solid or perforated bottom, and with or without snap-on covers. Perforated cable trays are pre-slotted for ventilation or easy attachment of cables.

Our flanged-type instrumentation trays come in depths of 50mm or 80mm, measuring from the outside of the top to the outside of the bottom. Enduro flanged-type tray widths come in 50mm, 100mm, 150mm and 300mm, measuring inside to inside of the flanges. Lengths can be in 3m and 6m. In addition, our offering includes a full complement of fittings, support systems and accessories.

Flanged-Type Straight Section Part Numbers

Example: **EL - ITS - 50 - CT - 50 - 3M**

Resin (Δ)
EL = Polyester
EV = Vinyl Ester
R = Conductive
S = Poly Halogen-Free
VS = VE Halogen-Free
Y = Halogen-Free Low Smoke Plus

Bottom (B)
ITS = Solid Bottom
ITP = Perforated Bottom*

Side Rail Height (H)
50 = 50mm (1.97″)
80 = 80mm (3.15″)

Width (W)
50 = 50mm (1.97″)
100 = 100mm (3.94″)
150 = 150mm (5.91″)
300 = 300mm (11.82″)

Length (L)
3M = 3m (118.1″)

*Slot size: 1½″ x ¼″ (31.75mm x 6.33mm) +/-

Technical Data - Flanged Tray

Maximum Loading

Part No.	Span Ft. (m)	Max Loading Lbs./Ft. (N/m)
EL-ITS-50-CT-50-3M	5 (1.5) 10 (3) 15 (4.5)	25.7 (34.8) 3.1 (4.2) 0.9 (1.2)
EL-ITS-50-CT-100-3M	5 (1.5) 10 (3) 15 (4.5)	30.9 (41.9) 3.8 (5.2) 1.1 (1.5)
EL-ITS-50-CT-150-3M	5 (1.5) 10 (3) 15 (4.5)	35.6 (48.3) 4.4 (6.0) 1.3 (1.8)
EL-ITS-50-CT-300-3M	5 (1.5) 10 (3) 15 (4.5)	42.4 (57.5) 5.2 (7.1) 1.5 (2.0)
EL-ITS-80-CT-50-3M	5 (1.5) 10 (3) 15 (4.5)	54.2 (73.9) 6.7 (9.1) 2.0 (2.7)
EL-ITS-80-CT-100-3M	5 (1.5) 10 (3) 15 (4.5)	94.4 (128.0) 11.8 (16.0) 3.5 (4.7)
EL-ITS-80-CT-150-3M	5 (1.5) 10 (3) 15 (4.5)	108.4 (147.0) 13.5 (18.3) 4.0 (5.4)
EL-ITS-80-CT-300-3M	5 (1.5) 10 (3) 15 (4.5)	130.8 (177.3) 16.4 (22.2) 4.8 (6.5)

Load (Lbs/Ft) are based on deflection equal to L/D = 200.

Part numbers above are polyester and solid bottom flanged-type instrumentation tray. A change in resin will not affect loading. Please contact us for loading of slotted tray.

Accessories & Splice Plates

Straight Cover

Part No. Key*
(Δ)-IT-(W)-CTC-(L)

Example: EL-IT-50-CTC-3M
Covers only available in 3m lengths.

Straight Splice Plates

Part No. Key*	Material
ESS-IT-(H)-SSP	Stainless Steel
EL-IT-(H)-SSP	Polyester
EV-IT-(H)-SSP	Vinyl Ester

Stainless Example: ESS-IT-80-SSP; Vinyl Ester Example: EV-IT-80-SSP; Polyester Example: EL-IT-80-SSP

Reducer Splice Plates

Part No. Key*	Material
ESS-IT-(H)-(W)-RSP	Stainless Steel

Please specify Width 1 and Width 2 when ordering.

* In Part No. Key, parentheses ( ) = insert corresponding option code; Δ = Resin; B = Bottom; H = Side Rail Height
W = Width of the *inside* distance from tray wall to tray wall

Fittings - Flanged-Type Inst. Tray

Flanged-Type Fittings Part Numbers

Example: **EL - ITS - 50 - HB - 50 - 90 - 300**

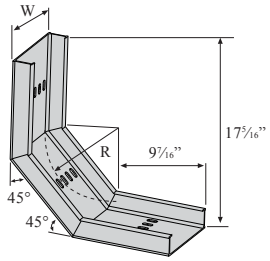
Resin (Δ)	Bottom (B)	Side Rail Height (H)	Type	Width (W)	Angle
EL=Polyester	ITS=Solid Bottom	50=50mm (1.97″)	HB=Horizontal Bend	50=50mm (1.97″)	90=90°
EV=Vinyl Ester	ITP=Perforated Bottom*	80=80mm (3.15″)	IV=Inside Vertical	100=100mm (3.94″)	45=45°
RT=Conductive			OV=Outside Vertical	150=150mm (5.91″)	
S=Poly Halogen-Free			HT=Horizontal Tee	300=300mm (11.82″)	
VS=VE Halogen-Free			HC=Horizontal Cross		
Y=Halogen-Free Low Smoke Plus					

*Slot size: 1¼″ (31.75mm) x ¼″ (6.35mm)
Note: More fittings and fitting covers available, please contact us.

90° Vertical Inside Mitered

Part No. Key*
(Δ)-(B)-(H)-IV-(W)-90-300

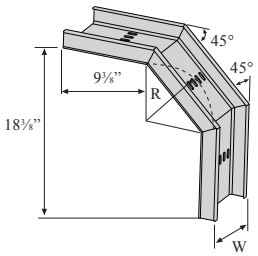
Radius = 11.8″ (300mm)



90° Vertical Outside Mitered

Part No. Key*
(Δ)-(B)-(H)-OV-(W)-90-300

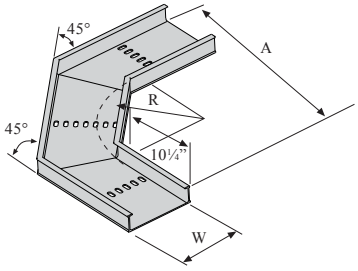
Radius = 11.8″ (300mm)



90° Horizontal Mitered

Part No. Key*	A
(Δ)-(B)-50-HB-50-90-300 (Δ)-(B)-80-HB-50-90-300	19 3/8″ (493)
(Δ)-(B)-50-HB-100-90-300 (Δ)-(B)-80-HB-100-90-300	21 3/8″ (543)
(Δ)-(B)-50-HB-150-90-300 (Δ)-(B)-80-HB-150-90-300	23 5/16″ (593)
(Δ)-(B)-50-HB-300-90-300 (Δ)-(B)-80-HB-300-90-300	29 1/4″ (743)

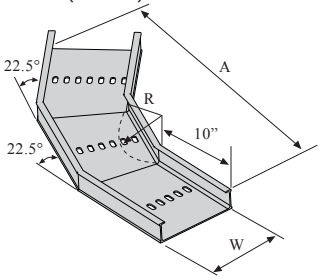
Radius = 11.8″ (300mm)



45° Horizontal Mitered

Part No. Key*	A
(Δ)-(B)-50-HB-50-45-300 (Δ)-(B)-80-HB-50-45-300	27 1/16″ (688)
(Δ)-(B)-50-HB-100-45-300 (Δ)-(B)-80-HB-100-45-300	28 1/2″ (723)
(Δ)-(B)-50-HB-150-45-300 (Δ)-(B)-80-HB-150-45-300	29 7/8″ (758)
(Δ)-(B)-50-HB-300-45-300 (Δ)-(B)-80-HB-300-45-300	34 1/16″ (865)

Radius = 11.8″ (300mm)

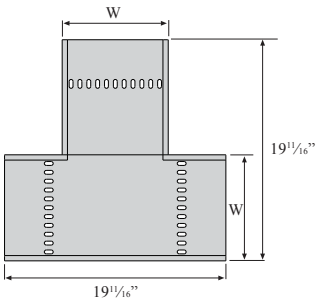


Horizontal Fitting Cover

Part No. Key*
(Δ)-IT-(W)-CTC-(90 or 45)-300

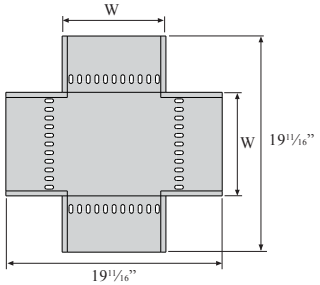
Horizontal Tee

Part No. Key*
(Δ)-(B)-(H)-(W)-HT



Horizontal Cross

Part No. Key*
(Δ)-(B)-(H)-(W)-HC



Note: More fittings and fitting covers available, please contact us.
* In Part No. Key, parentheses ( ) = insert corresponding option code; Δ = Resin; B = Bottom; H = Side Rail Height; L = Length; W = Width of the *inside* distance from tray wall to tray wall

Enduro wireway is designed to protect data control, communication and power cables from atmospheric conditions (like dust, dirt, oil, water) and unauthorized/accidental tampering. Enduro lay-in wireway is often found in:

- Computer, communication, and clean room applications.
  Enduro wireway readily conforms to the grid-post system of raised floors.
- Food processing plants
  where periodic washdowns often utilize caustic disinfectants
- Transportation/subway systems
  where enclosed environments desire telecommunication wireway materials to have low smoke development and non-toxic smoke properties for enhanced public safety

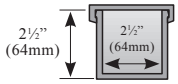
Enduro lay-in-wireway is manufactured by the pultrusion process using special fiberglass composite designs and fire-retardant resin formulation for superior strength, durabiliy, and corrosion resistance.

Enduro wireway carries a Class 1 fire rating in accordance with ASTM Standard E-84.

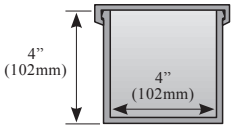
Our wireway straight sections and fittings are provided with a "snap-on / snap-off" cover. It also has a modular design which includes straight sections, elbows, tees and crosses.

All wireway sections and fittings are available in the five sizes shown below. Please contact us about other available sizes and gasketing. Straight sections and covers come in 10 ft. lengths. Splice plates are a separate order item.

Part No. CW 250 x 10

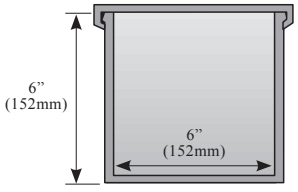


Part No. CW 404 x 10

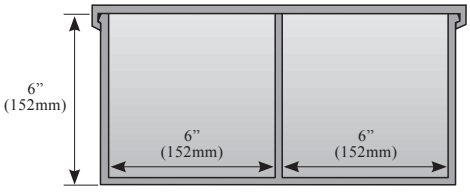


Part No. CW 412 x 10

Part No. CW 606 x 10



Part No. CW 612 x 10



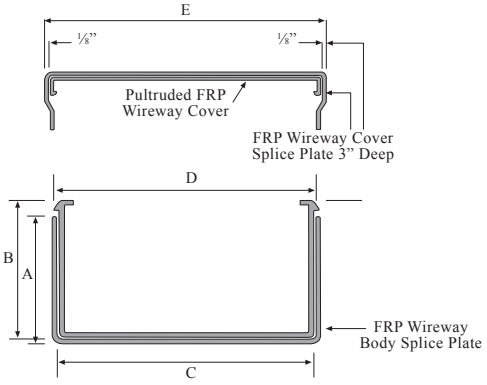
The CW 612 x 10 is available with or without a divider. The divider allows separation of various cables as needed.

Dimensions - Wireway with Cover

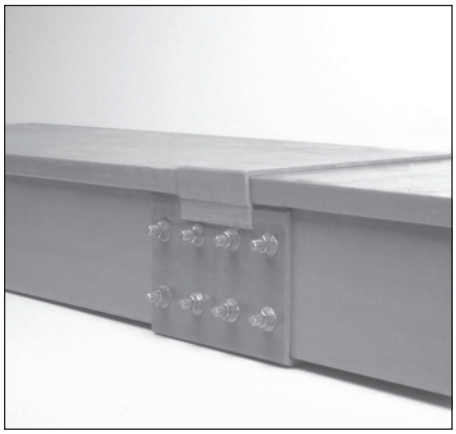
Dimension Inches (mm)

Part No.	A	B	C	D	E
CW 250 x 10	N/A	2.5" (64)	2.5" (64)	3" (76)	N/A*
CW 404 x 10	3 3/16" (81)	4" (102)	4" (102)	4 3/4" (121)	5 3/8" (136)
CW 412 x 10	3 3/16" (81)	4" (102)	12" (305)	12 3/4" (324)	13 3/8" (340)
CW 606 x 10	5 5/8" (143)	6" (152)	6" (152)	6 3/4" (171)	7 3/8" (187)
CW 612 x 10	5 5/8" (143)	6" (152)	12" (305)	12 3/4" (324)	13 3/8" (340)

* Cover body and splice plates not available for CW250. See page 34 for splicing method



Technical Data - Wireway



Wireway Load Span

Part No.	Maximum Span	Maximum Loading
CW250 x 10	contact us	contact us
CW404 x 10	10' (3m)	10 Lbs/Ft (14.9 kg/m)
CW412 x 10	10' (3m)	12 Lbs/Ft (17.9 kg/m)
CW606 x 10	10' (3m)	20 Lbs/Ft (29.8 kg/m)
CW612 x 10	10' (3m)	25 Lbs/Ft (37.2 kg/m)

Wireway Physical Properties

Electrical

Property	Polyester Fire Retardant	ASTM Test
Electric Strength, Short Term in Oil ⅛", VPM*	200	D149
Electric Strength, Short Term in Oil, KV per inch	35	D149

Other

Property	Polyester Fire Retardant	ASTM Test
Density - Solid Shape Lbs./In.	0.065	D792
Water Absorption (24 Hr. Immersion) Max % by Wt.	0.50	D570
Surface Burning Characteristic, Maximum	25	E84

Thermal

Property	Polyester Fire Retardant	ASTM Test
Thermal Coefficient of Expansion (Inches/Inch/°F)**	5 x 10^{-6}	D696

Logitudinal Direction

Property	Polyester Fire Retardant	ASTM Test
Ultimate Tensile Strength	30,000 PSI	D638
Ultimate Compressive Strength	30,000 PSI	D695
Ultimate Flexural Strength	30,000 PSI	D790

Transverse Direction

Property	Polyester Fire Retardant
Ultimate Tensile Strength	7,000 PSI
Ultimate Compressive Strength	15,000 PSI
Ultimate Flexural Strength	10,000 PSI

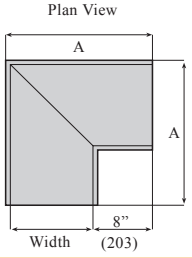
* Speciman tested perpendicular to laminate face.
** Reported value measured in logitudinal direction.

Meets and exceeds test standard for UL 94-VO Flammability Classification and has a flame spread rating under 25 when tested in accordance with ASTM E84.

Fittings - Wireway

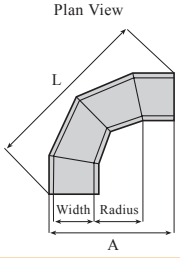
90° Horizontal Direct Bend

Part No.	A
CW 250-90H	8" (203)
CW 404-90H	12 13/16" (325)
CW 412-90H	21" (533)
CW 606-90H	15" (381)
CW 612-90H	21" (533)



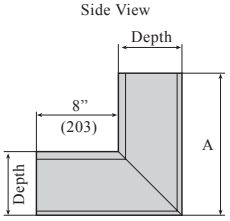
90° Horizontal Bend 12" Radius

Part No.	A	L
CW 250-90H-12	22½" (572)	31 13/16" (808)
CW 404-90H-12	24 13/16" (630)	35" (889)
CW 412-90H-12	33" (838)	46 9/16" (1183)
CW 606-90H-12	27" (686)	38⅛" (968)
CW 612-90H-12	33" (838)	46 9/16" (1183)



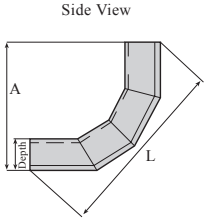
90° Vertical Inside Direct Bend

Part No.	A
CW 250-90IV	10½" (267)
CW 404-90IV	12" (305)
CW 412-90IV	12" (305)
CW 606-90IV	14" (356)
CW 612-90IV	14" (356)



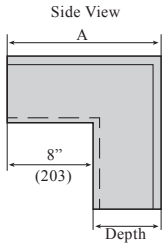
90° Vertical Inside Bend 12" Radius

Part No.	A	L
CW 250-90IV-12	17 9/16" (446)	24 13/16" (630)
CW 404-90IV-12	18⅛" (460)	25 11/16" (652)
CW 412-90IV-12	18⅛" (460)	25 11/16" (652)
CW 606-90IV-12	18⅛" (460)	25 11/16" (652)
CW 612-90IV-12	18⅛" (460)	25 11/16" (652)



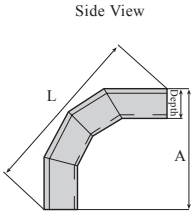
90° Vertical Outside Direct Bend

Part No.	A
CW 250-90OV	10½" (267)
CW 404-90OV	12" (305)
CW 412-90OV	12" (305)
CW 606-90OV	14" (356)
CW 612-90OV	14" (356)



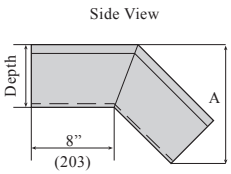
90° Vertical Outside Bend 12" Radius

Part No.	A	L
CW 250-90OV-12	19 3/16" (487)	27 1/8" (689)
CW 404-90OV-12	22 1/8" (562)	31 3/8" (797)
CW 412-90OV-12	22 1/8" (562)	31 3/8" (797)
CW 606-90OV-12	24 3/16" (614)	34 3/16" (868)
CW 612-90OV-12	24 3/16" (614)	34 3/16" (868)



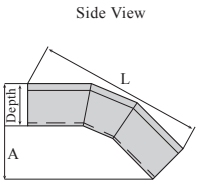
45° Vertical Outside Direct Bend

Part No.	A
CW 250-45OV	8 1/16" (205)
CW 404-45OV	10" (254)
CW 412-45OV	10" (254)
CW 606-45OV	12" (305)
CW 612-45OV	12" (305)



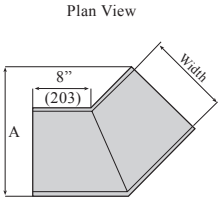
45° Vertical Outside Bend 12" Radius

Part No.	A	L
CW 250-45OV-12	9 5/16" (252)	21 3/8" (543)
CW 404-45OV-12	12" (305)	23 7/16" (595)
CW 412-45OV-12	12" (305)	23 7/16" (595)
CW 606-45OV-12	14" (356)	25" (635)
CW 612-45OV-12	14" (356)	25" (635)



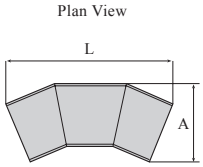
45° Horizontal Direct Bend

Part No.	A
CW 250-45H	8 1/16" (205)
CW 404-45H	10½" (267)
CW 412-45H	18 5/8" (473)
CW 606-45H	12 5/8" (321)
CW 612-45H	18 5/8" (473)



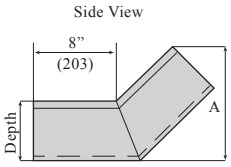
45° Horizontal Bend 12" Radius

Part No.	A	L
CW 250-45H-12	5 9/16" (141)	25 7/8" (657)
CW 404-45H-12	8 1/16" (205)	28 3/8" (721)
CW 412-45H-12	16 3/16" (411)	34 9/16" (878)
CW 606-45H-12	10 3/16" (259)	30" (762)
CW 612-45H-12	16 3/16" (411)	34 9/16" (878)



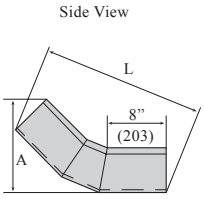
45° Vertical Inside Direct Bend

Part No.	A
CW 250-45IV	8 1/16" (205)
CW 404-45IV	10 3/8" (264)
CW 412-45IV	10 3/8" (264)
CW 606-45IV	11 3/16" (284)
CW 612-45IV	11 3/16" (284)



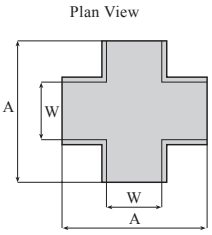
45° Vertical Inside Bend 12" Radius

Part No.	A	L
CW 250-45IV-12	10 1/8" (257)	21 1/16" (535)
CW 404-45IV-12	11 5/16" (287)	21 3/4" (552)
CW 412-45IV-12	11 5/16" (287)	21 3/4" (552)
CW 606-45IV-12	12 3/4" (324)	21 3/4" (552)
CW 612-45IV-12	12 3/4" (324)	21 3/4" (552)



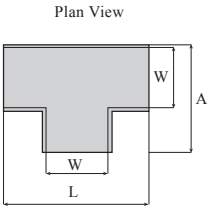
Horizontal Cross Direct

Part No.	A
CW 250-HC	18½" (470)
CW 404-HC	20 5/8" (524)
CW 412-HC	28 3/4" (730)
CW 606-HC	22 3/4" (578)
CW 612-HC	28 3/4" (730)



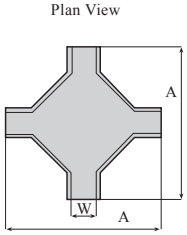
Horizontal Tee Direct

Part No.	A	L
CW 250-HT	10½" (267)	18½" (470)
CW 404-HT	13" (330)	20 5/8" (524)
CW 412-HT	21" (533)	28 3/4" (730)
CW 606-HT	15" (381)	22 3/4" (578)
CW 612-HT	21" (533)	28 3/4" (730)



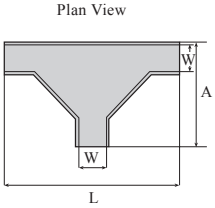
Horizontal Cross 12" Radius

Part No.	A
CW 250-HC-12	42 1/4" (1073)
CW 404-HC-12	44 5/8" (1133)
CW 412-HC-12	52 3/4" (1140)
CW 606-HC-12	46 3/4" (1187)
CW 612-HC-12	52 3/4" (1140)



Horizontal Tee 12" Radius

Part No.	A	L
CW 250-HT-12	22½" (572)	42 1/4" (1073)
CW 404-HT-12	24 13/16" (630)	44 5/8" (1133)
CW 412-HT-12	32 15/16" (837)	52 3/4" (1340)
CW 606-HT-12	26 15/16" (684)	46 3/4" (1187)
CW 612-HT-12	32 15/16" (837)	52 3/4" (1340)



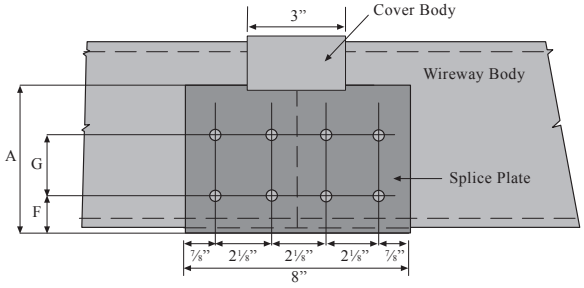
Splice Plates & Accessories - Wireway

Splice Plates - Wireway

Cover Body & Splice Plates

Part No.	A	F	G	Hole Dia.
CW 404 x SP304	3 3/16" (81)	1 3/4" (44)	0	7/16" (11)
CW 412 x SP304	3 3/16" (81)	1 3/4" (44)	0	7/16" (11)
CW 606 x SP304	5 3/8" (136)	1 1/2" (38)	2 5/8" (67)	7/16" (11)
CW 612 x SP304	5 3/8" (136)	1 1/2" (38)	2 5/8" (67)	7/16" (11)

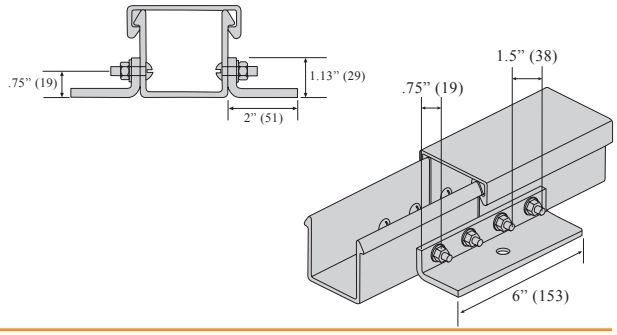
Includes snap-on cover splice plate and bottom plate with 304SS fasteners. If 316SS is required, substitude 316 for 304 in part number.



CW 250 Hold Down Splice Joint

Part No.
CW250-AC304
CW404-AC304
CW606-AC304
CW612-AC304

A dual purpose splice plate that offers hold down capabilities. Easily adaptable to other Enduro wireway sizes with or without body splice plate. Standard hold down splice joint material color is gray. Contact us for details regarding a custom color. If 316SS is required, substitude 316 for 304 in part number.

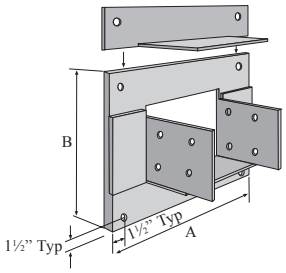


Accessories - Wireway

Panel Adapter

Part No.	A	B
CW 250 - PA	contact us	contact us
CW 404 - PA	10 1/4" (260)	10 3/8" (264)
CW 412 - PA	18 1/4" (463)	10 3/8" (264)
CW 606 - PA	12 1/4" (311)	12 3/8" (314)
CW 612 - PA	18 1/4" (463)	12 3/8" (314)

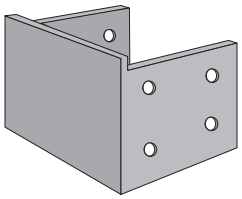
Top plate removable for easy access.



Closure Plate

Part No.
CW 250 - CP304
CW 404 - CP304
CW 412 - CP304
CW 606 - CP304
CW 612 - CP304

Fasteners are 304SS.
If required 316SS can be substituded;
Example: CW 404-CP-316



Specification - Wireway

1.0 General

1.1 This specification covers the requirements for a fiberglass lay-in-wireway system to support and protect power, control and instrumentation cables.

1.2 Wireway shall be solid bottom type construction with minimum wall thickness of .1875 inches.

1.3 Cover and cover splice plates shall be snap-on type construction requiring no installation fasteners.

2.0 Standards

2.1 The wireway system shall conform to the applicable sections of the National Electric Code (NEC) Article 378.

2.2 The NEC requires wireway to be supported at intervals not exceeding 5 feet, unless specifically approved for supports at greater intervals, but in no case shall the distance between supports exceed 10 feet.

3.0 Materials

3.1 The wireway, cover, and splice plates shall be made from the pultrusion process utilizing an Enduro Fire Retardant Polyester resin formulation with UV light inhibiting additives and exterior veil coverage.

3.2 Resin System (as required): Isophthalic Polyester, Vinyl Ester, Halogen-Free Isophthalic Polyester, Halogen-Free Vinyl Ester or Halogen-Free Low Smoke Plus resin available.

3.3 All composite material shall meet ASTM E84, maximum 25 flame spread rating.

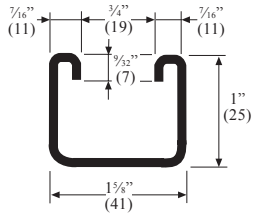
3.4 Color shall be gray.

4.0 Loading Capabilities

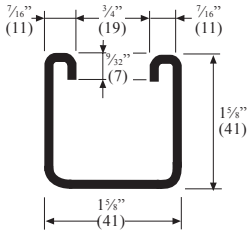
Consult factory for specific applications.

Channel Framing (Solid & Punched)

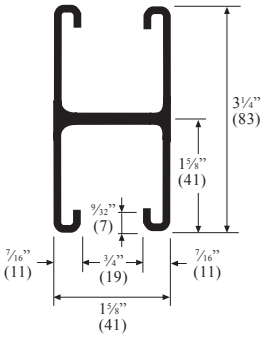
Part No.	Lbs/Ft.
Polyester: EC-10	0.47
Vinyl Ester: EC-VE-10	

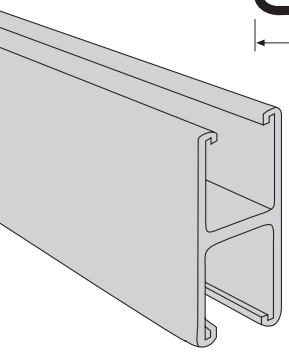


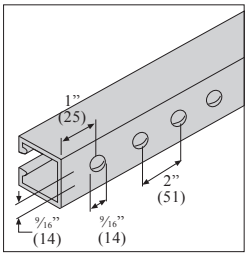
Part No.	Lbs/Ft.
Polyester: EC-158	0.68
Vinyl Ester: EC-VE-158	



Part No.	Lbs/Ft.
Polyester: EC-158D	1.36
Vinyl Ester: EC-VE-158D	







For punched channel framing add "H" to the end of the part number; example: EC-10H. Punched not available for double channel. Punched holes are 9/16" holes on 2" centers. Replaces drilled strut.

For use in tray support systems, electrical conduit and tray rungs for tying down cable. Available in 10 ft and 20 ft lengths. See below for loading, and see page 38 for specification information.

Technical Data - Support Systems & Strut

Channel Framing Loading

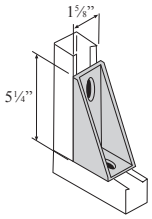
Beam and Column Data: Polyester and Vinyl Ester Resin Base

Beam Span or Column Height In.(mm)	Part No.	Maximum Allowable Uniform Beam Load Poly Lbs.(kg)	Maximum Allowable Uniform Beam Load Vinyl Lbs.(kg)	Deflection @ Maximum Allowable Uniform Beam Load Poly In.(mm)	Deflection @ Maximum Allowable Uniform Beam Load Vinyl In.(mm)	Uniform Load @ Maximum Deflection = 0.25 In. (6mm) Poly Lbs.(kg)	Uniform Load @ Maximum Deflection = 0.25 In. (6mm) Vinyl Lbs.(kg)	Uniform Load @ Maximum Deflection = 0.50 In. (13mm) Poly Lbs.(kg)	Uniform Load @ Maximum Deflection = 0.50 In. (13mm) Vinyl Lbs.(kg)	Maximum Allowable Column Load Lbs.(kg)
12" (305)	**EC-10**	790 (358)	990 (449)	0.11 (3)	0.12 (3)	-	-	-	-	2550 (1156)
	EC-158	1720 (780)	2150 (975)	0.07 (2)	0.07 (2)	-	-	-	-	3650 (1655)
	EC-158D	5080 (2301)	6350 (2880)	0.04 (1)	0.04 (1)	-	-	-	-	7300 (3111)
18" (457)	**EC-10**	530 (240)	670 (304)	0.24 (6)	0.27 (7)	-	620 (281)	-	-	2350 (1066)
	EC-158	1150 (521)	1440 (653)	0.15 (4)	0.17 (4)	-	-	-	-	3370 (1528)
	EC-158D	5080 (2301)	4240 (1923)	0.09 (2)	0.10 (2)	-	-	-	-	6740 (3058)
24" (610)	**EC-10**	400 (181)	500 (227)	0.43 (11)	0.48 (12)	240 (109)	270 (122)	-	-	2070 (939)
	EC-158	860 (390)	1080 (490)	0.27 (7)	0.30 (8)	810 (367)	910 (412)	-	-	2960 (1342)
	EC-158D	2540 (1152)	3180 (1442)	0.16 (4)	0.17 (4)	-	-	-	-	5920 (2685)
30" (762)	**EC-10**	320 (145)	400 (181)	0.67 (17)	0.75 (19)	120 (54)	140 (63)	240 (109)	270 (122)	1710 (775)
	EC-158	690 (313)	870 (394)	0.42 (11)	0.48 (12)	410 (186)	460 (209)	-	-	2450 (1111)
	EC-158D	2040 (925)	2550 (1156)	0.24 (6)	0.27 (7)	2000 (907)	2350 (1066)	-	-	4900 (2222)
36" (914)	**EC-10**	270 (122)	340 (154)	0.98 (25)	1.10 (28)	70 (31)	80 (36)	140 (63)	160 (72)	1260 (571)
	EC-158	580 (263)	730 (331)	0.61 (15)	0.69 (19)	240 (109)	270 (122)	480 (217)	540 (245)	1800 (816)
	EC-158D	1700 (771)	2130 (966)	0.35 (9)	0.39 (10)	1220 (553)	1370 (621)	-	-	3600 (1633)
42" (1067)	**EC-10**	230 (104)	290 (131)	1.32 (34)	1.49 (38)	50 (22)	55 (25)	100 (45)	115 (52)	920 (417)
	EC-158	490 (222)	620 (281)	0.82 (21)	0.92 (23)	150 (68)	170 (77)	300 (136)	340 (154)	1320 (598)
	EC-158D	1460 (662)	1830 (830)	0.48 (12)	0.62 (16)	770 (349)	870 (394)	1510 (650)	1720 (530)	2640 (1197)
48" (1219)	**EC-10**	200 (91)	250 (113)	1.72 (44)	1.92 (49)	30 (13)	25 (16)	60 (27)	70 (31)	700 (317)
	EC-158	430 (195)	540 (245)	1.07 (27)	1.20 (30)	100 (45)	115 (52)	200 (90)	230 (104)	1010 (458)
	EC-158D	1270 (576)	1590 (721)	0.62 (16)	0.69 (17)	520 (236)	590 (267)	1040 (471)	1170 (780)	2020 (916)
60" (1524)	**EC-10**	160 (72)	200 (91)	2.68 (68)	2.99 (76)	20 (9)	23 (10)	40 (18)	45 (20)	180 (81)
	EC-158	350 (158)	400 (200)	1.70 (43)	1.91 (48)	60 (27)	70 (32)	120 (54)	135 (61)	260 (118)
	EC-158D	1020 (462)	1280 (580)	0.97 (25)	1.09 (28)	270 (122)	310 (140)	540 (245)	610 (276)	520 (235)
72" (1829	**EC-10**	140 (63)	180 (81)	*	*	10 (4)	12 (5)	20 (9)	23 (10)	-
	EC-158	290 (131)	370 (168)	2.44 (62)	2.78 (71)	30 (13)	34 (15)	60 (27)	70 (32)	-
	EC-158D	850 (385)	1070 (485)	1.40 (35)	1.57 (40)	160 (72)	180 (81)	320 (145)	360 (163)	-
84" (2134)	**EC-10**	120 (54)	150 (68)	*	*	NR	-	12 (5)	15 (7)	-
	EC-158	250 (113)	320 (145)	*	*	20 (9)	23 (10)	40 (18)	45 (20)	-
	EC-158D	730 (331)	920 (417)	1.91 (48)	2.15 (55)	100 (45)	115 (52)	200 (90)	230 (104)	-
96" (2438)	**EC-10**	100 (45)	130 (59)	*	*	NR	-	-	-	-
	EC-158	220 (100)	250 (113)	*	*	13 (6)	15 (7)	26 (12)	30 (13)	-
	EC-158D	640 (290)	800 (363)	2.50 (63)	2.79 (71)	70 (32)	80 (36)	140 (63)	160 (72)	-

* Deflection is in excess of 3.00 In. (76mm); mid-span support is recommended. NR = Not Recommended; **Beam Loads:** Table lists the total allowable load for various simple spans based on a minimum safety factor 2:1. If load is concentrated at center of span, multiply the load from the table by 0.5 and the corresponding deflection by 0.8. **Column Loads:** Table lists the total allowable axial load for various unsupported column heights based on a minimum safety factor of 3:1. Eccentric loads should be reduced according to standard practice.
Notes: All beams should be supported in a manner to prevent rotation at supports. Long, deep beams should be tied between supports to prevent twist.

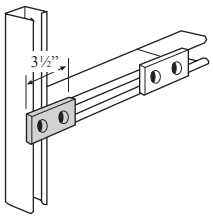
Connector Plates

Based on individual applications, changes may be required on dimension and thickness of material. Please contact us. Holes are drilled to accept 3/8" and 1/2" bolts.
For Vinyl Ester Connector Plates, insert the letters "VE" as indicated in this example:
Polyester = CP-100; Vinyl Ester = CP-VE-100

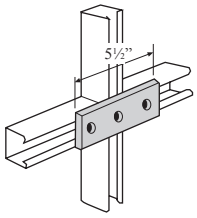


Universal Angle
SEE NOTE AT BOTTOM

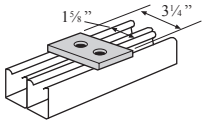
Part No.
Polyester: CP-501
Polyurethane: CP-PU-501
Nylon: CP-NY-501



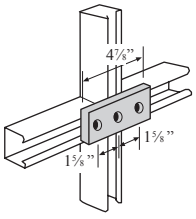
Part No.
CP-100



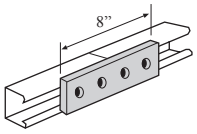
Part No.
CP-101



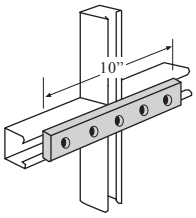
Part No.
CP-102



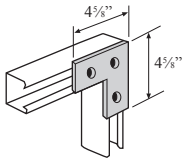
Part No.
CP-103



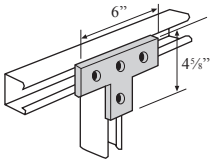
Part No.
CP-104



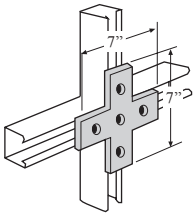
Part No.
CP-105



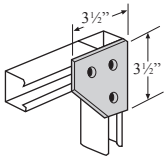
Part No.
CP-109



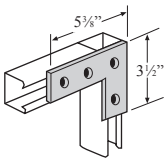
Part No.
CP-110



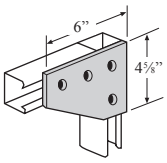
Part No.
CP-111



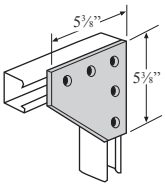
Part No.
CP-112



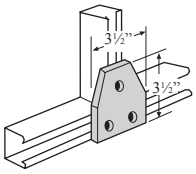
Part No.
CP-113



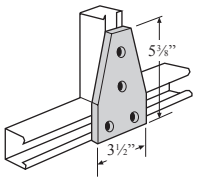
Part No.
CP-114



Part No.
CP-115



Part No.
CP-116



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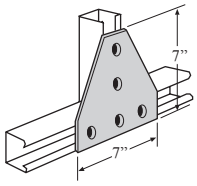

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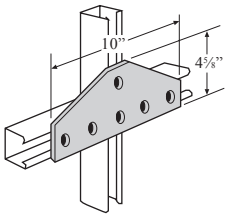

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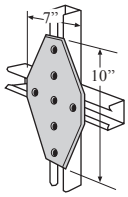

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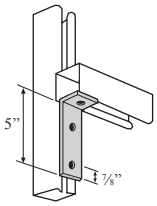
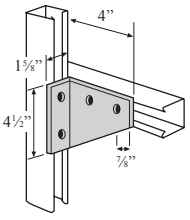
CP-120



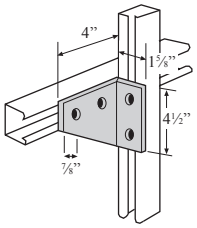
Note: Flat washer not required for CP-205

Part No.
CP-205



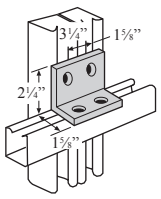
SEE NOTE AT BOTTOM

Part No.
CP-209



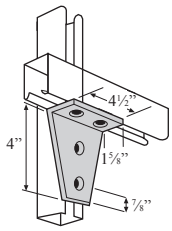
SEE NOTE AT BOTTOM

Part No.
CP-210



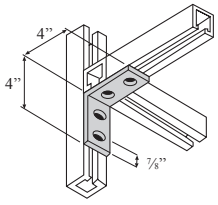
SEE NOTE AT BOTTOM

Part No.
CP-211



SEE NOTE AT BOTTOM

Part No.
CP-226



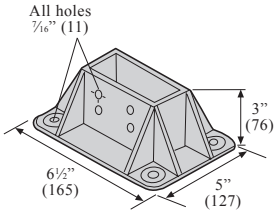
SEE NOTE AT BOTTOM

Part No.
CP-405

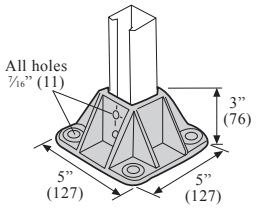
NOTE: These composite angle components will not support tensile loads or forces.

Post Base

Part No.
Polyester: PBD-PE
Polyurethane: PBD-PU



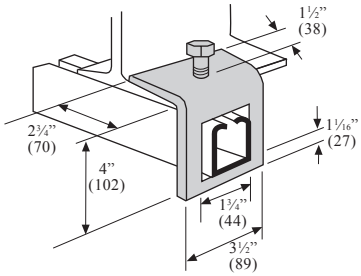
Part No.
Polyester: PBS-PE
Polyurethane: PBS-PU



Window Clamp

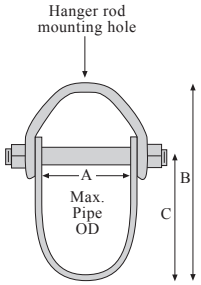
Part No.
WC-158

Stainless steel set screw included



Fiberglass Clevis Hanger

Part No.	Nominal Dia. In.	Dimension In. A	B	C	Hanger Rod In.	Allowable Load Lbs.
CH-010	1	1⅝	4¾	3	½	200
CH-015	1½	2⅛	5⅝	3⅜	½	200
CH-020	2	2½	7	4⅜	½	200
CH-025	2½	3 5/16	6 9/16	4¼	½	200
CH-030	3	3¾	7½	4¼	½	300
CH-040	4	5⅛	9¾	5⅞	½	400
CH-060	6	7 3/16	12⅜	8	½	600
CH-080	8	9⅜	15 9/16	10¼	½	600
CH-100	10	11 19/32	14⅞	12 11/16	⅝	600
CH-120	12	13⅝	22¼	14	⅝	600
CH-140	14	15¼	26 3/16	16¾	⅝	600



Vinyl Ester resin is the standard. Allowable loads have a 3:1 safety factor at 120°F. Insulation may be required at higher temperatures. Tolerance is ¾" maximum.

FRP Channel Nut

Part No.	Size	Weight	t
CN-025	¼"-20	5.58 Lbs/C	1 1/16" (27)
CN-038	⅜"-16	5.31 Lbs/C	1 1/16" (27)
CN-050	½"-13	5.27 Lbs/C	1 1/16" (27)

Vinyl Ester resin is the standard. Channel nuts are self locking and designed for use with EC-158 and EC-158D strut only.
Resistance to slip = 450 Lbs. per bolt
Pull out strength = 700 Lbs. per bolt
Recommended safety factor = 3

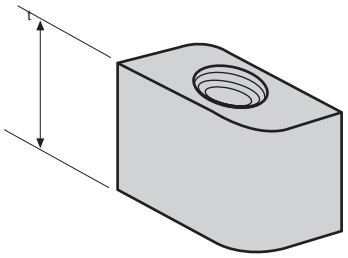
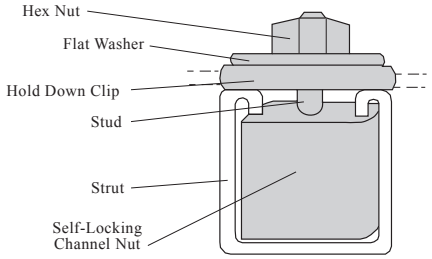
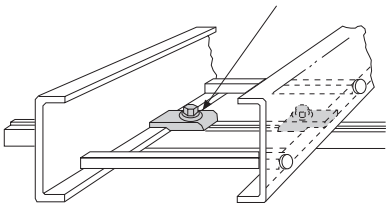


Diagram: FRP Channel Nut with Hold Down Clip





Non-Metallic Universal Pipe Clamp

Part No.	Pipe Size Inches	Wt./ 100 Sets* Lbs.	Conduit Outside Diameter Inches (for reference only) PVC Schedule 40 & 80	PVC Coated Steel	Rigid Steel	Fiberglass (FRP)
PC-1609N	½	9.0	0.840	0.920	0.840	-
PC-1610N	¾	10.0	1.050	1.130	1.050	0.890
PC-1611N	1	10.5	1.315	1.395	1.315	1.195
PC-1612N	1¼	11.0	1.660	1.740	1.660	1.507
PC-1613N	1½	13.0	1.900	1.980	1.900	1.757
PC-1614N	2	14.0	2.375	2.455	2.375	2.132
PC-1615N	2½	18.0	2.875	2.955	2.875	2.650
PC-1616N	3	20.0	3.500	3.580	3.500	3.132
PC-1617N	3½	23.0	4.000	4.080	4.000	3.632
PC-1618N	4	25.0	4.500	4.580	4.500	4.132

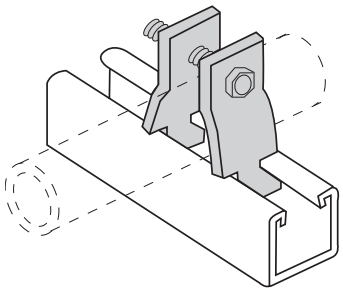
* Includes nylon bolt

For rigid, PVC coated steel, PVC Schedule 40 & 80 and fiberglass conduit.

Made from a toughened grade of glass reinforced polycarbonate resin. Standard fasteners are nylon slotted hex bolt and nut. Recommended for horizontal use as shown. For vertical placement please contact us.

Packaged 10 sets per bag.

If stainless steel fasteners are preferred, indicate by adding the letter "S" after the catalog number (Example: PC-1609S).

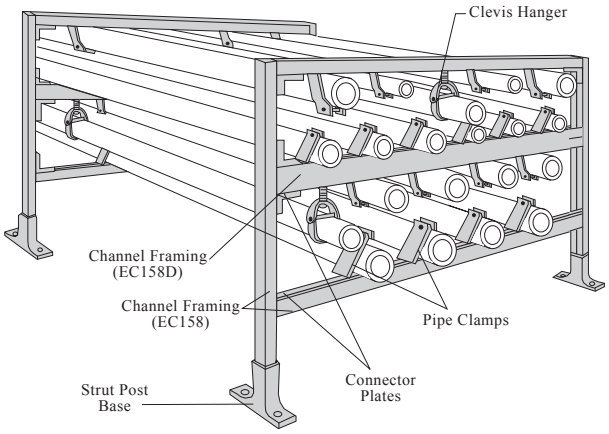


Typical Installations - Support Systems & Strut

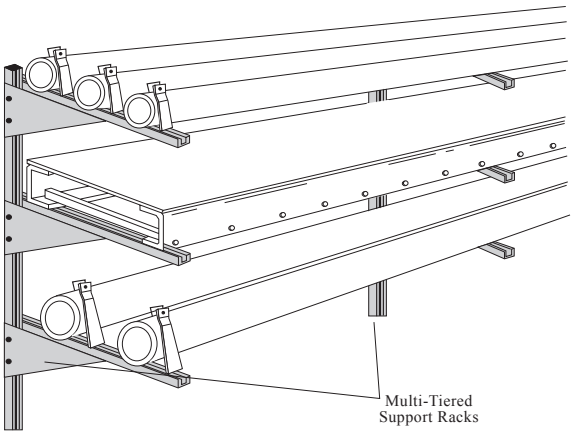
Enduro's DuroStrut combined with our cable tray accessories are functional in many non-cable tray applications. DuroStrut includes all the items necessary to field fabricate to your specifications whether wall, floor, or ceiling mounted. Enduro can also assist in engineering to your requirements. The information published are guideline suggestions for the design professional. Full-scale proof testing of installation is recommended to verify assembly at site.

If you need a special shape or assembly, call Enduro for information on custom pultrusions and fabrications.

Pipe Support Racks Sample Installation



Wall Stanchion Sample Installation



Specification - DuroStrut

1.0 Scope
1.1 This specification covers the requirements for Enduro non-metallic Channel Framing Systems & Accessories

2.0 Standards
2.1 All channel shall have a flame spread rating of 25 or less, and the Smoke Developed Index shall have a density of 450 or less when tested in accordance with the provisions of ASTM E-84; therefore qualifying as a class 1 material in the Uniform Building Code
2.2 All channel shall have a surfacing veil over the entire surface in addition to a UV inhibitor in the resin system to protect against degradation from ultra-violet light.

3.0 Materials
3.1 All channel shall be manufactured by the pultrusion process, and contain a minimum of 50% glass by weight.
3.2 All channel shall conform, as a minimum requirement, to loads and deflections shown on the tables in the latest version of the Enduro technical catalog.

4.0 Non-Metallic Pipe Clamps
4.1 All pipe clamps shall be manufactured by the injection molding process with an impact modified, 30% glass filled thermoplastic polyester resin.
4.2 All pipe clamps interlock with the channel framing described above.
4.3 All pipe clamps shall be designed for rigid PVC coated steel, Schedule 40 and 80 PVC, and filament wound fiberglass pipe or conduit. Clamps shall be adjustable to accommodate a ¾" minimum deviation in O.D. size.

5.0 Fasteners
5.1 All fasteners shall be injected molded glass reinforced nylon, 316 stainless steel, or pultruded vinyl ester rod with ground threads and compression molded vinyl ester nuts.

6.0 Acceptable Manufacturer
6.1 DuroStrut is manufactured and fabricated exclusively by Enduro Composites, Inc. - Houston, TX.

Fastener & Hanging Systems

Enduro fastener and hanging systems are exceptionally strong non-metallic mechanical systems with outstanding shear and tensile strengths. This makes the Enduro fastener system an excellent choice for all structural, mechanical, and electrical applications where fasteners must be corrosion-resistant and/or non-conductive. Refer to the fastener and hanging system installation guide on page 40 and threaded rod properties in the table below. It is not recommended that FRP threaded rod be used in conjunction with steel or PVC coated steel beam clamps or nuts. Thread shear could occur due to insufficient thread engagement.

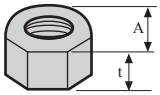
FRP Threaded Rod

Part No.	Size	Weight
TR-FRP-038	⅜"-16	0.07 Lbs/Ft
TR-FRP-050	½"-13	0.12 Lbs/Ft
TR-FRP-0625	⅝"-11	0.18 Lbs/Ft
TR-FRP-075	¾"-10	0.28 Lbs/Ft
TR-FRP-100	1"-8	0.50 Lbs/Ft

Vinyl Ester resin is the standard. Available in 8 ft. lengths.

FRP Hex Nut

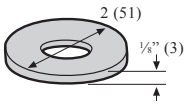
Part No.	Size	Weight	t	A
FN-FRP-038	⅜"-16	2.43 Lbs/C	⅝" (16)	⅞" (22)
FN-FRP-050	½"-13	2.17 Lbs/C	⅝" (16)	⅞" (22)
FN-FRP-0625	⅝"-11	6.05 Lbs/C	⅞" (22)	1¼" (32)
FN-FRP-075	¾"-10	5.42 Lbs/C	⅞" (22)	1¼" (32)
FN-FRP-1000	1"-8	20.49 Lbs/C	1¼" (32)	2" (51)



Vinyl Ester resin is the standard.

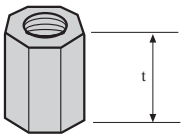
FRP Flat Washer

Part No.	Size	Weight
FW-FRP-038	⅜"-16	1.3 Lbs/C
FW-FRP-050	½"-13	1.3 Lbs/C
FW-FRP-0625	⅝"-11	1.3 Lbs/C
FW-FRP-075	¾"-10	1.3 Lbs/C
FW-FRP-1000	1"-8	1.3 Lbs/C



FRP Rod Coupler

Part No.	Size	Weight	t
RC-FRP-038	⅜"-16	7.80 Lbs/C	2" (51)
RC-FRP-050	½"-13	7.00 Lbs/C	2" (51)
RC-FRP-0625	⅝"-11	13.73 Lbs/C	2" (51)
RC-FRP-075	¾"-10	12.66 Lbs/C	2" (51)
RC-FRP-1000	1"-8	44.03 Lbs/C	2¾" (70)



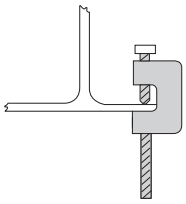
Vinyl Ester resin is the standard. IMPORTANT: Minimum thread engagement must be ¾" per side.

Beam Clamps

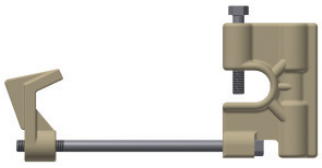
Part No.	Description
BCS-3/8	Single for ⅜" FRP Threaded Rod
BCS-1/2	Single for ½" FRP Threaded Rod
BCD-3/8	Double for ⅜" FRP Threaded Rod
BCD-1/2	Double for ½" FRP Threaded Rod

Ultimate load = 300 Lbs
Recommended safety factor = 3
SS set screws included with clamps.

Single



Double



Typical Properties - FRP Threaded Rod

Properties	⅜-16 UNC	½-13 UNC	⅝-11 UNC	¾-10 UNC	1-8 UNC
Thread shear strength using FRP hex nut in tensile - Lbs.	1,250	2,200	3,100	4,500	6,500
Transverse shear on threaded rod - double shear (load Lb.) (ASTM-B565)	3,000	5,000	7,500	12,000	22,000
Transverse shear on threaded rod - single shear (load Lb.)	1,600	2,600	3,800	6,200	15,000
Compressive strength longitudinal, PSI (ASTM-D695)	54,000	54,000	54,000	54,000	65,000
Flexural strength, PSI (ASTM-D790)	55,000	55,000	55,000	55,000	60,000
Flexural modulus, PSI x 10^6 (ASTM-D790)	2.0	2.0	2.0	2.50	2.75
Torque strength using fiberglass nut lubricated with SAE 10W30 motor oil, Ft.-Lbs.	8	18	35	50	110
Dielectric strength, KV/In. (ASTM-D149)	35	35	35	35	35
Water absorption 24 hour immersion - threaded, % (ASTM-D570)	1	1	1	1	1
Coefficient of thermal expansion - longitudinal In./In./°F	5 x 10^{-6}	5 x 10^{-6}	5 x 10^{-6}	5 x 10^{-6}	5 x 10^{-6}
Max recommended operation temp - based on 50% retention of ultimate thread shear strength °F (°C)	200°(93°)	200°(93°)	200°(93°)	200°(93°)	200°(93°)
Stud weight, Lb./Ft.	0.07	0.12	0.18	0.28	0.50
Flammability	Self-extinguishing on all				

Note: 1 Ft.-Lb. = .138 kg-M; 1 Lb = .4536 kg; 1 PSI = 6.984 K Pa; Test results are for studs with single FRP hex nuts only, stainless steel nuts will result in reduced values. Proper safety factors should be applied to testing. All values are based on laboratory test results.

Fastener & Hanging Systems - Installation Guide

The Enduro fastener system is a vinyl ester resin and fiberglass composite with unique characteristics which make it ideal for many applications where high strength, non-metallic fasters are required.

Size	Thread Shear (single nut)	Maximum Installation Torque	Socket Size
3/8" - 16 UNC	1,250 Lbs.	4 Ft.-Lbs.	15/16"
1/2" - 13 UNC	2,200 Lbs.	8 Ft.-Lbs.	15/16"
5/8" - 11 UNC	3,100 Lbs.	16 Ft.-Lbs.	15/16"
3/4" - 10 UNC	4,500 Lbs.	24 Ft.-Lbs.	15/16"
1" - 10 UNC	6,500 Lbs.	50 Ft.-Lbs.	2"

For Access After Installation

If the assembly will require occasional removal of the nuts, the rod should be lightly coated with a dry lubricant, silicon spray, or a light oil prior to assembly.

For Permanent Installation

If the assembly is designed to be a permanent installation, the nuts and studs should be bonded with an epoxy adhesive.

Apply a light coating of adhesive to the stud and nut threads, then quickly secure the assembly before adhesive has time to set, otherwise the mil thickness of the adhesive will make it impossible to thread. Next, apply a thick coat of adhesive to the exposed stud and nut surfaces. This provides a locking mechanism which eliminates the need for extra torque and lock washers.

For Hanging System Installation

The optimum method of installation for a hanger system is to finger tighten the assembly and then only tighten the nuts one-half turn to secure any jam nut assemblies. Follow the permanent installation procedure whenever possible. This results in minimum torque and allows maximum thread shear.

To insure maximum resistance to chemical attack once the assembly is completed, the exposed stud thread and nut surfaces should be coated with Enduro's Field Cutting Sealant (Part No. ES-Q or ES-G; see pg. 25).

Metal & FRP Installation

When utilizing metal fasteners, connectors, or nuts, consideration must be given to reduced strengths. Enduro rod and nuts are designed with maximum thread engagement and extra nut thickness. Metal products have less thread engagement. When installation requires metal components, special tests may be necessary to define ultimate strengths of the fastener systems.

For Beam Clamp Installation

Maximum installation torque of 10 foot-pounds is recommended to secure set screw.

Site Conditions

Vibration and dynamic loading conditions on the Enduro fastener assembly should be eliminated or minimized. If this is not possible, additional safety factors should be used in designed the fastener system.

Tools Required

The oversize hex nut design of the Enduro nut requires a larger than normal socket wrench, but either a six point or twelve point socket will work.
Important - do not exceed the torque values listed in the table above.

Caution

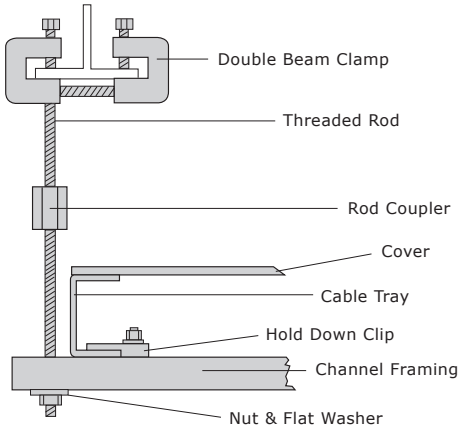
Do not over torque the Enduro nut and rod. The thread shear and torque values are NOT mutually exclusive, they are additive

Example

1/2" - 13 has a thread shear of 2,200 Lbs. and an ultimate torque strength of 18 ft-lbs. If you use the maximum installation torque of 8 ft-lbs, the amount of thread shear remaining is reduced to 1,225 lbs.

Specifying engineers should apply this information at the design stage, applying the proper safety factors to ensure a secure installation.

Typical Hanging Support System



Instrument & Pushbutton Stands

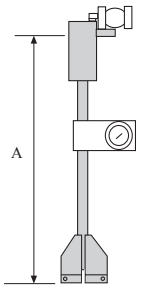
Enduro's universal instrument support system offers many of the same features and benefits as our cable tray, strut and wireway systems. Enduro instrument and pushbutton stands are built to any configuration required, including, single or double post, large mounting panel (switch rack/station) type designs, and any mounting requirements needed. For all configurations, please specify dimensions in inches.

Enduro Instrument & Pushbutton Stand Benefits:

- Costs less than stainless steel systems & competitive with most metallic systems
- Faster assembly time than metallic systems due to easy cut, fit, and adhesive design
- Lighter weight with corrosion resistance comparable to stainless steel and galvanized stand designs
- Compatible with metallic post bases and metallic support structures
- Easily built on site allowing for design freedom and increasing response time
- Constructed from 2" Schedule 80 gray vinyl ester base for superior corrosion resistance
- 2" SteelFree™ U-Bolt (shown below) may be used to attach instruments and/or gauges to the supports

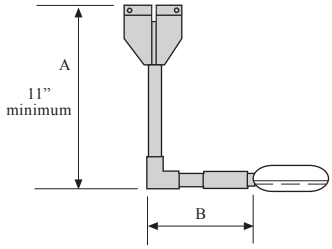
Floor Mount Single

Part No. Key*
DISR170B1 x (A)



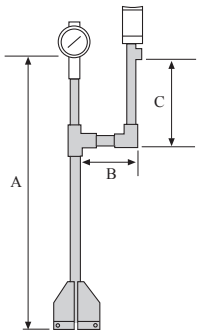
Column or Wall Mount

Part No. Key*
DISR175B48 x (A) x (B)



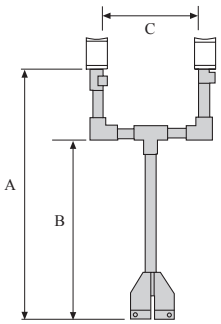
Floor Mount, Multiple Instrument

Part No. Key*
DISR172B x (A) x (B) x (C)



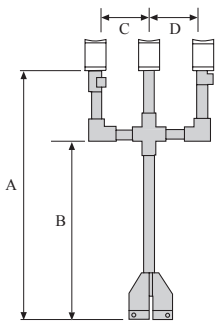
Floor Mount Double

Part No. Key*
DISR171B x (A) x (B) x (C)



Floor Mount Triple

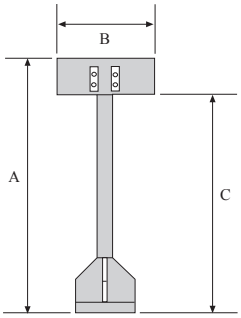
Part No. Key*
DISR173T x (A) x (B) x (C) x (D)



Pushbutton Station

Part No. Key*
DPS x (A) x (B) x (C)

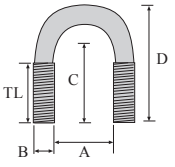
Made of pultruded fiberglass reinforced vinyl ester 2" square tube with an 8" square vinyl ester base at 6 1/2" high. Please specify dimensions in inches.



U-Bolts

Part No.	Pipe Nom. Dia.	A	B	C	D	TL	Max Rec. Loading Lbs.	Max Rec. Torque In.-Lbs.
EU050	½"	0.93	0.375	1.56	2.41	1.25	75	20
EU070	¾"	1.12	0.375	1.66	2.60	1.25	75	20
EU100	1"	1.37	0.375	1.78	2.85	1.25	75	20
EU125	1¼"	1.68	0.375	1.94	3.16	1.25	75	20
EU150	1½"	2.00	0.375	2.10	3.47	1.25	75	20
EU200	2"	2.43	0.500	2.46	4.18	1.50	150	40
EU250	2½"	2.93	0.500	2.71	4.68	1.50	150	40
EU300	3"	3.56	0.500	3.03	5.31	1.50	150	40
EU350	3½"	4.06	0.500	3.28	5.81	1.50	150	40
EU400	4	4.56	0.500	3.53	6.31	1.50	150	40

Made from glass reinforced polyurethane resin, u-bolts are the ideal choice for mounting enclosures, instrumentation, conduit, and piping on your Enduro instrument and pushbutton support systems.
Excellent as an alternative when replacing corroded steel u-bolts.
Recommended for operating temperatures up to 150 °F.
Four nuts included with each u-bolt.



* In Part No. Key, parentheses ( ) = insert corresponding dimension

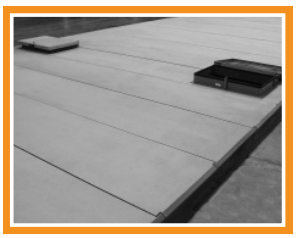
Other Enduro Engineered FRP Products

Enduro Environmental Products

FRP Tank Cover

High Strength Corrosion Resistant FRP

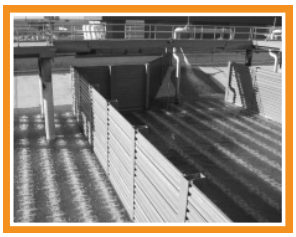
- Compression Sealed for Effective Odor Control
- Removable Panels for Easy Access
- Walkable Non-skid Surface
- Less Headspace Over Water for Efficient Odor Processing
- Customized to Your Application



FRP Baffle Wall

High Strength Corrosion Resistant FRP

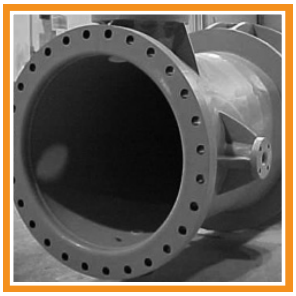
- UL Certified to NSF ANSI standard 61
- Easy Installation
- Baffle Options:
  - Removable Panels
  - Flexible Design
  - Access Doors
  - Solid or Perforated
- Customized to Your Application



Enduro Pipe & Vessels

FRP & Dual Laminate Pipe & Vessels

Enduro's pipe & vessel division (located South of Houston in Freeport, TX) manufactures, fabricates and installs fiberglass and dual laminate pipe & vessels from 1" to 60". Enduro can virtually source any resin required for your application, and has produced fiberglass piping systems for world class companies like Dow Chemical for over 50 years.



Enduro Third Rail Cover Board

For Light Rail & Mass Transit Systems

Enduro third rail cover boards are custom designed to provide safety by shielding or insulating personnel from a rail that is "live" or may contain stray currents. Our fiberglass light rail covers are made of high-performance, lightweight pultruded composites. Enduro has exceeded the most stringent of transportation safety tests utilizing our Halogen Free Low Smoke Plus resin technology that provides the highly desired low smoke development and low toxicity characteristics preferred by transportation safety authorities.

Enduro Building Products

Enduro Tuff Span® FRP Building Panels

World-Leading Industrial Building Panels

For demanding structural and environmental conditions, Enduro Tuff Span® FRP Building Panels deliver unsurpassed performance as industrial roofing and siding.

Strength

In FRP materials, strength and stiffness is determined by the alignment and amount of its glass fiber reinforcements.

Tuff Span® is constructed with high reinforcing content placed in straight and continuous, bidirectional alignment. As a result, Tuff Span® has higher strength and stiffness of any profiled FRP Building Panel and history of standing up to hurricane winds where aged metal, cementious, and other materials have failed.

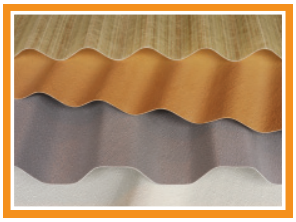
Corrosion Resistance

To resist attack from aggressive chemical exposure, Tuff Span® is formulated with premium resin systems, Iso-Polyester or Vinyl Ester.

UV Protection

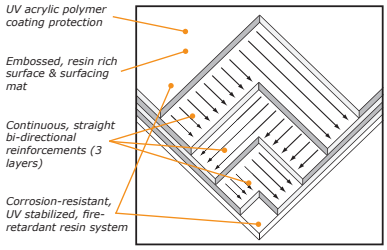
Extended and superior UV protection is provided by an exterior acrylic coating, UV stabilized resin, embossed resin-rich surface, and interior mat or veil.

Fertilizer storage facility installed with Enduro DuroLite roofing & siding panels



Opaque Colors	Translucent Colors	
Gray	Gray	Clear
White	White	Green
Beige	Beige	Daylight Blue
Stone White	Stone White	Gray Mist
Shale	Shale	

Enduro has the ability to produce colors matched to existing strucutures. More colors available, contact us.



Enduro Tuff Span® FRP panels are the strongest of any profiled FRP building panel.

More Enduro Tuff Span® Products

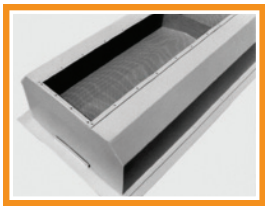
For a complete FRP system, Enduro offers other building products designed specifically for corrosive applications & environments.

Beams
Angle
Louvers
Tube
Ridge Vents
Wide Flange
Gutter Systems
Flat Plate Sections
Channel

Enduro FRP structural members at a water treatment plant

Enduro FRP primary & secondary beams

Enduro FRP louvers on an offshore platform off the Gulf Coast



Enduro FRP Ridge Vent

enduro

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