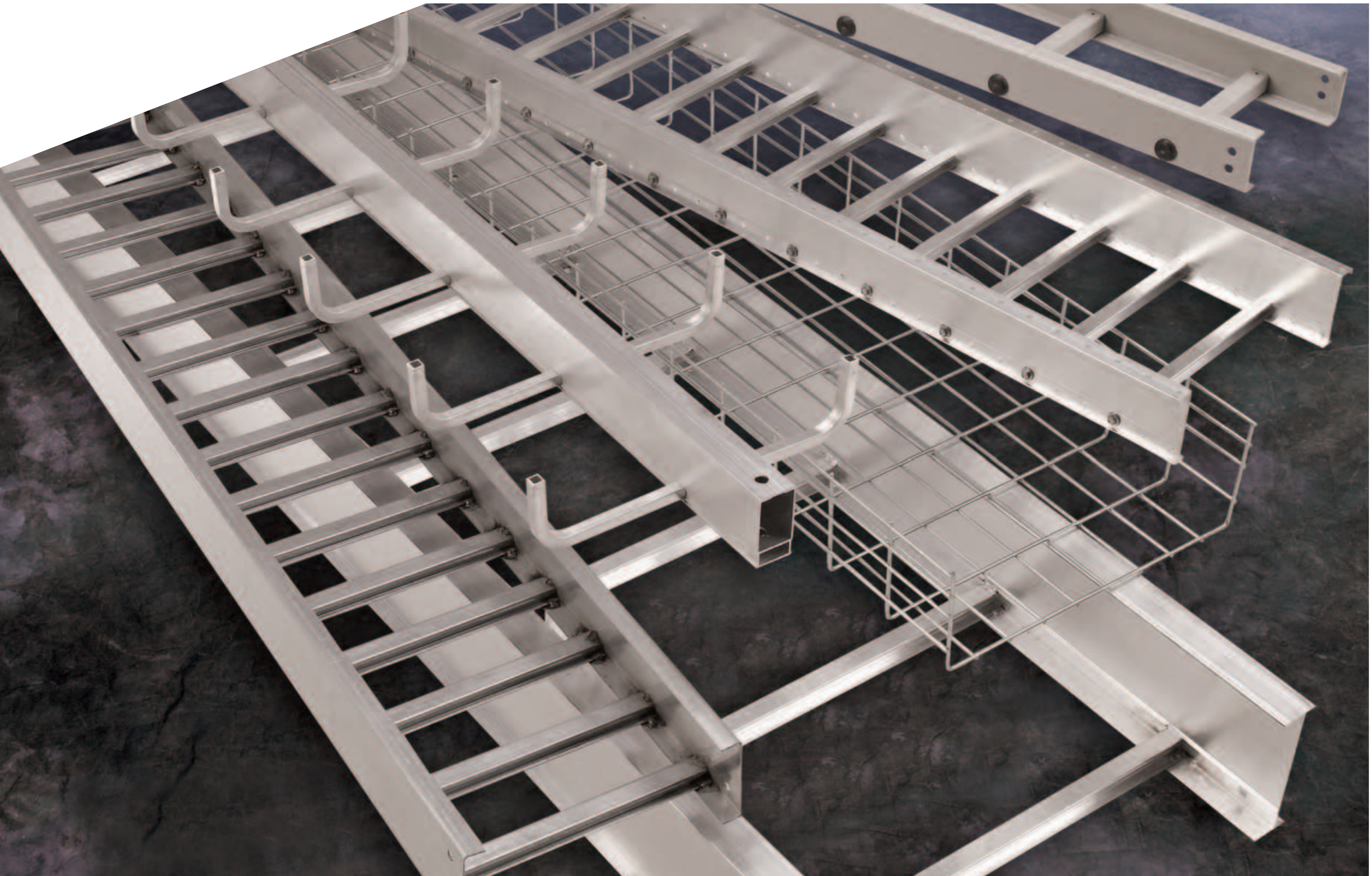
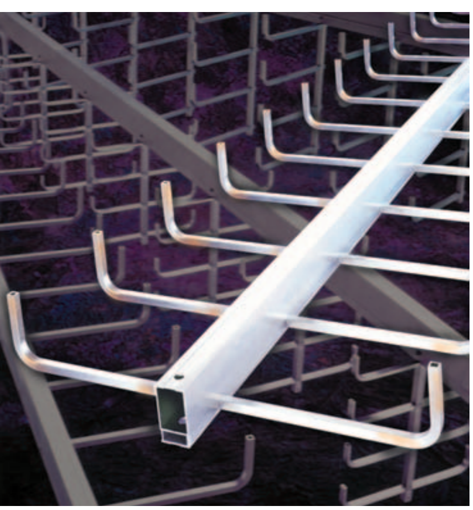


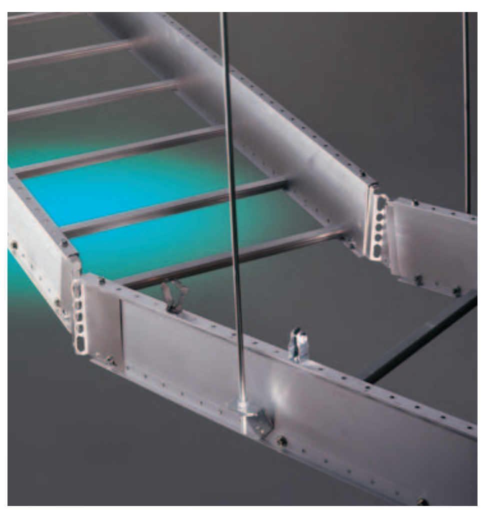
Cable Tray Systems

Aluminum, Steel, Stainless Steel & Fiberglass Cable Tray Systems
Redi-Rail™ & Cent-R-Rail™ Tray Systems
Cable Channel & Wire Basket Systems

CT-10

COOPER B-Line





Introduction

B-Line Systems was formed in 1956 and has over 30 years experience manufacturing cable tray systems in which it has grown to become the industry leader. This growth was achieved by offering unmatched quality in both service and products.

Today Cooper B-Line stands alone in its customer service resources with cable tray fabrication location at four locations throughout the United States. Strategically located facilities alone do not generate unmatched service. The professional staff at Cooper B-Line is knowledgeable, energetic, and care about customer needs. The right attitude coupled with the facilities does generate unsurpassed customer service.

Cooper B-Line's product offerings also set new standards. Cooper B-Line manufactures cable support product lines that bridge both the electrical and telecom markets. Each of those product lines are engineered to provide top performance while offering unique installation savings. This catalog is dedicated to the metallic and non-metallic, two side rail, cable tray systems.

NEMA MEMBER

Cooper B-Line cable trays conform to the requirements of IEC Standard 61537, 2001 Ed.

Questions, Comments, Suggestions?
"B-VOCAL℠ with Cooper B-Line"
Voice Of the Customer...Actively Listening
bvocal@cooperindustries.com
877-351-9450

Ask The Experts!

1-800-851-7415 ext. 366

Cooper B-Line

509 West Monroe Street
Highland, IL 62249

Phone: 800-851-7415
Fax: 618-654-1917

www.cooperbline.com

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Series 1 Steel

Series 2, 3, 4, & 5 Aluminum

Series 2, 3, 4, & 5 Steel

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Series 2, 3, 4, & 5 Fittings

Fiberglass Cable Tray

Cable Fixing

Appendix

Cable Tray Manual

continued on page 3

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Searching for Cooper B-Line Cable Tray Material?

Need a Cable Tray Materials Price Quote?

Get **Fastray** On-Line.

http://www.cooperbline.com/product/CableTray/SearchProducts

- Search for Product Info!
- Create Submittal Package! (see page 6)
- View Bill of Materials!
- Even Receive a Quote Request!

All This ON-LINE

Cooper B-Line Gives Just the Facts on:

Construction Specifications

All specs are arranged as to their recommended CSI MasterFormat™ Divisions.

All Construction Specification Documents

On-Line or Downloaded

in Mircosoft Word format

http://www.cooperbline.com/engineer/specs.asp

If you need more information about this or any other great Cooper B-Line product just...

By Just One Click of the Mouse Button add Cooper B-Line Cable Tray to your next set of Plans

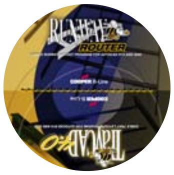
To Download a Free copy of TrayCAD
Go to: www .cooperbline.com
and click on Software & Specifications

Directly: http://www.cooperbline.com/engineer/Software.asp#TrayCAD

Call: (800) 851-7415

TrayCAD is a cable tray layout design program that works with AutoCAD®. TrayCAD is a Windows® based program and installs as an add-on to your AutoCAD® system. Use the TrayCAD toolbar to add cable tray to your plans by drawing a single line as the center line of the tray run, then, with the click of a button, the program will build a 3-D wire-frame model of the cable tray and all of the appropriate fittings. The program will also create a Bill of Material and contains a library of details.

By Just One Click of the Mouse Button add Cooper B-Line Cable Runway, Cent-R-Rail™ and Relay Racks to your next set of Plans



To Download a Free copy of Runway Router™
Go to: www .cooperbline.com
and click on Software & Specifications

Directly: http://www.cooperbline.com/engineer/Software.asp#Runway

Call: (800) 851-7415

Runway Router™ is a cable runway (ladder rack) layout design program that works with AutoCAD®. Runway Router is a Windows® based program that installs as an add-on to your AutoCAD® system. Use the commands from the Runway Router toolbar to layout cable runway, Cent-R-Rail, relay racks and electronic cabinets. Add cable runway or Cent-R-Rail to your existing plans by drawing a single line as the centerline path of the run. Then, with the click of a button, the program will build a 3-D wire-frame model of the cable runway and all of the appropriate connectors and fittings. The program will also create a Bill Of Materials, and contains a library of details.

Ask The Experts!

Cooper B-Line Cable Tray Systems

Cable tray is a mechanical support system that can support cables and raceways. Cable tray is not a raceway. Cable tray systems are required to be electrically continuous but not mechanically continuous.

Advantages of Cooper B-Line Cable Tray Systems

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

For more information refer to Cooper B-Line's Cable Tray Manual (Pages 381 thru 431)
or call Cooper B-Line engineering at 1-800-851-7415 extension 366

Quick List Selection Process

See pages 36 & 37 for expanded selection process.

1. **Support Span Issues are: Strength and Length**
   - Very important to first consider the support span as it affects the strength of the system and the length of the straight sections required.
   - Short Span, 6 to 8 foot support spacing - use 12 foot sections.
   - Intermediate Span, 8 to 12 foot support spacing - use 12 foot sections.
   - Long Span, 16 to 20 foot support spacing - use 20 foot sections.
   - Extra Long Span, over 20 foot to 30 foot support spacing - use 24 or 30 foot sections.

2. **Working Load Issues are: Size (Width, Loading Depth, and Strength)**
   Cable Load
   - Types and numbers of cables to support - Total cable load in lbs. per linear foot (lbs/ft)
   - Power - is single layer - issue width (refer to local electrical code)
   - Low Voltage - is stacked - issue loading depth and width (refer to affecting code)
   - See chart of listed cable load guidelines (refer to page 40)

   Additional Loads

   200 lb. concentrated load - Industrial installations
   Ice, Wind, Snow loads - Outdoor installations
   Select a Cable Tray system that meets the working load for the support span required and a straight section length that fits the installation. NEMA VE 2 - Straight sections equal to or larger than span.
   www.cabletrays.com/technical.htm

3. **Installation Environment Issues are: Material and Finish**
   - Indoor Dry - Institutional, Office, Commercial, Light Industrial
     Aluminum, Pre-Galvanized Steel
   - Indoor Industrial - Automotive, Pulp and Paper, Power Plants
     Aluminum, Pre-Galvanized Steel, Possibly Hot-Dipped Galvanized After Fabrication (HDGAF)
   - Outdoor Industrial - Petrochemical, Automotive, Power Plants
     Aluminum, Hot-Dipped Galvanized After Fabrication (HDGAF)
   - Outdoor Marine - Off Shore Platforms
     Aluminum, Stainless Steel, Fiberglass
   - Special - Petrochemical, Pulp and Paper, Environmental Air
     Contact Cooper B-Line Engineering (1-800-851-7415 ext, 366)

Cooper B-Line Cable Tray Product Offering

- **Two Side Rail Systems**
  Aluminum, Pre-Galvanized Steel, Hot Dip Galvanized After Fabrication Steel, 304 and 316L Stainless Steel, Fiberglass in Polyester Resin, Vinyl Ester, Zero Halogen, and Dis-Stat
  Redi-Rail Systems loaded with special installation and cable friendly features.
  Systems tested to 173 lbs/ft on a 30 foot span
  Special bottom options and splices
  Highest quality fittings
  Unmatched accessories supplied with attachment hardware
- **Cable Channel (See Cable Channel Section - pages 98-113)**
  3, 4, and 6 inch widths in Aluminum, Pre-Galvanized Steel, Hot Dip Galvanized after Fabrication Steel and 304 or 316L Stainless Steel
  3, 4, 6, and 8 inch widths in Fiberglass in Polyester Resin, Vinyl Ester, Zero Halogen, and Dis-Stat
  Unmatched fitting and accessory offering
  Special bottom options and splices
  Highest quality fittings
  Unmatched accessories supplied with attachment hardware
- **Cent-R-Rail™ Systems (See Cent-R-Rail Section - pages 114- 175)**
  Data Track™, Verti-Rack™, Half-Rack™, and Multi-Tier Half-Rack™
  Each system targeted to installation needs
  Each system is the fastest in the industry to install
  Pre-assembled, boxed connectors, splices
  Crated straight section shipments
- **Wire Flextray Tray (See Flextray Section - pages 42-97)**
  Best finish in the industry, ASTM B633, SC2 (ZN)
  Strong straight top wire design maximizes strength and minimizes weight
  Unmatched accessory package

Advantage of Using Cooper B-Line Cable Tray?
Selection!

What kind of Cooper B-Line Cable Tray will work for your project?
First, answer three questions.

1. **Location:** Where will the project be located?
   A. Is the installation inside or outside?
   (decision dealing with thermal and weather conditions)
   B. Any contact of corrosive materials?
   (decision on cable tray material or finish)
   C. Is the location for the cable tray confined or open?
   (decision on the size and type of cable tray)
2. **Span:** What would be the longest and shortest spans between supporting locations for the installation of cables? (decision on type or combination of types of cable tray design needed to be the most efficient and economical)
3. **Cables:** How many and what type of cables are involved in the support installation? (decision on the strength of the cable tray)

All these variables are important to the cost savings and safety of your Cooper B-Line Cable Tray installation project.

It is your money, your decision.

Cable Tray Selection Charts

Short Span 6 - 8 Foot
(distance between the supports)

Recommended Short Span Cable Tray Selection
Use 10 ft or 12 ft Sections

Series	Catalog Number	Rail Height	Load Depth	Span Load lbs/ft 6'	Span Load lbs/ft 8'	Available Widths	Material*	Straight Sections & Accessories Pages	Fittings Pages
Flextray	FT2X2X10	2.380”	2.000”	28	20	2”	S	46 & 49 - 97	--
	FT2X4X10	2.380”	2.000”	43	27	4”	S	46 & 49 - 97	--
	FT2X6X10	2.380”	2.000”	47	27	6”	S	46 & 49 - 97	--
	FT2X8X10	2.380”	2.000”	47	27	8”	S	46 & 49 - 97	--
	FT2X12X10	2.380”	2.000”	47	27	12”	S	46 & 49 - 97	--
	FT2X18X10	2.380”	2.000”	47	27	18”	S	46 & 49 - 97	--
	FT2X20X10	2.380”	2.000”	47	27	20”	S	46 & 49 - 97	--
	FT2X24X10	2.380”	2.000”	47	27	24”	S	46 & 49 - 97	--
	FT4X4X10	4.380”	4.000”	49	36	4”	S	47 & 49 - 97	--
	FT4X8X10	4.380”	4.000”	77	46	8”	S	47 & 49 - 97	--
	FT4X12X10	4.380”	4.000”	83	47	12”	S	47 & 49 - 97	--
	FT4X18X10	4.380”	4.000”	83	47	18”	S	47 & 49 - 97	--
	FT4X20X10	4.380”	4.000”	83	47	20”	S	47 & 49 - 97	--
	FT4X24X10	4.380”	4.000”	89	50	24”	S	47 & 49 - 97	--
	FT6X12X10	6.380”	6.000”	86	48	12”	S	47 & 49 - 97	--
	FT6X18X10	6.380”	6.000”	89	50	18”	S	47 & 49 - 97	--
	FT6X20X10	6.380”	6.000”	98	55	20”	S	47 & 49 - 97	--
	FT6X24X10	6.380”	6.000”	107	60	24”	S	47 & 49 - 97	--
Cable Channel	ACC-03	1.250”	1.250”	15	10	3”	A	100 & 101 - 104	105 - 112
	ACC-04	1.750”	1.750”	33	20.5	4”	A	100 & 101 - 104	105 - 112
	ACC-06	1.750”	1.750”	36	22.5	6”	A	100 & 101 - 104	105 - 112
	†CC-03	1.250”	1.250”	17	11.5	3”	S, SS_	100 & 101 - 104	105 - 112
	†CC-04	1.750”	1.750”	36	24.5	4”	S, SS_	100 & 101 - 104	105 - 112
	†CC-06	1.750”	1.750”	41	28	6”	S, SS_	100 & 101 - 104	105 - 112
	FCC-03	1.000”	1.000”	8	--	3”	F	352 & 353	353 & 354
	FCC-04	1.125”	1.125”	12	--	4”	F	352 & 353	353 & 354
	FCC-06	1.625”	1.625”	58	--	6”	F	352 & 353	353 & 354
	FCC-08	2.188”	2.188”	87	--	8”	F	352 & 353	353 & 354
Cent-R-Rail	C3ADB	3.700”	3.000”	100	100	6” - 24”	A	124 & 132 - 156	--
	C4ADB	4.700”	4.000”	100	100	6” - 24”	A	124 & 132 - 156	--
	C6ADB	6.700”	6.000”	100	100	6” - 24”	A	124 & 132 - 156	--
	C3A1H	3.700”	3.000”	50	50	3” - 12”	A	128 & 132 - 156	--
	C4A1H	4.700”	4.000”	50	50	3” - 12”	A	128 & 132 - 156	--
	C6A1H	6.700”	6.000”	50	50	3” - 12”	A	128 & 132 - 156	--
	C2A①V	All	2.000”	--	225	3” - 12”	A	126 & 132 - 156	--
	C3A②M	All	3.000”	50	50	3” - 12”	A	130 & 132 - 156	--
	C4A②M	All	4.000”	50	50	3” - 12”	A	130 & 132 - 156	--
Redi-Rail	H14AR	3.840”	3.000”	224	194	6” - 36”	A	178 & 180 - 187	191 - 201
	H15AR	4.840”	4.000”	224	224	6” - 36”	A	178 & 180 - 187	191 - 201
	H16AR	5.840”	5.000”	224	224	6” - 36”	A	179 & 180 - 187	191 - 201
	H17AR	6.840”	6.000”	224	224	6” - 36”	A	179 & 180 - 187	191 - 201
Cable Tray – Steel	148	3.625”	3.077”	204	115	6” - 36”	S	204 & 208 - 214	216 - 224
	156	4.188”	3.628”	304	171	6” - 36”	S	205 & 208 - 214	216 - 224
	166	5.188”	4.628”	308	173	6” - 36”	S	206 & 208 - 214	216 - 224
	176	6.188”	5.628”	-	194	6” - 36”	S	207 & 208 - 214	216 - 224
Cable Tray – Fiber	13F	3.000”	2.000”	257	145	6” - 24”	F	324 & 348 - 351	330 - 347

*Material: A = Aluminum • S = Steel • SS_ = Stainless Steel Type 304 or 316 • F = Fiberglass
† = G for HDGAF • P for Pre-Galvanized • SS4 for 304 or SS6 for 316 Stainless Steel
① Insert 2, 3, 4, 5 or 6 for number of tiers • ② Insert 2, 3 or 4 for number of tiers

IEC

Cooper B-Line cable trays conform to the requirements of IEC Standard 61537, 2001 Ed.

Intermediate Span 10 - 12 Foot

(distance between the supports)

Recommended Intermediate Span Cable Tray Selection

Use 12 ft Sections

	Catalog Number	Rail Height	Load Depth	Span Load lbs/ft 10'	Span Load lbs/ft 12'	Available Widths	Material*	Straight Sections & Accessories Pages	Fittings Pages
Cent-R-Rail	C3ADB	3.700"	3.000"	100	100	6" - 24"	A	124 & 132 - 156	--
Cent-R-Rail	C4ADB	4.700"	4.000"	100	100	6" - 24"	A	124 & 132 - 156	--
Cent-R-Rail	C6ADB	6.700"	6.000"	100	100	6" - 24"	A	124 & 132 - 156	--
Cent-R-Rail	C3A1H	3.700"	3.000"	100	100	3" - 12"	A	128 & 132 - 156	--
Cent-R-Rail	C4A1H	4.700"	4.000"	100	100	3" - 12"	A	128 & 132 - 156	--
Cent-R-Rail	C6A1H	6.700"	6.000"	100	100	3" - 12"	A	128 & 132 - 156	--
Redi-Rail	H14AR	3.840"	3.000"	124	86	6" - 36"	A	178 & 180 - 187	191 - 201
Redi-Rail	H15AR	4.840"	4.000"	147	102	6" - 36"	A	178 & 180 - 187	191 - 201
Redi-Rail	H16AR	5.840"	5.000"	164	114	6" - 36"	A	179 & 180 - 187	191 - 201
Redi-Rail	H17AR	6.840"	6.000"	144	100	6" - 36"	A	179 & 180 - 187	191 - 201
Cable Tray – Aluminum	24A	4.120"	3.050"	181	126	6" - 36"	A	228 & 238 - 248	288 - 302
Cable Tray – Aluminum	25A	5.000"	3.930"	200	139	6" - 36"	A	230 & 238 - 248	288 - 302
Cable Tray – Aluminum	26A	6.120"	5.040"	204	142	6" - 36"	A	232 & 238 - 248	288 - 302
Cable Tray – Aluminum	37A	7.140"	6.050"	--	222	6" - 36"	A	234 & 238 - 248	288 - 302
Cable Tray – Steel	148	3.625"	3.077"	73	51	6" - 36"	S	204 & 208 - 214	216 - 224
Cable Tray – Steel	156	4.188"	3.628"	109	76	6" - 36"	S	205 & 208 - 214	216 - 224
Cable Tray – Steel	166	5.188"	4.628"	111	77	6 "- 36"	S	206 & 208 - 214	216 - 224
Cable Tray – Steel	176	6.188"	5.628"	124	86	6" - 36"	S	207 & 208 - 214	216 - 224
Cable Tray – Steel	248	4.188"	3.140"	148	103	6" - 36"	S	252 & 260 - 270	288 - 302
Cable Tray – Steel	258	5.188"	4.140"	157	109	6" - 36"	S	254 & 260 - 270	288 - 302
Cable Tray – Steel	268	6.188"	5.140"	158	110	6" - 36"	S	256 & 260 - 270	288 - 302
Cable Tray – Steel	378	7.188"	6.140"	204	142	6" - 36"	S	258 & 260 - 270	288 - 302
Cable Tray – Stainless Steel	348	4.188"	3.130"	180	125	6" - 36"	SS_	274 & 277 - 284	288 - 302
Cable Tray – Stainless Steel	358	5.188"	4.130"	248	172	6" - 36"	SS_	275 & 277 - 284	288 - 302
Cable Tray – Stainless Steel	368	6.188"	5.130"	236	164	6" - 36"	SS_	276 & 277 - 284	288 - 302
Cable Tray – Fiberglass	13F	3.000"	2.000"	93	64	6" - 24"	F	324 & 348 - 351	330 - 347
Cable Tray – Fiberglass	24F	4.000"	3.000"	226	157	6" - 36"	F	325 & 348 - 351	330 - 347

*Material
A = Aluminum
S = Steel
SS_ = Stainless Steel Type 304 or 316
F = Fiberglass

IEC — Cooper B-Line cable trays conform to the requirements of IEC Standard 61537, 2001 Ed.

Cable Tray Information

Long 16 - 20 Foot
(distance between the supports)

Recommended Intermediate Span Cable Tray Selection
Use 20 ft Sections

Cable Tray	Catalog Number	Rail Height	Load Depth	Span Load lbs/ft 16'	18'	20'	Available Widths	Material*	Straight Sections & Accessories Pages	Fittings Pages
Aluminum	25A	5.000"	3.930"	78	62	50	6" - 36"	A	230 & 238 - 248	288 - 302
Aluminum	34A	4.200"	3.080"	125	99	80	6" - 36"	A	228 & 238 - 248	288 - 302
Aluminum	35A	5.060"	3.960"	121	96	77	6" - 36"	A	230 & 238 - 248	288 - 302
Aluminum	26A	6.120"	5.040"	80	63	51	6" - 36"	A	232 & 238 - 248	288 - 302
Aluminum	36A	6.170"	5.060"	131	104	84	6" - 36"	A	232 & 238 - 248	288 - 302
Aluminum	37A	7.140"	6.050"	125	99	80	6" - 36"	A	234 & 238 - 248	288 - 302
Aluminum	46A	6.190"	5.080"	161	127	103	6" - 36"	A	232 & 238 - 248	288 - 302
Aluminum	47A	7.240"	6.130"	156	123	100	6" - 36"	A	234 & 238 - 248	288 - 302
Aluminum	H46A	6.240"	5.090"	261	206	167	6" - 36"	A	232 & 238 - 248	288 - 302
Aluminum	H47A	7.240"	6.090"	233	184	149	6" - 36"	A	234 & 238 - 248	288 - 302
Steel	346	4.188"	3.130"	98	78	63	6" - 36"	S	252 & 260 - 270	288 - 302
Steel	356	5.188"	4.130"	108	85	69	6" - 36"	S	254 & 260 - 270	288 - 302
Steel	366	6.188"	5.140"	117	93	75	6" - 36"	S	256 & 260 - 270	288 - 302
Steel	378	7.188"	6.140"	80	63	51	6" - 36"	S	258 & 260 - 270	288 - 302
Steel	444	4.188"	3.110"	142	112	91	6" - 36"	S	252 & 260 - 270	288 - 302
Steel	454	5.188"	4.110"	166	131	106	6" - 36"	S	254 & 260 - 270	288 - 302
Steel	464	6.188"	5.110"	192	152	51	6" - 36"	S	256 & 260 - 270	288 - 302
Steel	476	7.188"	6.130"	120	95	77	6" - 36"	S	258 & 260 - 270	288 - 302
Steel	574	7.188"	6.110"	203	160	130	6" - 36"	S	258 & 260 - 270	288 - 302
Stainless Steel	348	4.188"	3.130"	70	56	45	6" - 36"	SS_	274 & 277 - 284	288 - 302
Stainless Steel	358	5.188"	4.130"	97	77	62	6" - 36"	SS_	275 & 277 - 284	288 - 302
Stainless Steel	368	6.188"	5.140"	92	73	59	6" - 36"	SS_	276 & 277 - 284	288 - 302
Stainless Steel	464	6.188"	5.110"	192	152	123	6" - 36"	SS_	277 & 277 - 284	288 - 302
Fiberglass	36F	6.000"	5.000"	139	109	89	6" - 36"	F	326 & 348 - 351	330 - 347
Fiberglass	46F	6.000"	5.000"	221	174	141	6" - 36"	F	327 & 348 - 351	330 - 347
Fiberglass	H46F	6.000"	5.000"	239	188	153	6" - 36"	F	328 & 348 - 351	330 - 347

*Material
A = Aluminum
S = Steel
SS_ = Stainless Steel Type 304 or 316
F = Fiberglass

Cooper B-Line cable trays conform to the requirements of IEC Standard 61537, 2001 Ed.

Extra Long Span 24 - 30 Foot

(distance between the supports)

Recommended Extra Long Span Cable Tray Selection

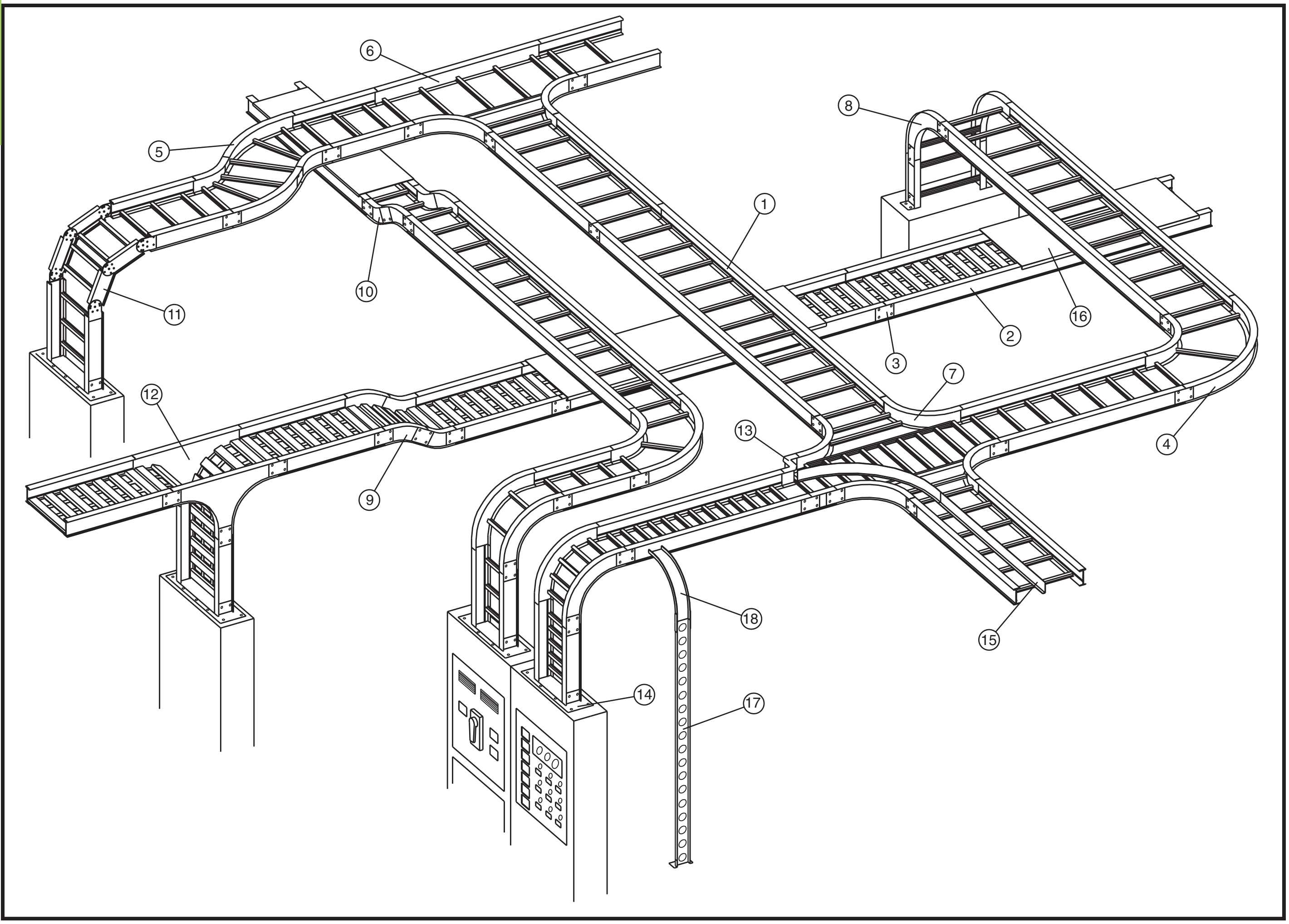
Use 24 ft or 30 ft Sections

Cable Tray	Catalog Number	Rail Height	Load Depth	Span Load lbs/ft 24'	Span Load lbs/ft 30'	Available Widths	Material*	Straight Sections & Accessories Pages	Fittings Pages
Aluminum	46A	6.190"	5.080"	72	-	6" - 36"	A	232 & 238 - 248	288 - 302
Aluminum	47A	7.240"	6.130"	69	-	6" - 36"	A	234 & 238 - 248	288 - 302
Aluminum	57A	7.400"	6.230"	161	75	12" - 36"	A	234 & 238 - 248	288 - 302
Aluminum	H46A	6.240"	5.090"	116	-	6" - 36"	A	232 & 238 - 248	288 - 302
Aluminum	H47A	7.240"	6.090"	103	-	6" - 36"	A	234 & 238 - 248	288 - 302
Aluminum	S8A	8.000"	6.200"	252	161	12" - 36"	A	236 & 237	237
Steel	444	4.188"	2.110"	63	-	6" - 36"	S	252 & 260 - 270	288 - 302
Steel	454	5.188"	4.110"	74	-	6" - 36"	S	254 & 260 - 270	288 - 302
Steel	464	6.188"	5.110"	85	-	6" - 36"	S	256 & 260 - 270	288 - 302
Steel	476	7.188"	6.130"	53	-	6" - 36"	S	258 & 260 - 270	288 - 302
Steel	574	7.188"	6.110"	90	-	6" - 36"	S	258 & 260 - 270	288 - 302
SS	464	6.188"	5.110"	85	-	6" - 36"	SS_	276 & 277 - 284	288 - 302

*Material
A = Aluminum
S = Steel
SS_ = Stainless Steel Type 304 or 316

Cooper B-Line cable trays conform to the requirements of IEC Standard 61537, 2001 Ed.

Cooper B-Line Cable Trays - Designed for Your Cable Support Requirements



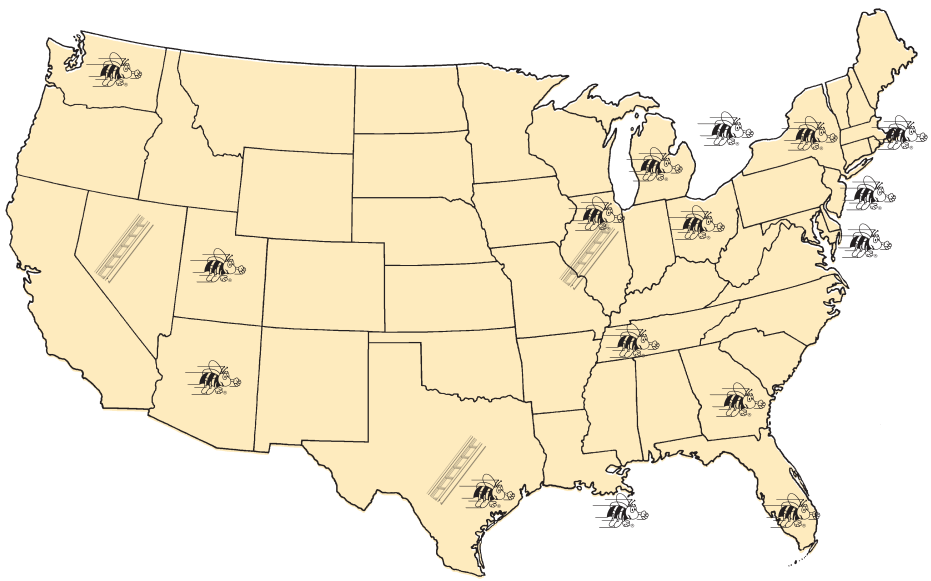
Nomenclature

1. Ladder Type Cable Tray
2. Ventilated Trough Type Cable Tray
3. Straight Splice Plate
4. 90° Horizontal Bend, Ladder Type Cable Tray
5. 45° Horizontal Bend, Ladder Type Cable Tray
6. Horizontal Tee, Ladder Type Cable Tray
7. Horizontal Cross, Ladder Type Cable Tray
8. 90° Vertical Outside Bend, Ladder Type Cable Tray
9. 45° Vertical Outside Bend, Ventilated Type Cable Tray
10. 30° Vertical Inside Bend, Ladder Type Cable Tray
11. Vertical Bend Segment (VBS)
12. Vertical Tee Down, Ventilated Trough Type Cable Tray
13. Left Hand Reducer, Ladder Type Cable Tray
14. Frame Type Box Connector
15. Barrier Strip Straight Section
16. Solid Flanged Tray Cover
17. Ventilated Channel Straight Section
18. Channel Cable Tray, 90° Vertical Outside Bend

The Cooper B-Line Advantage - The Company

COOPER B-Line -- is Committed to the Success of its Customers through Manufacturing, Engineering and Service.

COOPER B-Line -- is Positioned to Serve.



Four United States cable tray fabrication sites:

Troy, IL	Sherman, TX
Alum Bank, PA	Reno, NV

Sixteen factory inventories

COOPER B-Line -- a Proven Industry Leader.

Over thirty years experience

COOPER B-Line -- offers Industry Involvement.

NEMA - 5VE Member -- Metallic Cable Tray Section
NEMA - 5FG Member -- Nonmetallic Cable Tray Section
Cable Tray Institute (CTI) -- A Founding Member
Cooper B-Line cable trays conform to the requirements of IEC Standard 61537, 2001 Ed.

COOPER B-Line -- unmatched Cable Support Systems.

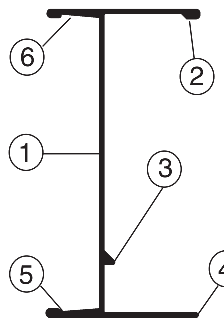
Cable Tray -- Two Side Rail (Metallic)
Cable Tray -- Two Side Rail (Metallic) Redi-Rail™ Design
Cable Tray -- Two Side Rail (Nonmetallic)
Cable Tray -- CENT-R-RAIL™; DATA-TRACK™, VERTI-RACK™, HALF-RACK™, and MULTI-TIER HALF-RACK™.
Cable Tray -- Flextray Cable Support Systems
Cable Runways -- B-Line Telecom
NEMA Wireways -- Circle AW Products Co., a B-Line Company

Aluminum Cable Tray, Series 2, 3 & 4

COOPER B-Line -- the Side Rails

Our I-Beam -- the most efficient structural shape

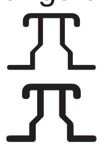
Using “Copper-free” 6063-T6 Aluminum Alloy



1. **I-beam side rail design**
   - maximize strength-to-weight ratio
2. **Added material to top flange to increase cable tray stiffness**
3. **Welding bead**
   - positive rung lock
   - added material disperses heat
4. **Bottom flange inside**
   - positive rung support
5. **Bottom flange outside**
   - strong lower flange for hold down clamps and expansion guides
6. **Top flange outside**
   - strong upper flange for securing the tray cover or the conduit-to-tray adapter

COOPER B-Line -- the Rungs -- provide system integrity

The rungs can represent 40% of your cable tray system.

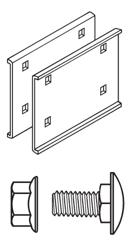


Rung A Standard for widths through 24"
The 24" width supports 589 lbs. with safety factor 1.5

Rung B Standard for widths greater than 24"
The 36" width supports 487 lbs. with safety factor 1.5

- For industrial applications -- 200 lb. concentrated loads
  - New P-Rung design allows P-Clamp cable fastening at any location.

COOPER B-Line -- the Splices -- provide system integrity



With the unique Wedge Lock splice system:
- Channel-shaped for extra strength
- Snaps into the side rail
- Positions and holds for bolting, a labor-saving feature
- Four bolt patterns, a labor-saving feature
- 316 Stainless Steel hardware is available as an option

COOPER B-Line -- the Fittings -- provide system integrity

Surpasses NEMA VE 1 requirements
3" straight tangents for splice integrity

COOPER B-Line -- with a 200 lb. Concentrated Load -- providing system integrity

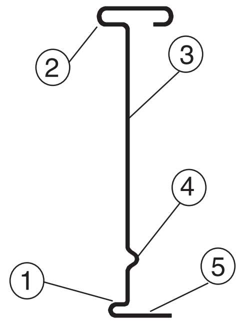
Side rails engineered to support a 200 lb. concentrated load + cable load
Rungs engineered to support a 200 lb. concentrated load + cable load

COOPER B-Line -- our reliable time-tested products. A system that works.

Steel Cable Tray, Series 2, 3, 4 & 5

COOPER B-Line -- the Side Rails

Our I-Beam -- the most efficient structural shape



1. **Roll formed for extra strength**
2. **Enlarged top flange for stiffness**
3. **Structural grade traceable steel**
4. **Rung top lock**
5. **Rung bottom rest**

Side rails and rungs are stamped every 18" with:

- **Company Name**
- **Part Number**
- **Material**
- **Heat Trace Number**

COOPER B-Line -- the Rungs -- provide system integrity

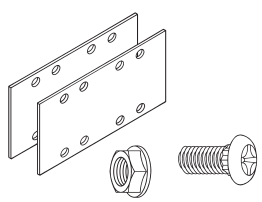
The rungs can represent 40% of your cable tray system.

 Rung A — Standard for widths through 24"
The 24" width supports 581 lbs. with safety factor 1.5

 Rung B — Standard for widths greater than 24"
The 36" width supports 485 lbs. with safety factor 1.5

For industrial applications -- 200 lb. concentrated loads.
Both Rung A and Rung B are roll formed from traceable structural grade steel

COOPER B-Line -- the Splices -- provide system integrity



The Splices -- the engineered connection:
- Special high strength eleven gauge steel
- Eight bolt connection for required strength
- Finish and hardware options

COOPER B-Line -- Hot Dip Galvanized After Fabrication (HDGAF) -- providing system integrity

- ASTM A123/CSA Type I
- In plant post-dip inspection and deburr
- ASTM F-1136-88 Grade 3 Splice hardware exceeds NEMA requirements.
- ASTM A123 Covers available - system compatibility

COOPER B-Line -- Pre-Galvanized- Hot Dip Mill Galvanized -- providing system integrity

- ASTM A653SS Gr.33 G90/ CSA Type II
- Anti-corrosive silicon bronze welds eliminate cosmetic painting

COOPER B-Line -- our reliable time-tested products. A system that works.

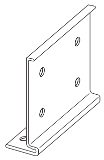
- 200 lb. Concentrated Load- side rail and rungs
- Splice integrity - 3" fitting tangents

The Cooper B-Line Advantage - The Extras

COOPER B-Line -- Special Packaging

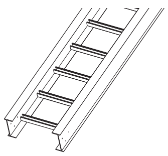
- For less than truckload (LTL) shipments
- Reduced freight claims over 50%
- A positive package for all

COOPER B-Line -- New Mid Span Aluminum Splice



- The standard splice for H46A, H47A and 57A systems
- Optional availability for other systems
- See appendix page 363 for details

COOPER B-Line -- Special Aluminum Long Span Systems

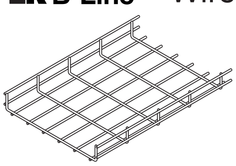


- 57A12-36-360 Tested to 102 lbs./ft. on 30' span - safety factor 1.5 (Page 234 & 235)
- S8A12-36-360 Tested to 161 lbs./ft. on 30' span - safety factor 1.5 (Page 236 & 237)

COOPER B-Line -- Redi-Rail™ Aluminum Cable Tray Systems (See Redi-Rail Section)

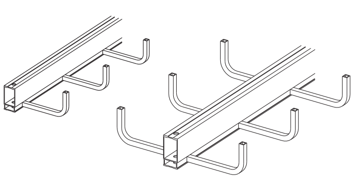
- 2, 3, 4, 5 and 6 inch cable fill depths
- NEMA classes to 12C
- Unique fabrication method provides unmatched installation options
- Industry leading accessory package

COOPER B-Line -- Wire Basket Cable Support Systems (See FLEXTRAY™ Section)

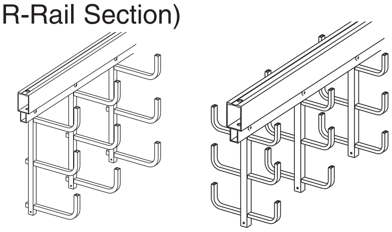


- Field adaptable - no fittings to order
- Low profile in 2", 4” and 6" loading depths
- Rugged welded steel, wire mesh construction

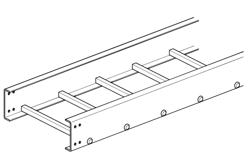
COOPER B-Line -- Cent-R-Rail™ Cable Tray System (See Cent-R-Rail Section)



- Four unique product offerings
- Perfect for today’s high technology
- Fast to install in congested areas
- Request latest catalog



COOPER B-Line -- Non-Metallic Cable Tray (See Fiberglass Section)



- For corrosive environments
- For voltage isolation
- A complete line offering
- Request latest catalog

NEMA MEMBER®

Cooper B-Line cable trays conform to the requirements of IEC Standard 61537, 2001 Ed.

The following factors should be considered when determining the appropriate cable tray system.

1. **Material & Finish**
    - Standards Available (Pages 18 - 20)
    - Corrosion (Pages 21 - 23)
    - Thermal Contraction and Expansion (Page 24)
    - Installation Considerations and Electrical Grounding Capacity (Page 25)

2. **Strength**
    - Environmental Loads (Pages 26 & 27)
    - Concentrated Loads (Page 27)
    - Support Span (Page 27)
    - Deflection (Page 28)
    - Rung/Trough Data (Page 29)
    - Load Capacity (NEMA & CSA Classes) (Pags 30 & 31)
    - Cable Data (Page 32)

3. **Width & Available Loading Depth**
    - Cable Diameter (Page 32)
    - Allowable Cable Fill (Pages 33 - 37)
    - Barrier Requirements (Page 38)
    - Future Expansion Requirements (Page 38)
    - Space Limitations (Page 38)

4. **Length**
    - Lengths Available (Page 39)
    - Support Spans (Not to exceed the length of straight sections) (Page 39)
    - Space Limitations (Page 39)
    - Installation (Page 39)

5. **Loading Possibilities**
    - Power Application (Page 40)
    - Data/Communication Cabling (Page 40)
    - Other Factors to Consider (Page 40)

6. **Bottom Type**
    - Type of Cable (Page 41)
    - Cost vs. Strength (Page 41)
    - Cable Exposure (Page 41)
    - Cable Attachment (Page 41)

7. **Fitting Radius**
    - Cable Flexibility (Page 41)
    - Space Limitations (Page 41)

Standards Available

MATERIAL	MATERIAL SPECIFICATION	ADVANTAGES
Aluminum	**6063-T6** (Side rails, Rungs and Splice Plates) **5052-H32** (Trough Bottoms, Covers and Accessories)	• Corrosion Resistance • Easy Field Fabrication & Installation • Excellent Strength to Weight Ratio • Excellent Grounding Conductor
Steel	**ASTM A1011 SS Gr. 33** (14 Gauge Plain Steel) **ASTM A1008 Gr. 33 Type 2** (16 & 18 Gauge Plain **ASTM A653SS Gr. 33 G90 (Pre-Galvanized)**	• Electric Shielding • Finish Options • Low Thermal Expansion • Limited Deflection
Stainless Steel	**AISI Type 304 or AISI Type 316** **ASTM A240**	• Superior Corrosion Resistance • Withstands High Temperatures

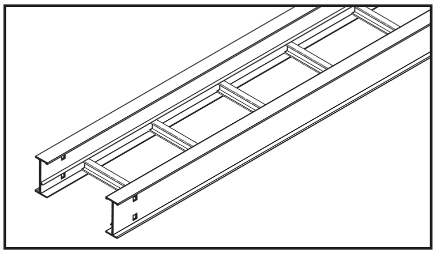
Note: Fiberglass available - see page 308

Aluminum

Aluminum cable trays are fabricated from structural grade “copper free” (marine grade) aluminum extrusions. Aluminum’s excellent corrosion resistance is due to its ability to form an aluminum oxide film that when scratched or cut reforms the original protective film. Aluminum has excellent resistance to "weathering” in most outdoor applications. Aluminum cable tray has excellent corrosion resistance in many chemical environments and has been used for over thirty years in petro-chemical plants and paper mills along the gulf coast from Texas to Florida. Typically, aluminum cable trays can perform indefinitely, with little or no degradation over time, making it ideal for many chemical and marine environments. The resistance to chemicals, indoor and outdoor, can best be determined by tests conducted by the user with exposure to the specific conditions for which it is intended. For further information, contact Cooper B-Line or the Aluminum Association.

Some common chemicals which aluminum resists are shown on pages 22 & 23.

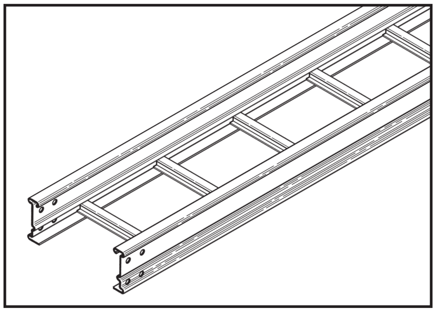
Aluminum Cable Tray



Steel

Steel cable trays are fabricated from continuous roll-formed structural quality steel. By roll-forming steel, the mechanical properties are increased allowing the use of a lighter gauge steel to carry the required load. This reduces the dead weight that must be carried by the supports and the installers. Using structural quality steel, Cooper B-Line assures that the material will meet the minimum yield and tensile strengths of applicable ASTM standards. All cable tray side rails, rungs and splice plates are numbered for material traceability. The corrosion resistance of steel varies widely with coating and alloy.

Steel and Stainless Steel Cable Tray



Note:

For help choosing proper cable tray material, see Cooper B-Line Technical Paper Series.
(bline.com/engineer/Technical.asp)

Stainless Steel

Stainless Steel cable trays are fabricated from continuous roll-formed AISI Type 304 or AISI Type 316/316L stainless steel. Both are non-magnetic and belong to the group called austenitic stainless steels. Like carbon steel, they exhibit increased strength when cold worked by roll-forming or bending.

Several important conditions could make the use of stainless steel imperative. These include long term maintenance costs, corrosion resistance, appearance and locations where product contamination is undesirable. Stainless steel exhibits stable structural properties such as yield strength and high creep strength at elevated temperatures.

Cooper B-Line’s stainless steel cable trays are welded using stainless steel welding wire to ensure each weldment exhibits the same corrosion resistant characteristic as the base metal. Localized staining in the weld area or heat affected zone may occur in severe environments. Specialized shielding gases and low carbon materials are used to minimize carbon contamination during welding and reduce staining and stress corrosion. Specify passivation after fabrication per ASTM A380 to minimize staining, improve aesthetics and further improve corrosion resistance.

A detailed study of the corrosive environment is recommended when considering a stainless steel design (see pages 22 & 23).

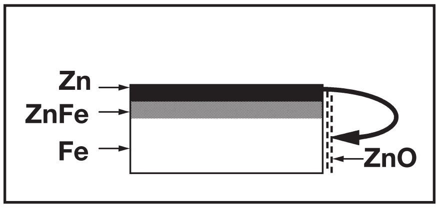
Standards Available

FINISH	SPECIFICATION	RECOMMENDED USE
Electrogalvanized Zinc	**ASTM B633** (For Cable Tray Hardware and Accessories, Alum. and Pre-Galv.) (For Flextray Standard is B633 SC2)	**Indoor**
Chromium Zinc	**ASTM F-1136-88** (Hardware for Hot Dip Galvanized Cable Tray)	**Indoor/Outdoor**
Pre-Galvanized Zinc	**ASTM A653SS Gr.33 G90 (CSA Type 2)** (Steel Cable Tray and Fittings)	**Indoor**
Hot Dip Galvanized Zinc After Fabrication	**ASTM A123 (CSA Type 1)** (Steel Cable Tray and Fittings)	**Indoor/Outdoor**
Special Paint	**Per Customer Specification** (Aluminum or Steel Cable Tray & Fittings)	**Indoor**

Zinc Coatings

Zinc protects steel in two ways. First it protects the steel as a coating and second as a sacrificial anode to repair bare areas such as cut edges, scratches, and gouges. The corrosion protection of zinc is directly related to its thickness and the environment. This means a .2 mil coating will last twice as long as a .1 mil coating in the same environment.

Galvanizing also protects cut and drilled edges.



Electrogalvanized Zinc

Electrogalvanized Zinc (also known as zinc plated or electroplated) is the process by which a coating of zinc is deposited on the steel by electrolysis from a bath of zinc salts. This finish is standard for cable tray hardware and some accessories for aluminum and pre-galvanized systems.

A rating of SC3, B-Line's standard, provides a minimum zinc coating thickness of .5 mils (excluding threaded rod, which is SC1 = .2 mils)

When exposed to air and moisture, zinc forms a tough, adherent, protective film consisting of a mixture of zinc oxides, hydroxides, and carbonates. This film is in itself a barrier coating which slows subsequent corrosive attack on the zinc. This coating is usually recommended for indoor use in relatively dry areas, as it provides ninety-six hours protection in salt spray testing per ASTM B117.

Chromium/ Zinc

Chromium/ Zinc is a corrosion resistant composition, which was developed to protect fasteners and small bulk items for automotive use. The coating applications have since been extended to larger parts and other markets.

Chromium/Zinc composition is an aqueous coating dispersion containing chromium, proprietary organics, and zinc flake.

This finish provides 1000 hours protection in salt spray testing per ASTM B117, exceeding NEMA VE-1 requirements by 300%.

Pre-Galvanized Zinc

(Mill galvanized, hot dip mill galvanized or continuous hot dip galvanized)

Pre-Galvanized steel is produced by coating coils of sheet steel with zinc by continuously rolling the material through molten zinc at the mills. This is also known as mill galvanized or hot dip mill galvanized. These coils are then slit to size and fabricated by roll forming, shearing, punching, or forming to produce B-Line pre-galvanized cable tray products.

The G90 specification calls for a coating of .90 ounces of zinc per square foot of steel. This results in a coating of .45 ounces per square foot on each side of the sheet. This is important when comparing this finish to hot dip galvanized after fabrication.

During fabrication, cut edges and welded areas are not normally zinc coated; however, the zinc near the uncoated metal becomes a sacrificial anode to protect the bare areas after a short period of time.

To further insure a quality product, B-Line welds all pre-galvanized cable trays with a silicon bronze welding wire allowing only a small heat affected zone to be exposed. This small area quickly repairs itself by the same process as cut edges.

Hot Dip Galvanized After Fabrication

(Hot dip galvanized or batch hot dip galvanized)

Hot Dip Galvanized After Fabrication cable tray products are fabricated from steel and then completely immersed in a bath of molten zinc. A metallic bond occurs resulting in a zinc coating that completely coats all surfaces, including edges and welds.

Another advantage of this method is coating thickness. Cable, trays hot dip galvanized after fabrication, have a minimum thickness of 1.50 ounces per square foot on each side, or a total 3.0 ounces per square foot of steel, according to ASTM A123.

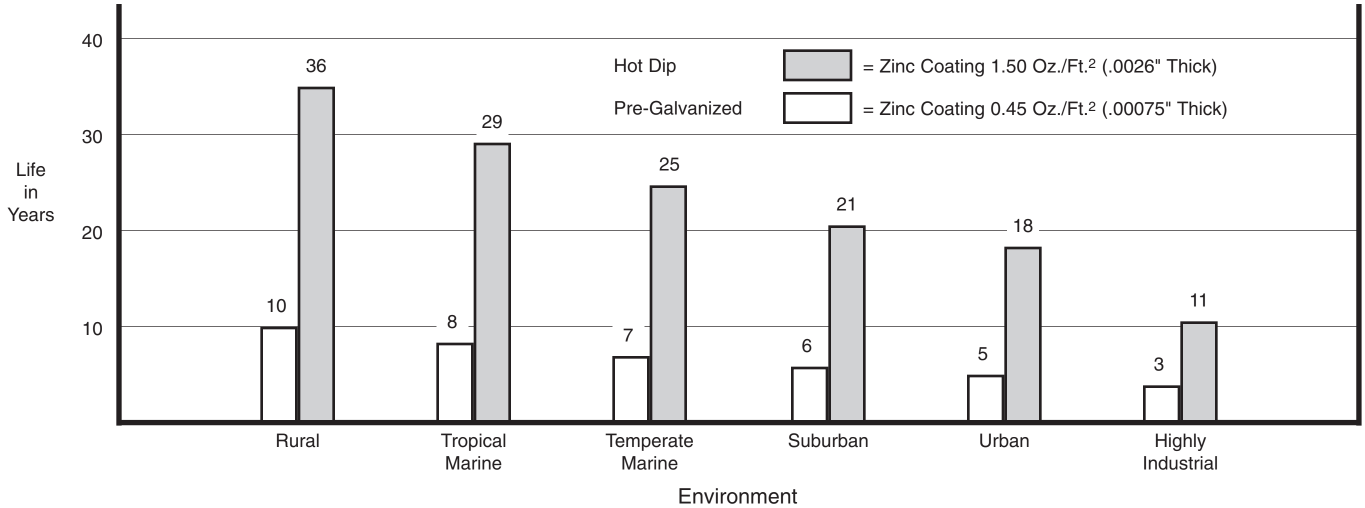
The zinc thickness is controlled by the amount of time each part is immersed in the molten zinc bath as well as the speed at which it is removed. The term "double dipping" refers to parts too large to fit into the galvanizing kettle and, therefore, must be dipped one end at a time. It does not refer to extra coating thickness.

The layer of zinc which bonds to steel provides a dual protection against corrosion. It protects first as an overall barrier coating. If this coating happens to be scratched or gouged, zinc's secondary defense is called upon to protect the steel by galvanic action.

Hot dip galvanized after fabrication is recommended for prolonged outdoor exposure and will protect steel for many years in most outdoor environments and in many aggressive industrial environments (see charts on page 20).

Standards Available

Service Life is defined as the time to 5% rusting of the steel surface.
Anticipated Life of Zinc Coatings In Various Atmospheric Environments



PVC Coating

PVC coating aluminum or steel cable tray is not recommended and has been removed from Cooper B-Line's cable tray line.

The application of a 15 mil PVC coating to aluminum or steel cable tray was a somewhat popular finish option 15 or more years ago. The soft PVC coating must be completely intact for the finish to be effective. In a caustic atmosphere, a pinhole in the coating can render it useless and corrode the cable tray. The shipment of the cable tray consistently damages the coating, as does installation. The splice hardware, splice plates and ground straps require field removal of the coating to ensure connections. PVC coated cable tray drastically increases the product's cost and delivery time.

Cooper B-Line recommends using fiberglass - See Fiberglass section, or stainless steel cable tray systems in highly corrosive areas.

Painting Cable Tray

Cooper B-Line offers painted cable tray to any color specified by the customer. It is important to note that there are key advantages and disadvantages to ordering factory painted cable tray. Cooper B-Line typically does not recommend factory painted cable tray for most applications.

Painted cable tray is often used in "open ceiling" applications, where all the overhead equipment and structure is painted the same color. In this type of application, additional painting is often necessary in the field, after installation, to ensure all of the supporting components, such as hanger rods, clamps and attaching hardware have been painted uniformly. Pre-painted cable tray interferes with common grounding practices, requiring the paint to be removed at splice locations, and/or the addition of bonding jumpers that were otherwise unnecessary. This additional field modification not only increases the installation cost, but causes potential damage to the special painted finish.

It is typically more cost effective to use an Aluminum or Pre-Galvanized Steel cable tray and paint it after installation, along with the other un-painted building components. Consult painting contractor for proper surface preparation.

Special Paint

B-Line cable tray and supports can be painted or primed to meet the customers requirements. Cooper B-Line has several colors available, consult the factory.

If a non-standard color is required the following information needs to be specified:

1. Type of material preparation (primer, etc.)
2. Type of paint, manufacturer and paint number or type of paint with chip.
3. Dry film thickness.

Material/Finish Prefix Designation Chart

Catalog Number Prefix	Material to be Furnished
A	Aluminum
P	Pre-Galvanized
G	Hot Dip Galvanized
ZN	Zinc Plated
S	Plain Steel
SS4	Type 304 Stainless Steel
SS6	Type 316 Stainless Steel

Corrosion

All metal surfaces are affected by corrosion. Depending on the physical properties of the metal and the environment to which it is exposed, chemical or electromechanical corrosion may occur.

Atmospheric Corrosion

Atmospheric corrosion occurs when metal is exposed to airborne liquids, solids or gases. Some sources of atmospheric corrosion are moisture, salt, dirt and sulphuric acid. This form of corrosion is typically worse outdoors, especially near marine environments.

Chemical Corrosion

Chemical corrosion takes place when metal comes in direct contact with a corrosive solution. Some factors which affect the severity of chemical corrosion include: chemical concentration level, duration of contact, frequency of washing, and operating temperature.

Storage Corrosion

Wet storage stain (White rust) is caused by the entrapment of moisture between surfaces of closely packed and poorly ventilated material for an extended period. Wet storage stain is usually superficial, having no affect on the properties of the metal.
Light staining normally disappears with weathering. Medium to heavy buildup should be removed, in order to allow the formation of normal protective film.
Proper handling and storage will help to assure stain-free material. If product arrives wet, it should be unpacked and dried before storage. Dry material should be stored in a well ventilated “low moisture” environment to avoid condensation formation. Outdoor storage is undesirable, and should be avoided whenever possible.

Galvanic Corrosion

Galvanic corrosion occurs when two or more dissimilar metals are in contacts in the presence of an electrolyte (ie. moisture). An electrolytic cell is created and the metals form an anode or a cathode depending on their relative position on the Galvanic Series Table. The anodic material will be the one to corrode. Whether a material is anodic depends on the relative position of the other material. For example: If zinc and steel are in contact, the zinc acts as the anode and will corrode; the steel acts as the cathode, and will be protected. If steel and copper are in contact, the steel is now the anode and will corrode.
The rate at which galvanic corrosion occurs depends on several factors:

1. The amount and concentration of electrolyte present- An indoor, dry environment will have little or no galvanic corrosion compared to a wet atmosphere.

2. The relative size of the materials- A small amount of anodic material in contact with a large cathodic material will result in greater corrosion. Likewise, a large anode in contact with a small cathode will decrease the rate of attack.

3. The relative position on the Galvanic Series Table - The further apart in the Galvanic Series Table, the greater the potential for corrosion of the anodic material.

Galvanic Series In Sea Water

Anodic End

More Anodic ↑

Magnesium
Magnesium Alloys
Zinc
Beryllium
Aluminum - Zinc Alloys (7000 series)
Aluminum - Magnesium Alloys (5000 series)
Aluminum (1000 series)
Aluminum - Magnesium Alloys (3000 series)
Aluminum - Magnesium - Silicon Alloys (6000 series)
Cadmium
Aluminum - Copper Alloys (2000 series)
Cast Iron, Wrought Iron, **Mild Steel**
Austenitic Nickel Cast Iron
Type 410 Stainless Steel (active)
Type 316 Stainless Steel (active)
Type 304 Stainless Steel (active)
Naval Brass, Yellow Brass, Red Brass
Tin
Copper
Lead-Tin Solders
Admiralty Brass, Aluminum Brass
Manganese Bronze
Silicon Bronze
Tin Bronze
Type 410 Stainless Steel (passive)
Nickel - Silver
Copper Nickel Alloys
Lead
Nickel - Aluminum Bronze
Silver Solder
Nickel 200
Silver
Type 316 Stainless Steel (passive)
Type 304 Stainless Steel (passive)
Incoloy 825
Hastelloy B
Titanium
Hastelloy C
Platinum
Graphite

Cathodic End

Corrosion Guide

Chemical	Aluminum Cold	Aluminum Warm	Aluminum Hot	Stainless Type 304 Cold	Stainless Type 304 Warm	Stainless Type 304 Hot	Stainless Type 316 Cold	Stainless Type 316 Warm	Stainless Type 316 Hot
Acteone	R	R	R	R	R	R	R	R	R
Aluminum Chloride Solution	NR	NR	NR	NR	--	--	F	--	--
Anhydrous Aluminum Chloride	R	R	R	NR	--	--	F	--	--
Aluminum Sulfate	R	R	R	R	R	R	R	R	R
Ammonium Chloride 10%	F	F	NR	R	R	R	R	R	R
Ammonium Hydroxide	F	F	F	R	R	R	R	R	R
Ammonium Phosphate	F	F	NR	R	--	--	R	--	--
Ammonium Sulfate	F	--	--	R	R	R	R	R	R
Ammonium Thiocyanate	R	R	R	R	--	--	R	R	R
Amyl Acetate	R	R	R	R	R	R	R	R	R
Amyl Alcohol	R	R	R	R	--	--	R	R	R
Arsenic Acid	F	F	F	R	R	--	R	R	R
Barium Chloride	F	F	NR	R	R	R	R	R	R
Barium Sulfate	R	R	R	R	R	--	R	R	--
Barium Sulfide	NR	NR	NR	R	R	--	R	R	--
Benzene	R	R	R	R	R	R	R	R	R
Benzoic Acid	F	F	NR	R	R	R	R	R	R
Boric Acid	R	R	F	R	R	R	R	R	R
Bromine Liquid or Vapor	NR	NR	NR	NR	NR	NR	NR	NR	NR
Butyl Acetate	R	R	R	R	--	--	R	R	R
Butyl Alcohol	R	R	R	R	R	R	R	R	R
Butyric Acid	F	F	F	R	R	R	R	R	R
Calcium Chloride 20%	F	F	NR	R	--	--	R	--	--
Calcium Hydroxide	N	--	--	R	R	F	R	R	R
Calcium Hypochlorite 2 - 3%	F	--	--	R	--	--	R	--	--
Calcium Sulfate	R	R	--	R	R	--	R	R	--
Carbon Monoxide Gas	R	R	R	R	R	R	R	R	R
Carbon Tetrachloride	F	F	NR	F	F	F	R	R	R
Chloroform Dry	R	NR	NR	R	R	--	R	R	--
Chloroform Solution	R	NR	NR	--	--	--	--	--	--
Chromic Acid 10% CP	R	R	--	R	R	F	R	R	R
Citric Acid	F	F	F	R	R	NR	R	R	R
Copper Cyanide	NR	NR	NR	R	R	R	R	R	R
Copper Sulfate 5%	NR	NR	NR	R	R	R	R	R	R
Ethyl Alcohol	R	R	R	R	R	R	R	R	R
Ethylene Glycol	R	R	F	R	R	--	R	R	R
Ferric Chloride	NR	NR	NR	NR	NR	NR	NR	NR	NR
Ferrous Sulfate 10%	R	NR	NR	R	R	--	R	R	--
Formaldehyde 37%	R	R	R	R	R	R	R	R	R
Formic Acid 10%	R	R	--	R	R	NR	R	R	R
Gallic Acid 5%	R	R	NR	R	R	R	R	R	R
Hydrochloride Acid 25%	NR	NR	NR	NR	NR	NR	NR	NR	NR
Hydrofluoric Acid 10%	NR	NR	NR	NR	NR	NR	NR	NR	NR
Hydrogen Peroxide 30%	R	R	R	R	R	R	R	R	R
Hydrogen Sulfide Wet	R	--	--	NR	NR	NR	R	R	R

R = Recommended
F = May be used under some conditions
NR = Not Recommended
-- = Information not available

The corrosion data given in this table is for general comparison only. (Reference Corrosion Resistance Tables, Second Edition)

The presence of contaminates in chemical environments can greatly affect the corrosion rate of any material.

B-Line strongly suggests that field service tests or simulated laboratory tests using actual environmental conditions be conducted in order to determine the proper materials and finishes to be selected.

For questionable environments see Fiberglass Cable Tray Corrosion Guide (Pages 306 & 307).

Cold = 50 - 80°F Warm = 130 - 170°F Hot = 200 - 212°F

Corrosion Guide

Chemical	Cable Tray Material								
	Aluminum			Stainless Type 304			Stainless Type 316		
	Cold	Warm	Hot	Cold	Warm	Hot	Cold	Warm	Hot
Lactic Acid 10%	R	F	NR	R	R	F	R	R	R
Lead Acetate 5%	NR	NR	NR	R	R	R	R	R	R
Magnesium Chloride 1%	NR	NR	NR	R	--	F	R	--	R
Magnesium Hydroxide	R	R	R	R	R	--	R	R	--
Magnesium Nitrate 5%	R	--	--	R	R	R	R	R	R
Nickel Chloride	NR	NR	NR	R	--	--	R	--	--
Nitric Acid 15%	NR	NR	NR	R	R	R	R	R	R
Oleic Acid	R	R	F	R	R	F	R	R	R
Oxalic Acid 10%	R	F	NR	NR	NR	NR	R	R	R
Phenol CP	R	R	R	R	R	R	R	R	R
Phosphoric Acid 50%	NR	NR	NR	R	R	R	R	F	NR
Potassium Bromide 100%	R	F	NR	R	R	--	R	R	R
Potassium Carbonate 100%	F	F	--	R	R	R	R	R	R
Potassium Chloride 5%	R	R	R	R	R	R	R	R	R
Potassium Dichromate	R	R	R	R	R	R	R	R	R
Potassium Hydroxide 50%	NR	NR	NR	R	R	R	R	R	R
Potassium Nitrate 50%	R	R	R	R	R	R	R	R	R
Potassium Sulfate 5%	R	R	R	R	R	R	R	R	R
Propyl Alcohol	R	R	R	R	R	R	R	R	R
Sodium Acetate 20%	R	F	F	R	R	R	R	R	R
Sodium Bisulfate 10%	R	F	F	R	R	R	R	R	R
Sodium Borate	R	F	F	R	R	R	R	R	R
Sodium Carbonate 18%	R	F	F	R	R	R	R	R	R
Sodium Chloride 5%	R	NR	NR	R	R	R	R	R	R
Sodium Hydroxide 50%	NR	NR	NR	R	R	R	R	R	R
Sodium Hypochlorite 5%	R	F	F	F	--	--	R	--	--
Sodium Nitrate 100%	R	R	R	R	R	R	R	R	R
Sodium Nitrite 100%	R	R	R	R	R	R	R	R	R
Sodium Sulfate 100%	R	R	F	R	R	R	R	R	R
Sodium Thiosulfate	R	R	R	R	R	R	R	R	R
Sulfur Dioxide (Dry)	R	R	R	R	R	R	R	R	R
Sulfuric Acid 5%	NR	NR	--	F	NR	NR	R	--	--
Sulfuric Acid 10%	NR	NR	NR	NR	NR	NR	NR	NR	NR
Sulfuric Acid 50%	NR	NR	NR	NR	NR	NR	NR	NR	NR
Sulfuric Acid 75 - 98%	NR	NR	NR	NR	NR	NR	NR	NR	NR
Sulfuric Acid 98 - 100%	NR	NR	--	R	--	--	R	R	F
Tannic Acid 10 & 50%	NR	NR	NR	R	R	R	R	R	R
Tartaric Acid 10 & 50%	F	NR	NR	R	R	R	R	R	R
Vinegar	F	F	F	R	R	R	R	R	R
Zinc Chloride 5 & 20%	F	NR	NR	R	F	NR	R	R	R
Zinc Nitrate	F	NR	NR	R	R	R	R	R	R
Zinc Sulfate	F	NR	NR	R	R	R	R	R	R

R = Recommended
F = May be used under some conditions
NR = Not Recommended
-- = Information not available

The corrosion data given in this table is for general comparison only. (Reference Corrosion Resistance Tables, Second Edition)

The presence of contaminates in chemical environments can greatly affect the corrosion rate of any material.

B-Line strongly suggests that field service tests or simulated laboratory tests using actual environmental conditions be conducted in order to determine the proper materials and finishes to be selected.

For questionable environments see Fiberglass Cable Tray Corrosion Guide (Pages 306 & 307).

Cold = 50 - 80°F   Warm = 130 - 170°F   Hot = 200 - 212°F

Thermal Contraction and Expansion

It is important that thermal contraction and expansion be considered when installing cable tray systems. The length of the straight cable tray runs and the temperature differential govern the number of expansion splice plates required (see Table 2 below).

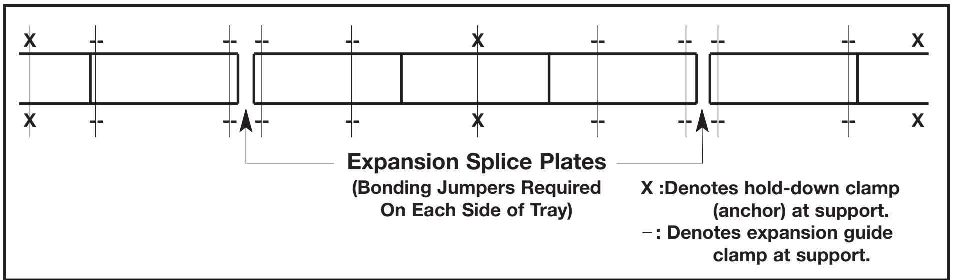
The cable tray should be anchored at the support nearest to its midpoint between the expansion splice plates and secured by expansion guides at all other support locations (see Figure 1). The cable tray should be permitted longitudinal movement in both directions from that fixed point. When used, covers should be overlapped at expansion splices.

Accurate gap settings at the time of installation are necessary for the proper operation of the expansion splice plates. The following procedure should assist the installer in determining the correct gap: (see Figure 2)

1. Plot the highest expected metal temperature on the maximum temperature line.
2. Plot the lowest expected metal temperature on the minimum temperature line.
3. Draw a line between the maximum and minimum points.
4. Plot the metal temperature at the time of installation to determine the gap setting.

Refer to page 311 for thermal contraction and expansion of fiberglass cable trays.

Figure 1



Typical Cable Tray Installation

Figure 2

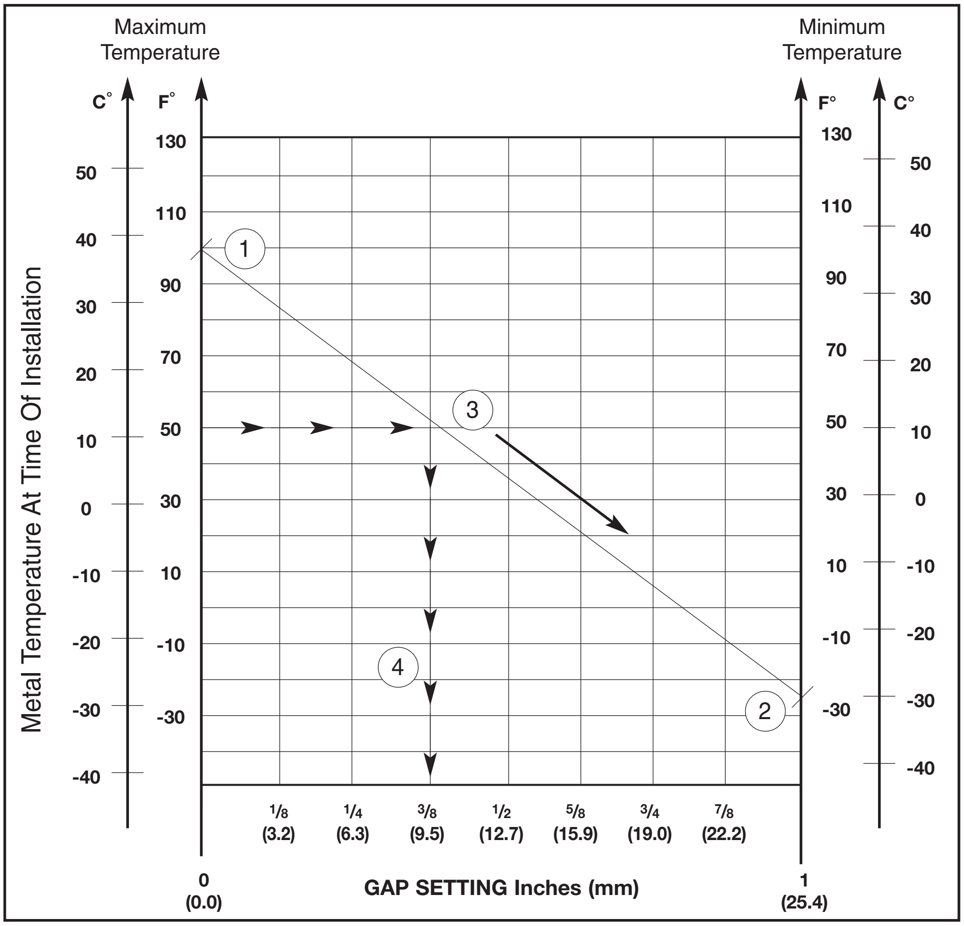


Table 2

Maximum Spacing Between Expansion Joints For 1" Movement									
Temperature Differential		Steel		Aluminum		Stainless Steel 304		316	
˚F	˚C	Feet	m	Feet	m	Feet	m	Feet	m
25	13.9	512	156.0	260	79.2	347	105.7	379	115.5
50	27.8	256	78.0	130	39.6	174	53.0	189	57.6
75	41.7	171	52.1	87	26.5	116	35.4	126	38.4
100	55.6	128	39.0	65	19.8	87	26.5	95	29.0
125	69.4	102	31.1	52	15.8	69	21.0	76	23.2
150	83.3	85	25.9	43	13.1	58	17.7	63	19.2
175	97.2	73	22.2	37	11.3	50	15.2	54	16.4

Note: every pair of expansion splice plates requires two bonding jumpers for grounding continuity.

Installation Considerations

Weight

The weight of an aluminum cable tray is approximately half that of a comparable steel tray. Some factors to consider include: shipping costs, material, handling, project weight restrictions and the strength of support members.

Field Modifications

Aluminum cable tray is easier to cut and drill than steel cable tray since it is a “softer” material. Similarly, galvanized steel cable tray is easier to cut and drill than stainless steel cable tray. Cooper B-Line aluminum cable tray uses a four bolt splice, resulting in half as much drilling and hardware installation as most steel cable tray, which uses an eight bolt splice. Hot dip galvanized and painted steel cable tray finishes must be repaired when field cutting or drilling. Failure to repair coatings will impair the cable tray’s corrosion resistance.

Availability

Aluminum, pre-galvanized, stainless steel and fiberglass cable tray can normally be shipped from the factory in a short period of time. Hot dip galvanized and painted cable tray requires an additional coating process, adding several days of preparation before final shipment. Typically, a coated cable tray will be sent to an outside source for coating, requiring additional packing and shipping.

Electrical Grounding Capacity

The National Electrical Code, Article 392.7 allows cable tray to be used as an equipment grounding conductor. All Cooper B-Line standard steel and aluminum cable trays are classified by Underwriter’s Laboratories per NEC Table 392.7 based on their cross-sectional area.

The corresponding cross-sectional area for each side rail design (2 side rails) is listed on a fade resistant UV stabilized label (see Figure 3). This cable tray label is attached to each straight section and fitting that is U.L. classified. U.L. assigned cross-sectional area is also stated in the loading charts in this catalog for each system.

NEMA Installation Guide

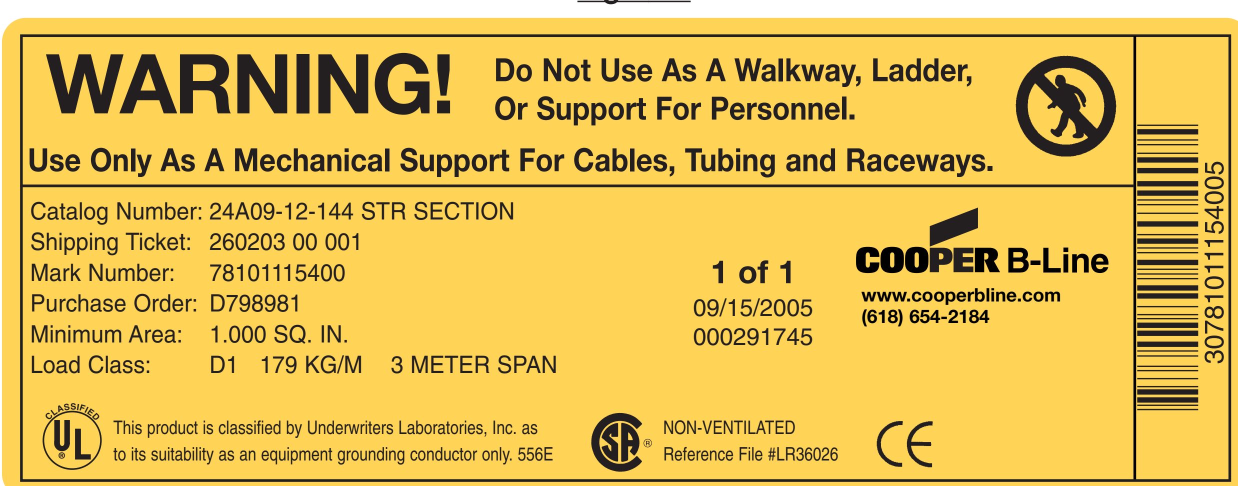
The new NEMA VE 2 is a cable tray installation guideline and is available from NEMA, CTI or Cooper B-Line. For free download see www.cabletrays.com.

Table 392.7(B)(2)
Metal Area Requirements for Cable Trays Used as Equipment Grounding Conductors

Maximum Fuse Ampere Rating, Circuit Breaker Ampere Trip Setting, or Circuit Breaker Protective Relay Ampere Trip Setting for Ground Fault Protection of any Cable Circuit in the Cable Tray System	Minimum Cross-Sectional Area of Metal* In Square Inches: Steel Cable Trays	Minimum Cross-Sectional Area of Metal* In Square Inches: Aluminum Cable Trays
60	0.20	0.20
100	0.40	0.20
200	0.70	0.20
400	1.00	0.40
600	1.50**	0.40
1000	--	0.60
1200	--	1.00
1600	--	1.50
2000	--	2.00**

For SI units: one square inch = 645 square millimeters.
* Total cross-sectional area of both side rails for ladder or trough-type cable trays; or the minimum cross-sectional area of metal in channel-type cable trays or cable trays of one-piece construction.
** Steel cable trays shall not be used as equipment grounding conductors for circuits with ground-fault protection above 600 amperes. Aluminum cable trays shall not be used as equipment grounding conductors for circuits with ground-fault protection above 2000 amperes.
For larger ampere ratings an additional grounding conductor must be used.

Figure 3



Environmental Loads

Wind Loads

Wind loads need to be determined for all outdoor cable tray installations. Most outdoor cable trays are ladder type trays, therefore the most severe loading to be considered is impact pressure normal to the cable tray side rails (see detail 1).

Detail 1

The impact pressure corresponding to several wind velocities are given below in Table 1.

Table 1
Impact Pressures

V(mph)	P(lbs/ft^2)	V(mph)	P(lbs/ft^2)
15	0.58	85	18.5
20	1.02	90	20.7
25	1.60	95	23.1
30	2.30	100	25.6
35	3.13	105	28.2
40	4.09	110	30.9
45	5.18	115	33.8
50	6.39	120	36.8
55	7.73	125	40.0
60	9.21	130	43.3
65	10.80	135	46.6
70	12.50	140	50.1
75	14.40	145	53.8
80	16.40	150	57.6

V= Wind Velocity
P= Impact Pressure

Note: These values are for an air density of 0.07651 lbs/ft^3 corresponding to a temperature of 60˚ F and barometric pressure of 14.7 lbs/in^2.

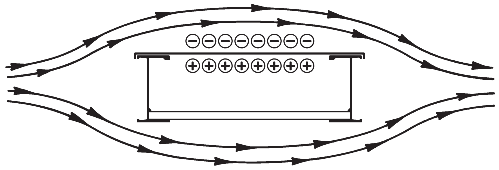
Example Calculation:

Side load for 6" side rail with 100 mph wind

$$\frac{25.6 \times 6}{12} = 12.8 \text{ lbs/ft}$$

When covers are installed on outdoor cable trays, another factor to be considered is the aerodynamic effect which can produce a lift strong enough to separate a cover from a tray. Wind moving across a covered tray (see detail 2) creates a positive pressure inside the tray and a negative pressure above the cover. This pressure difference can lift the cover off the tray.

Detail 2



B-Line recommends the use of heavy duty wrap-around cover clamps when covered trays are installed in an area where strong winds occur.

Special Notice:
Covers on wide cable tray and/or cable tray installed at elevations high off the ground may require additional heavy duty clamps or thicker cover material.

Ice Loads

Glaze ice is the most commonly seen form of ice build-up. It is the result of rain or drizzle freezing on impact with an exposed object. Generally, only the top surface (or the cover) and the windward side of a cable tray system is significantly coated with ice. The maximum design load to be added due to ice should be calculated as follows:

$$L_I = \left(\frac{W \times T_I}{144}\right) \times D_I \quad \text{where;}$$

L_I= Ice Load (lbs/linear foot)
W= Cable Tray Width (inches)
T_I= Maximum Ice Thickness (inches)
D_I= Ice Density = 57 lbs/ft^3
the maximum ice thickness will vary depending on location. A thickness of 1/2" can be used as a conservative standard.

Example Calculation:

Ice Loads for 24" wide tray with 1/2" thick ice;

$$\frac{24 \times .5}{144} \times 57 = 4.75 \text{ lbs/ft}$$

Environmental Loads

Snow Loads

Snow is measured by density and thickness. The density of snow varies almost as much as its thickness. The additional design load from snowfall should be determined using the building codes which apply for each installation.

Seismic Loads

A great deal of seismic testing and evaluation of cable tray systems, and their supports, has been performed. The conclusions reached from these evaluations is that cable tray is stronger laterally than vertically, since it acts as a truss in the lateral direction. Other factors that contribute to the stability of cable tray are the energy dissipating motion of the cables within the tray, and the high degree of ductility of the cable tray and the support material. These factors, working in conjunction with a properly designed cable tray system, should afford reasonable assurance to withstand even strong motion earthquakes.

When seismic bracing is required for a cable tray system, it should be applied to the supports and not the cable tray itself. Cooper B-Line's "Seismic Restraints" brochure provides OSHPD approved methods of bracing cable tray supports using standard Cooper B-Line products. Contact Cooper B-Line to receive a copy of this brochure.

Concentrated Loads

A concentrated static load represents a static weight applied at a single point between the side rails. Tap boxes, conduit attachments and long cable drops are just some of the many types of concentrated loads. When so specified, these concentrated static loads may be converted to an equivalent, uniform load (We) by using the following formula:

$$We = \frac{2 \times (\text{concentrated Static Load})}{\text{span length}}$$

Cooper B-Line's cable tray side rails, rungs and bottoms will withstand a 200 lb. static load without collapse (series 14 excluded)*. However, it should be noted that per NEMA Standard Publication VE1 cable tray is designed as a support for power or control cables, or both, and is not intended or designed to be a walkway for personnel. Each section of Cooper B-Line Cable Tray has a label stating the following message:

Warning! Not to be used as a walkway, ladder or support for personnel. To be used only as a mechanical support for cables and raceway.

Support Span

The strength of a cable tray is largely determined by the strength of its side rails. The strength of a cable tray side rail is proportionate to the distance between the supports on which it is installed, commonly referred to as the "support span". Therefore, the strength of a cable tray system can be altered by changing the support span. However, there is a limit to how much the strength of a cable tray system can be increased by reducing the support span, because the strength of the cable tray bottom members could become the determining factor of strength.

Once the load requirement of a cable tray system has been established, the following factors should be considered:

1. Sometimes the location of existing structural beams will dictate the cable tray support span. This is typical with outdoor installations where adding intermediate supports could be financially prohibitive. For this situation the appropriate cable tray must be selected to accommodate the existing span.
2. When cable tray supports are randomly located, the added cost of a higher strength cable tray system should be compared to the cost of additional supports. Typically, adding supports is more costly than installing a stronger series of cable tray. The stronger cable tray series (e.g. from 75 lbs./ft. on 20' span to 100 lbs./ft. on 20' span) will increase the price of the cable tray system minimally, possibly less than $1/ft., with little or no additional labor cost for installation. Alternately, one extra support may cost $100.00 (material and labor) for a simple trapeze. Future cable additions or the capability of supporting equipment, raceways for example, also favor stronger cable tray systems. *In summary, upgrading to a stronger cable tray series is typically more cost-effective than using the recommended additional supports for a lighter duty cable tray series.*
3. The support span lengths should be equal to or less than unspliced straight section lengths, to ensure that no more than one splice is placed between supports as stated in the NEMA VE 2 Cable Tray Installation Guideline.

Cable Tray Selection - Strength

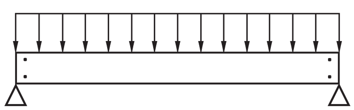
Deflection

Deflection in a cable tray system is primarily an aesthetic consideration. When a cable tray system is installed in a prominent location, a maximum simple beam deflection of 1/200 of support span can be used as a guideline to minimize visual deflection.

It is important at this point to mention that there are two typical beam configurations, simple beam and continuous beam, and to clarify the difference.

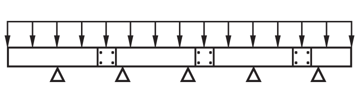
A good example of a simple beam is a single straight section of cable tray supported, but not fastened at either end. When the tray is loaded the cable tray is allowed to flex. Simple beam analysis is used almost universally for beam comparisons even though it is seldom practical in the field installations. The three most prominent reasons for using a simple beam analysis are: calculations are simplified; it represents the worst case loading; and testing is simple and reliable. The published load data in the Cooper B-Line cable tray catalog is based on the simple beam analysis per NEMA & CSA Standards.

Simple Beam



Continuous beam is the beam configuration most commonly used in cable tray installations. An example of this configuration is where cable trays are installed across several supports to form a number of spans. The continuous beam possesses traits of both the simple and fixed beams. When equal loads are applied to all spans simultaneously, the counter-balancing effect of the loads on both sides of a support restricts the movement of the cable tray at the support. The effect is similar to that of a fixed beam. The end spans behave substantially like simple beams. When cable trays of identical design are compared, <u>the continuous beam installation will typically have approximately half the deflection of a simple beam of the same span</u>. Therefore simple beam data should be used only as a general comparison. The following factors should be considered when addressing cable tray deflection:

Continuous Beam



1. Economic consideration must be considered when addressing cable deflection criteria.

2. Deflection in a cable tray system can be reduced by decreasing the support span, or by using a taller or stronger cable tray.

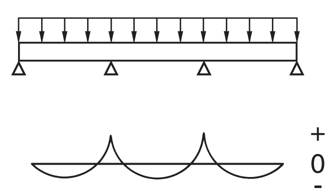
3. When comparing cable trays of equivalent strength, a steel cable tray will typically exhibit less deflection than an aluminum cable tray since the modulus of elasticity of steel is nearly three times that of aluminum.

4. The location of splices in a continuous span will affect the deflection of the cable tray system. The splices should be located at points of minimum stress whenever practical. NEMA Standards VE 1 limits the use of splice plates as follows:

Unspliced straight sections should be used on all simple spans and on end spans of continuous span runs. Straight section lengths should be equal to or greater than the span length to ensure not more than one splice between supports.

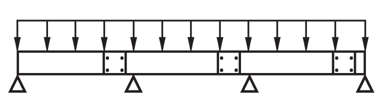
See the figures below for splicing configuration samples.

Typical Continuous Span Configuration

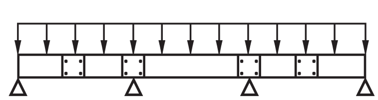


+ Maximum Positive Moment
- Maximum Negative Moment

Preferred Splice Plate Locations

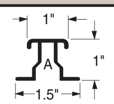
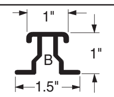
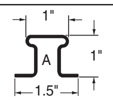
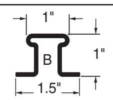
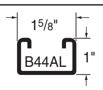
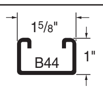
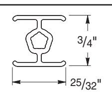
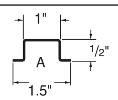
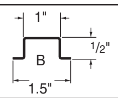
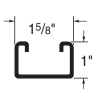
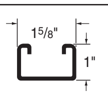


Undesirable Splice Plate Locations

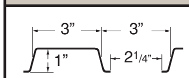
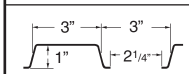
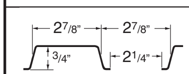


Load Capacity

Ladder Type Rungs

Rung Type	Design Factors	Material Type	Single Rung Uniform Load Capacity (in Lbs.) with safety factor of 1.5						
			Tray Width						
			6	9	12	18	24	30	36
	Ix = .0361 in.^{4} Sx = .0707 in.^{3}	Aluminum				766	575		
	Ix = .0432 in.^{4} Sx = .0877 in.^{3}	Aluminum						594	495
	Ix = .0249 in.^{4} Sx = .0528 in.^{3}	Steel	2912	1941	1456	971	728		
	Ix = .0312 in.^{4} Sx = .0661 in.^{3}	Steel						749	624
	Ix = .0450 in.^{4} Sx = .0787 in.^{3}	Aluminum Strut Rung	3328	2219	1664	1109	832	666	555
	Ix = .0445 in.^{4} Sx = .0782 in.^{3}	Steel Strut Rung	5172	3448	2586	1724	1293	1034	862
	Ix = .0130 in.^{4} Sx = .0344 in.^{3}	Redi-Rail	1480	987	740	493	370	296	224
	Ix = .0039 in.^{4} Sx = .0134 in.^{3}	Steel Series 1	981	654	491	327	245		
	Ix = .0047 in.^{4} Sx = .0164 in.^{3}	Steel Series 1						230	192
	Ix = .0353 in.^{4} Sx = .0708 in.^{3}	Aluminum Marine Rung	2996	1997	1498	999	749	599	499
	Ix = .0347 in.^{4} Sx = .0685 in.^{3}	Steel Marine Rung	4530	3020	2265	1510	1133	906	755

Corrugated Bottoms (Ventilated and Solid)

Bottom Type	Design Factors	Material Type	Single Rung Load Capacity (in Lbs.) with safety factor of 1.5						
			Tray Width						
			6	9	12	18	24	30	36
 Trough	Ix = .0455 in.^{4} Sx = .0898 in.^{3}	Aluminum	3141	2029	1491	970	726	660	594
 Trough	Ix = .0348 in.^{4} Sx = .0667 in.^{3}	Steel	2973	1946	1445	955	711	650	590
 Trough	Ix = .0185 in.^{4} Sx = .0503 in.^{3}	Series 148 Steel	2645	1763	1323	881	661		

Load Capacity

Calculate each anticipated load factor, then add them to obtain a total load.
(Example: Working Load = Cable + Concentrated + Wind + Snow + Ice Loads).
The Working Load should be used, along with the maximum support spacing, to select a span/load class designation from Table 3. Table 4 (page 31) contains the most common load/span class designations per the US and Canadian metallic cable tray standard, CSA, C22.2 No. 126.1-98 First Addition, NEMA VE 1-1998.

Table 3 - These Loading Classes Are Historical and Supplied For Reference Only

Load Class		Class Designations for lengths of				
lb/ft	kg/m	ft 8 m (2.4)	ft 10 m (3.0)	ft 12 m (3.7)	ft 16 m (4.9)	ft 20 m (6.0)
25	37	––	A	––	––	––
45	67	––	––	––	––	D
50	74	8A	––	12A	16A	20A
65	97	––	C	––	––	––
75	112	8B	––	12B	16B	E or 20B
100	149	8C	––	12C	16C	20C
120	179	––	D	––	––	––
200	299	––	E	––	––	––

Note: 8A/B/C, 12A/B/C, 16A/B/C, and 20A/B/C were the traditional NEMA designations. A, C, D, and E were the conventional CSA designations. Actual tested loadings per span will be stated on the product labels.

Table 4 - B-Line Cable Tray Load Classes

Aluminum (Copper free)

Series	Load Depth	Load lb/ft	Load (kg/m)	Span ft	Span (m)	Former Classes NEMA	Former Classes CSA
H14AR	3	86	(128)	12	(3.7)	12B	D_1 (3m)
24A	3	126	(187)	12	(3.7)	12C	D_1 (3m)
34A	3	80	(119)	20	(6.1)	20B	E (6m)
H15AR	4	102	(152)	12	(3.7)	12C	D_1 (3m)
25A	4	50	(74)	20	(6.1)	16B	D_1 (6m)
35A	4	121	(180)	16	(4.9)	20B	E (3m)
H16AR	5	114	(170)	12	(3.7)	12C	D_1 (3m)
26A	5	51	(76)	20	(6.1)	20A	D_1 (6m)
36A	5	84	(125)	20	(6.1)	20B	E (6m)
46A	5	103	(153)	20	(6.1)	20C	E (6m)
H46A	5	167	(248)	20	(6.1)	167# @ 20'	131 kg/m (7.6m)
H17AR	6	100	(149)	12	(3.7)	12B	D_1 (3m)
37A	6	80	(119)	20	(6.1)	20B	
47A	6	100	(149)	20	(6.1)	20C	
H47A	6	149	(222)	20	(6.1)	149# @ 20'	
57A	6	102	(152)	30	(9.1)	102# @ 30'	152 kg/m (9.1m)
S8A	6	161	(240)	30	(9.1)	161# @ 30'	240 kg/m (9.1m)
Data-Track	All	120	(179)	9.8	(3.0)		
Half Rack	All	25	(37)	9.8	(3.0)		
Verti-Rack	All	100	(149)	12	(3.7)		
Multi-Tier	All	140	(208)	10	(3.1)		

Fiberglass

Series	Load Depth	Load lb/ft	Load (kg/m)	Span ft	Span (m)	Former Classes NEMA	Former Classes CSA
13F	2	145	(216)	8	(2.4)	8C	
24F	3	156	(232)	12	(3.7)		
36F	5	88	(131)	20	(6.1)		
46F	5	141	(210)	20	(6.1)		
H46F	5	152	(226)	20	(6.1)		
48F	7	125	(187)	20	(6.1)		

Steel (HDGAF/Pre-Galvanized)

Series	Load Depth	Load lb/ft	Load (kg/m)	Span ft	Span (m)	Former Classes NEMA	Former Classes CSA
148*	3	51	(76)	12	(3.7)	12A	C_1 (3m)
248*	3	103	(153)	12	(3.7)	12C	D_1 (3m)
346*	3	63	(94)	20	(6.1)	20A	D_1 (6m)
444*	3	91	(135)	20	(6.1)	20B	E (3m)
156*	4	76	(113)	12	(3.7)	12B	C_1 (3m)
258*	4	109	(162)	12	(3.7)	12C	D_1 (3m)
356*	4	69	(103)	20	(6.1)	16C	D_1 (6m)
358*	4	62	(92)	20	(6.1)	20A	D_1 (6m)
454*	4	106	(158)	20	(6.1)	20C	E (6m)
166*	5	77	(115)	12	(3.7)	12B	C_1 (3m)
268*	5	110	(164)	12	(3.7)	12C	D_1 (3m)
368†	5	59	(88)	20	(6.1)	20A	D_1 (3m)
366*	5	75	(112)	20	(6.1)	20B	E (6m)
464*†	5	123	(183)	20	(6.1)	119# @ 20'	E (6m)
176*	6	86	(128)	12	(3.7)	12B	137 kg/m (3.7m)
378*	6	51	(76)	20	(6.1)	20A	D_1 (3m)
476*	6	77	(115)	20	(6.1)	20B	D_1 (6m)
574*	6	130	(193)	20	(6.1)	117# @ 20'	E (6m)
348†	3	125	(186)	12	(3.7)	12C	C_1 (3m)
358†	4	62	(92)	20	(6.1)	20A	89 kg/m (6.1m)
FT1.5X12	1 1/2	11	(16)	8	(2.4)		
FT2X2	2	20	(30)	8	(2.4)		
FT2X4	2	27	(40)	8	(2.4)		
FT2X6	2	27	(40)	8	(2.4)		
FT2X8	2	27	(40)	8	(2.4)		
FT2X12	2	27	(40)	8	(2.4)		
FT2X16	2	27	(40)	8	(2.4)		
FT2X18	2	27	(40)	8	(2.4)		
FT2X20	2	27	(40)	8	(2.4)		
FT2X24	2	27	(40)	8	(2.4)		
FT2X30	2	27	(40)	8	(2.4)		
FT2X36	2	27	(40)	8	(2.4)		
FT4X4	4	36	(53)	8	(2.4)		
FT4X6	4	46	(68)	8	(2.4)		
FT4X8	4	47	(70)	8	(2.4)		
FT4X12	4	47	(70)	8	(2.4)		
FT4X16	4	47	(70)	8	(2.4)		
FT4X18	4	47	(70)	8	(2.4)		
FT4X20	4	47	(70)	8	(2.4)		
FT4X24	4	50	(74)	8	(2.4)	8A	
FT4X30	4	50	(74)	8	(2.4)	8A	
FT6X8	6	43	(64)	8	(2.4)	8A	
FT6X12	6	48	(71)	8	(2.4)	8A	
FT6X16	6	50	(74)	8	(2.4)	8A	
FT6X18	6	50	(74)	8	(2.4)	8A	
FT6X20	6	55	(82)	8	(2.4)	8A	
FT6X24	6	60	(89)	8	(2.4)	8A	

* G denotes CSA Type 1 (HDGAF) or P denotes CSA Type 2 (Mill-Galvanized)

† SS4 (Type 304 Stainless) or SS6 (Type 316 Stainless)

Cable Data

The cable load is simply the total weight of all the cables to be placed in the tray. This load should be expressed in lbs/ft.

The data on this page provides average weights for common cable sizes.

Multiconductor Cable Type TC, 600V with XHHW Conductors, Copper

Size	3 conductors with ground			4 conductors with ground		
	Diameter in.	Area in.^{2}	Weight lbs/ft	Diameter in.	Area in.^{2}	Weight lbs/ft
8	0.66	0.34	0.33	0.72	0.41	0.42
6	0.74	0.43	0.45	0.81	0.52	0.58
4	0.88	0.61	0.66	0.96	0.72	0.84
2	1.00	0.79	0.96	1.10	0.95	1.20
1	1.13	1.00	1.17	1.25	1.23	1.55
1/0	1.22	1.17	1.43	1.35	1.43	1.84
2/0	1.31	1.35	1.72	1.45	1.65	2.20
3/0	1.42	1.58	2.14	1.58	1.96	2.80
4/0	1.55		2.64	1.77		3.46
250	1.76		3.18	1.93		4.04
350	1.98		4.29	2.18		5.48
500	2.26		5.94	2.50		7.64
750	2.71		9.01	3.12		11.40
1000	3.10		11.70			

Multiconductor Cable Type MC, 600V with XHHW Conductors, Copper

Size	3 conductors with ground						4 conductors with ground					
	Diameter (in.)		Area (in.^{2})		Weight (lbs/ft)		Diameter (in.)		Area (in.^{2})		Weight (lbs/ft)	
	Without Jacket	With Jacket	Without Jacket	With Jacket	Alum. Armor	Steel Armor	Without Jacket	With Jacket	Without Jacket	With Jacket	Alum. Armor	Steel Armor
8	0.70	0.80	0.38	0.50	0.41	0.57	0.76	0.86	0.45	0.58	0.51	0.68
6	0.78	0.88	0.48	0.61	0.55	0.74	0.85	0.95	0.57	0.71	0.69	0.87
4	0.89	0.99	0.62	0.77	0.74	0.95	0.97	1.07	0.74	0.90	0.93	1.15
2	1.01	1.12	0.80	0.99	1.08	1.32	1.10	1.22	0.95	1.17	1.29	1.56
1	1.16	1.27	1.06	1.27	1.38	1.63	1.25	1.36	1.23	1.45	1.61	1.91
1/0	1.23	1.34	1.19	1.41	1.56	1.86	1.35	1.46	1.43	1.67	1.94	2.27
2/0	1.32	1.43	1.37	1.61	1.85	2.20	1.46	1.56	1.67	1.91	2.36	2.72
3/0	1.46	1.57	1.67	1.94	2.35	2.67	1.58	1.71	1.96	2.30	2.94	3.33
4/0	1.56	1.68			2.82	3.21	1.75	1.88			3.64	3.97
250	1.74	1.86			3.31	3.94	1.92	2.04			4.21	4.64
350	1.96	2.10			4.48	4.97	2.16	2.30			5.71	6.12
500	2.24	2.37			6.08	6.58	2.47	2.63			7.91	8.39
750	2.68	2.84			8.96	9.70	3.03	3.22			11.48	12.17

Single Conductor Cable 600V

Size	XHHW			THHN, THWN			TW, THW			USE, RHH, RHW		
	Diameter in.	Area in.^{2}	Weight lbs/ft	Diameter in.	Area in.^{2}	Weight lbs/ft	Diameter in.	Area in.^{2}	Weight lbs/ft	Diameter in.	Area in.^{2}	Weight lbs/ft
1/0	0.48		0.37	0.50		0.37	0.53		0.39	0.53		0.39
2/0	0.52		0.46	0.54		0.46	0.57		0.48	0.57		0.49
3/0	0.58		0.57	0.60		0.57	0.62		0.60	0.63		0.60
4/0	0.63		0.71	0.66		0.71	0.68		0.74	0.68		0.75
250	0.70	0.38	0.85	0.72	0.41	0.85	0.75	0.44	0.88	0.76	0.45	0.89
300	0.75	0.44	1.02	0.77	0.47	1.02	0.81	0.52	1.04	0.81	0.52	1.05
350	0.80	0.50	1.17	0.83	0.54	1.17	0.86	0.58	1.21	0.86	0.58	1.22
400	0.85	0.57	1.33	0.87	0.59	1.33	0.90	0.64	1.37	0.91	0.65	1.38
500	0.93	0.68	1.64	0.96	0.72	1.64	0.98	0.75	1.69	0.99	0.77	1.70
600	1.04	0.85	2.03	1.06	0.88	2.01	1.09	0.93	2.03	1.10	0.95	2.07
750	1.14	1.02	2.24	1.17	1.08	2.48	1.19	1.11	2.51	1.20	1.13	2.55
1000	1.29		2.52	1.32		3.30	1.34		3.31	1.35		3.33

Allowable Cable Fill

For allowable cable types see the Appendix page 365.
The following guidelines are based on the 2002 National Electrical Code, Article 392.

I) Number of Multiconductor Cables rated 2000 volts or less in the Cable Tray

(1) 4/0 or Larger Cables

The ladder cable tray must have an inside available width equal to or greater than the sum of the diameters (Sd) of the cables, which must be installed in a single layer. When using solid bottom cable tray, the sum of the cable diameters is not to exceed 90% of the available cable tray width.

Example: Cable Tray width is obtained as follows:

List Cable Sizes	(D) List Cable Outside Diameter	(N) List Number of Cables	Multiply (D) x (N) = Subtotal of the Sum of the Cable Diameters
3/C - #500 kcmil	2.26 inches	1	2.26 inches
3/C - #250 kcmil	1.76 inches	2	3.52 inches
3/C - #4/0 AWG	1.55 inches	4	6.20 inches

The sum of the diameters (Sd) of all cables = 2.26 + 3.52 + 6.20 = 11.98 inches; therefore a cable tray with an available width of at least 12 inches is required.

(2) Cables Smaller Than 4/0

The total sum of the cross-sectional areas of all the cables to be installed in the cable tray must be equal to or less than the allowable cable area for the tray width, as indicated in Table 5.
When using solid bottom cable tray, the allowable cable area is reduced by 22%.

Table 5

Inside Width of Cable Tray inches	Allowable Cable Area square inches
6	7.0
9	10.5
12	14.0
18	21.0
24	28.0

Example: The cable tray width is obtained as follows:

List Cable Sizes	(A) List Cable Cross Sectional Areas	(N) List Number of Cables	Multiply (A) x (N) + Total of the Cross-Sectional Area for each Size
3/C - #12 AWG	0.167 sq. in.	10	1.67 sq. in.
4/C - #12 AWG	0.190 sq. in.	8	1.52 sq. in.
3/C - # 6 AWG	0.430 sq. in.	6	2.58 sq. in.
3/C - # 2 AWG	0.800 sq. in.	9	7.20 sq. in.

The sum of the total areas is 1.67 + 1.52 + 2.58 + 7.20 = 12.97 inches.
Using Table 4, a 12-inch wide tray with an allowable cable area of 14 sq. inches should be used.

Note: Increasing the cable tray loading depth does not permit an increase in allowable cable area for power and lighting cables. The maximum allowable cable area for all cable tray with a 3 inch or greater loading depth is limited to the allowable cable area for a 3 inch loading depth.

(3) 4/0 or Larger Cables Installed with Cables Smaller than 4/0

The ladder cable tray needs to be divided into two zones (a barrier or divider is not required but one can be used if desired) so that the No. 4/0 and larger cables have a dedicated zone, as they are to be placed in a single layer.

continued on 34

Allowable Cable Fill

A direct method to determine the correct cable tray width is to figure the cable tray widths required for each of the cable combinations per steps (2) & (3).
Then add the widths in order to select the proper cable tray width.

Example: The cable tray width is obtained as follows:

Part A- Width required for #4/0 AWG and larger multiconductor cables

List Cable Size	(D) List Cable Outside Diameter	(N) List Number of Cables	Multiply (D) x (N) = Subtotal of the Sum of the Cable Diameters (Sd)
3/C - #500 kcmil	2.26 inches	1	2.26 inches
3/C - #4/0 AGW	1.55 inches	2	3.10 inches

Cable tray width (inches) required for large cables = 2.26 + 3.10 = 5.36 inches.

Part B- Width required for multiconductor cables smaller than #4/0 AWG

List Cable Sizes	(A) List Cable Cross Sectional Areas	(N) List Number of Cables	Multiply (A) x (N) = Total of the Cross-Sectional Area for each Size
3/C - #12 AWG	0.167 sq. in.	10	1.67 sq. in.
3/C - #6 AWG	0.430 sq. in.	8	3.44 sq. in.
3/C - #2 AWG	0.800 sq. in.	2	1.60 sq. in.

The sum of the total areas (inches) = 1.67 + 3.44 + 1.60 = 6.71 sq. inches.
From Table 5 (page 33), the cable tray width required for small cables is 6 inches.

The total cable tray width (inches) = 5.36 + 6.00 = 11.36 inches. A 12-inch wide cable tray is required.

(4) Multiconductor Control and/or Signal Cables Only

A ladder cable tray containing only control and/or signal cables, may have 50% of its total available cable area filled with cable. When using solid bottom cable tray pans, the allowable cable area is reduced from 50% to 40%.

Example: Cable tray width is obtained as follows:

2/C- #16 AWG instrumentation cable cross sectional area = 0.04 sq. in.
Total cross sectional area for 300 Cables = 12.00 sq. in.
Minimum available cable area needed = 12.00 x 2 = 24.00 sq. in.; therefore the cable tray width required for 4 inch available loading depth tray = 24.00/4 = 6 inches.

II) Number of Single Conductor Cables Rated 2000 Volts or Less in the Cable Tray

All single conductor cables to be installed in the cable tray must be 1/0 or larger, and are not to be installed with continuous bottom pans.

(1) 1000 KCMIL or Larger Cables

The sum of the diameters (Sd) for all single conductor cables to be installed shall not exceed the cable tray width. See Table 6.

Table 6

Inside Width of Cable Tray inches	Allowable Cable Area square inches
6	6.50
9	9.50
12	13.00
18	19.50
24	26.00
30	32.50
36	39.00

Allowable Cable Fill

(2) 250 KCMIL to 1000 KCMIL Cables

The total sum of the cross-sectional areas of all the single conductor cables to be installed in the cable tray must be equal to or less than the allowable cable area for the tray width, as indicated in Table 6 (page 34). (Reference Table 8)

(3) 1000 KCMIL or Larger Cables Installed with Cables Smaller Than 1000 KCMIL

The total sum of the cross-sectional areas of all the single conductor cables to be installed in the cable tray must be equal to or less than the allowable cable area for the tray width, as indicated in Table 7.

Table 7

Inside Width of Cable Tray inches	Allowable Cable Area square inches
6	6.50 - (1.1 Sd)
9	9.50 - (1.1 Sd)
12	13.00 - (1.1 Sd)
18	19.50 - (1.1 Sd)
24	26.00 - (1.1 Sd)
30	32.50 - (1.1 Sd)
36	39.00 - (1.1 Sd)

(4) Single Conductor Cables 1/0 through 4/0

These single conductors must be installed in a single layer. See Table 8.

Note: It is the opinion of some that this practice may cause problems with unbalanced voltages. To avoid these potential problems, the individual conductors for this type of cable tray wiring system should be bundled with ties. The bundle should contain all of the three-phase conductors for the circuit, plus the neutral if used. The single conductor cables bundle should be firmly tied to the cable tray assembly at least every 6 feet.

Table 8

Number of 600 Volt Single Conductor Cables That May Be Installed in Ladder Cable Tray

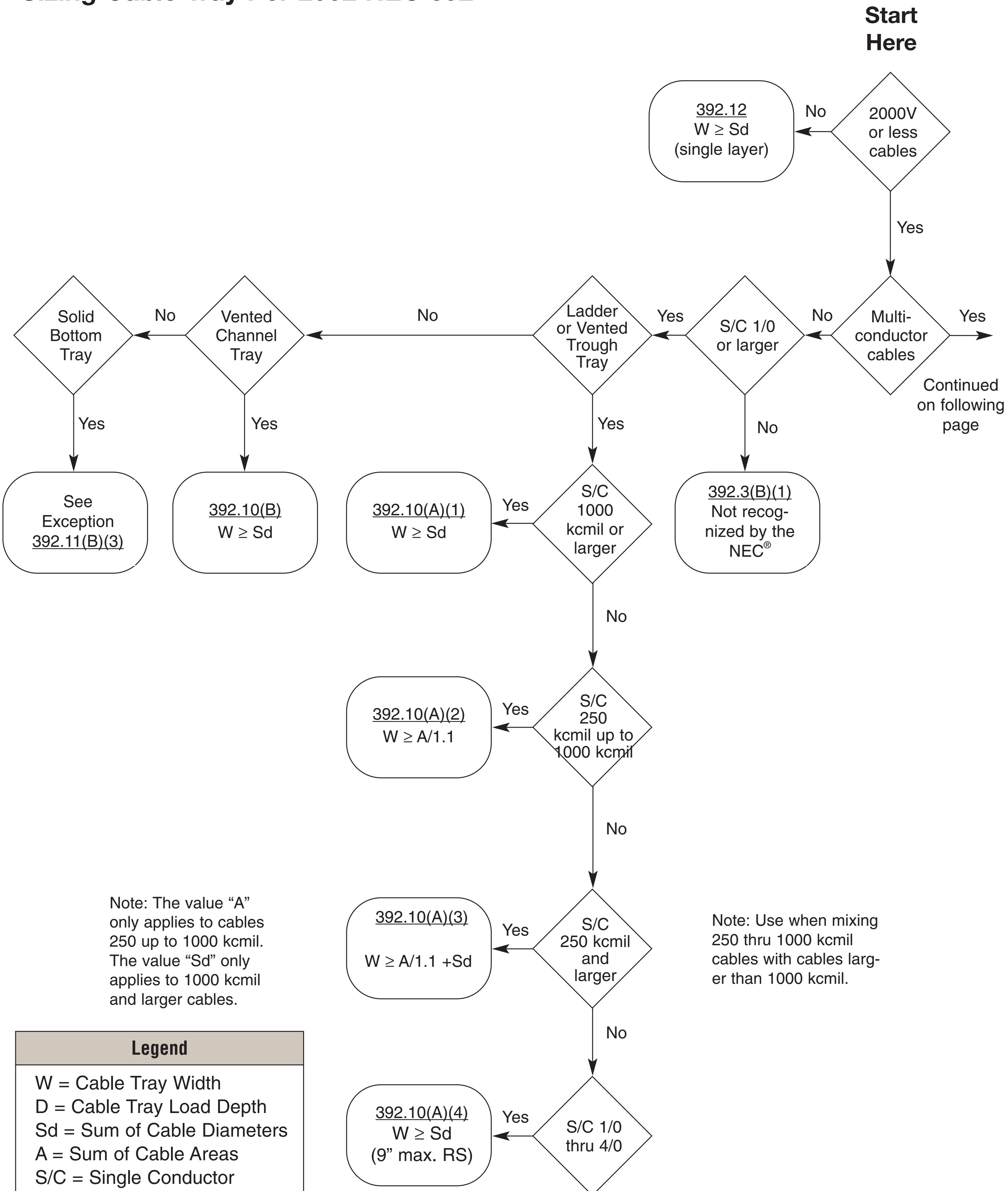
Single Conductor Size	Outside Diameter in.	Area sq. in.	Cable Tray Width				
			6 in.	9 in.	12 in.	18 in.	24 in.
1/0	0.58	-	10	15	20	31	41
2/0	0.62	-	9	14	19	29	38
3/0	0.68	-	8	13	17	26	35
4/0	0.73	-	8	12	16	24	32
250 Kcmil	0.84	.55	11	18	24	35	47
350 Kcmil	0.94	.69	9	14	19	28	38
500 Kcmil	1.07	.90	7	11	14	22	29
750 Kcmil	1.28	1.29	5	8	10	15	20
1000 Kcmil	1.45	-	4	6	8	12	16

Cable diameters used are those for Oknite-Okolon 600 volt single conductor power cables.

III) Number of Type MV and MC Cables Rated 2001 Volts or Over in the Cable Tray

The sum of the diameters (Sd) of all cables, rated 2001 volts or over, is not to exceed the cable tray width.

Sizing Cable Tray Per 2002 NEC 392

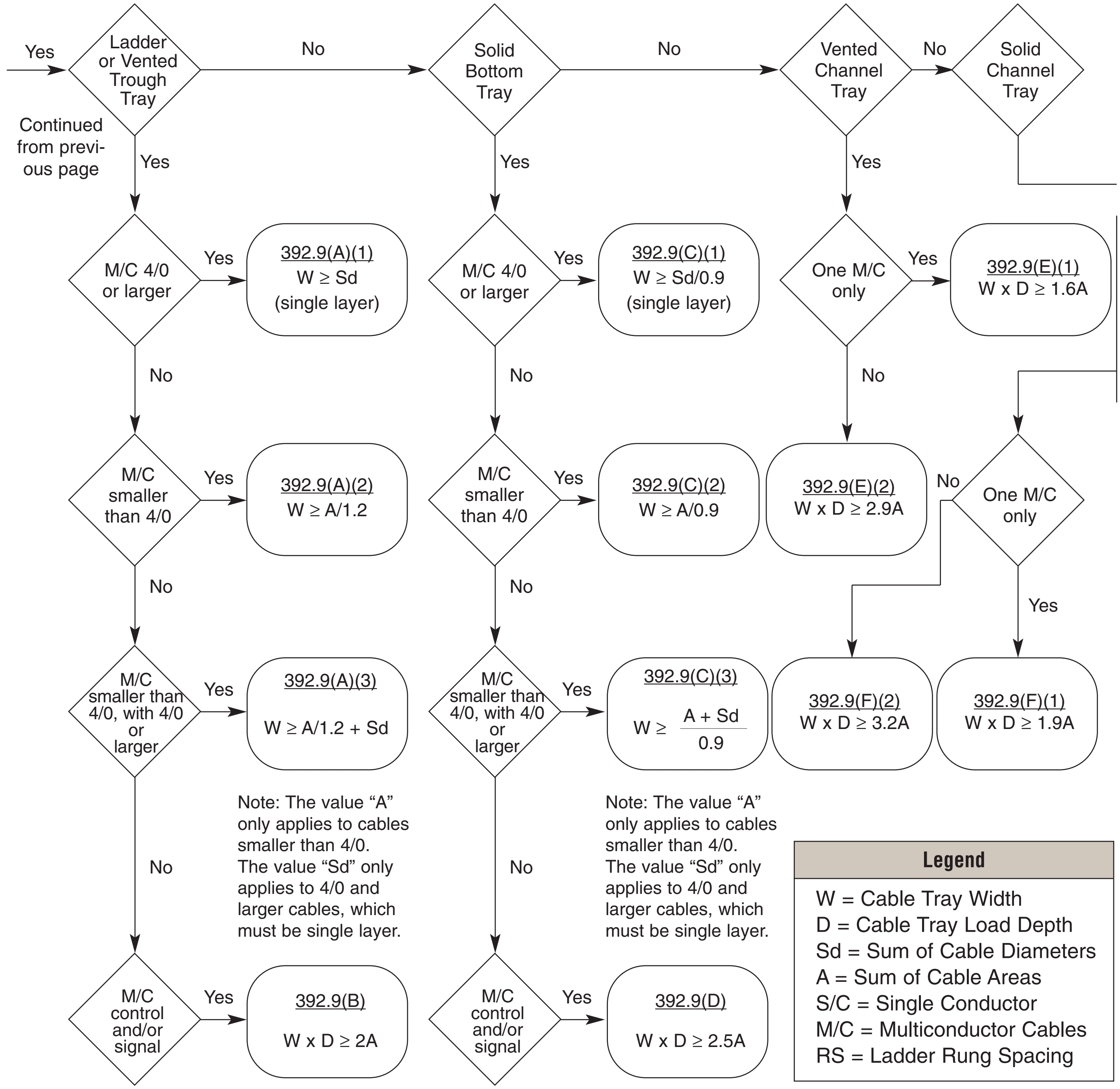


Note: The value “A” only applies to cables 250 up to 1000 kcmil. The value “Sd” only applies to 1000 kcmil and larger cables.

Note: Use when mixing 250 thru 1000 kcmil cables with cables larger than 1000 kcmil.

Legend
W = Cable Tray Width D = Cable Tray Load Depth Sd = Sum of Cable Diameters A = Sum of Cable Areas S/C = Single Conductor M/C = Multiconductor Cables RS = Ladder Rung Spacing

Note: See appendix on page 376 for additional information regarding cable ampacity and hazardous (classified) location requirements which might affect the cable tray sizing flow chart.

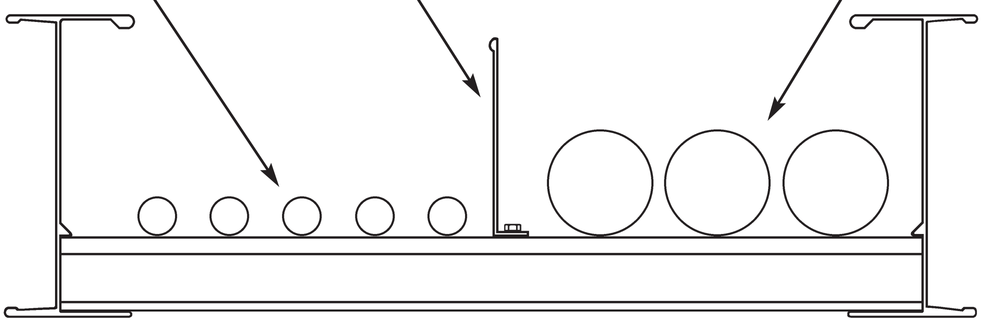


Legend

W = Cable Tray Width
D = Cable Tray Load Depth
Sd = Sum of Cable Diameters
A = Sum of Cable Areas
S/C = Single Conductor
M/C = Multiconductor Cables
RS = Ladder Rung Spacing

Barrier Requirements

Barrier strips are used to separate cable systems, such as when cables above and below 600 volts per NEC 392.6(F) are installed in the same cable tray. However, when MC type cables rated over 600 volts are installed in the same cable tray with cables rated 600 volts or less, no barriers are required. The barriers should be made of the same material type as the cable tray. When ordering the barrier, the height must match the *loading depth* of the cable tray into which it is being installed.



Future Expansion Requirements

One of the many features of cable tray is the ease of adding cables to an existing system. Future expansion should always be considered when selecting a cable tray, and allowance should be made for additional *fill area* and *load capacity*. A minimum of 50% expansion allowance is recommended.

Space Limitations

Any obstacles which could interfere with a cable tray installation should be considered when selecting a cable tray width and height. Adequate clearances should be allowed for installation of supports and for cable accessibility.
Note: The overall cable tray dimensions typically exceed the nominal tray width and loading depth.

Lengths Available

The current Cable Tray Standard, NEMA VE 1 and C22.2 No. 126.1-98, lists typical lengths as 3000 mm (10 ft), 3660 mm (12 ft), 6000 mm (20 ft), and 7320 mm (24 ft). It is impractical to manufacture either lighter systems in the longer lengths or heavier systems in the shorter lengths. For that reason, Cooper B-Line has introduced a primary and secondary length for each system. These straight section lengths were selected to direct the user to lengths that best suit support span demands and practical loading requirements. The primary length is the one that is the most appropriate for the strength of the system and that will provide the fastest service levels. The secondary lengths will be made available to service additional requirements. Special lengths are available with extended lead times.

For additional information please review the information contained on the Cooper B-Line website at www.cooperbline.com/product/CableTray/LengthSelection.asp.

Support Span

Per the NEMA VE 2, the support span on which a cable tray is installed should not exceed the length of the unspliced straight section. Thus installations with support spans greater than 12 feet should use 240" (20 feet) or 288" (24 feet) cable tray lengths.

Space Limitations

Consideration should be given to the space available for moving the cable tray from delivery to it's final installation location. Obviously, shorter cable tray allows for more maneuverability in tight spaces.

Installation

Shorter cable tray lengths are typically easier to maneuver on the job site during installation. Two people may be needed to manipulate longer cable tray sections, while shorter sections might be handled by one person. Although longer cable tray lengths are more difficult to maneuver, they can reduce installation time due to the fact that there are fewer splice connections. This trade-off should be evaluated for each set of job site restrictions.

Power Application:

Power application can create the heaviest loading. The heaviest cable combination found was for large diameter cables (i.e. steel armor, 600V, 4 conductor 750 kcmil). The cables weigh less than 3.8 lbs. per inch width of cable tray. As power cables are installed in a single layer, the width of the cable affects the possible loading.

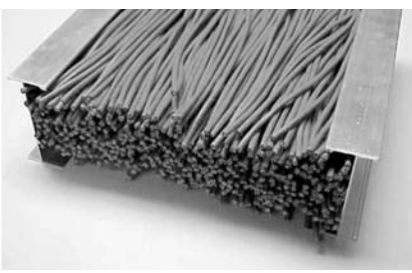
36" Wide	30" Wide	24" Wide	18" Wide	12" Wide	9" Wide	6" Wide
140 lbs/ft	115 lbs/ft	90 lbs/ft	70 lbs/ft	45 lbs/ft	35 lbs/ft	23 lbs/ft

Data/Communication Cabling:

Low voltage cables can be stacked as there is no heat generation problems. The NEC employs a calculation of the total cross sectional area of the cables not exceeding 50% of the fill area of the cable tray. As the cable fill area of the cable tray system affects the possible loading, both the loading depth and width of the systems must be considered. For this example 4UTP category 5 cable (O.D. = .21, .026 lbs./ft.) were used.

Calculated Cable Weight in Lbs/Ft

	36" Wide	30" Wide	24" Wide	18" Wide	12" Wide	9" Wide	6" Wide
6" Fill	81	64	52	41	27	20	14
5" Fill	68	53	43	34	23	17	12
4" Fill	54	43	35	27	18	13	9
3" Fill	41	32	26	21	14	10	7



The picture shows a 12" cable tray with a 3" load depth. The tray contains 520 4 UTP Category 5 cables with a .21" diameter.

The National Electrical Code allows for 50% fill of ventilated and ladder cable tray for control or signal wiring (Article 392.9(B)). ANSI/EIA/TIA 569-A Section 4.5* also requires that the fill ratio of cable tray is not to exceed 50%.

Calculation Example:

Tray Area = 12 in. x 3 in. = 36 sq. in.
50% Fill = 36 sq. in. x .5 = 18 sq. in.
Cable Area = $(.21 \text{ in.})^2 \times 3.14/4$ = .0346 sq. in.
Number of Cables = 18 sq. in. / .0346 sq. in. = 520 cables

*Section 4.5 is currently under review.

Other Factors To Consider

- **Support Span -** The distance between the supports affects the loading capabilities exponentially. To calculate loading values not cataloged use:

  $W_1 L_1^2 = W_2 L^2_2$
  W_1 - tested loading
  L_1 - span in feet, a tested span
  W_2 - loading in question
  L_2 - known span for new loading

- **Other Loads -** Ice, wind, snow for outdoor systems see page 26 and 27 for information.
  A 200 lb. concentrated load for industrial systems. The affect of a concentrated load can be calculated as follows

  $$\frac{2 \times (\text{concentrated static load})}{\text{span in feet}}$$

  When considering concentrated loads the rung strength should be considered.

- **Length Of The Straight Sections:**
  The VE 2, Cable Tray Installation Guide, states that the support span shall not be greater than the straight section length. If a 20C system is manufactured in 12 foot sections the greatest span for supports would be 12 feet. This dramatically affects the loading of the system.

  $W_1 L_1^2 = W_2 L^2_2$
  $100 (20^2) = W_2 (12^2)$
  $40{,}000 = 144 W_2$
  $W_2 = 277$ lbs. per foot

Cable Tray Selection - Bottom Type

Type of Cable

According to NEC Article 392, multiconductor tray cable may be installed in any standard cable tray bottom type. According to the 2005 NEC Article 392.11(8)(3), single conductor tray cable may be installed in any standard cable tray bottom type. Solid bottom cable trays are not allowed to be installed in Class II, Division 2 locations (2002 NEC Section 502.4(B)). In general, small, highly flexible cables should be installed in solid bottom, vented bottom or 6" rung spacing ladder type cable trays. Sensitive cables (e.g. fiberoptic) are typically installed in flat, solid bottom cable trays, instead of corrugated trough bottoms. Larger, less flexible cables are typically installed in ladder type cable trays having 9" or 12" rung spacing. Ladder type cable trays having 18" rung spacing should be used for large, stiff cables to reduce cost and facilitate cable drop-outs.

Cost vs Strength

Often more than one bottom type is acceptable. In this case the economic difference should be considered. Ladder cable trays have a lower cost than either non-ventilated or ventilated bottom configurations. Typically, the cost of ladder type cable tray decreases as rung spacing increases. However, the effect of rung spacing on load capacity for ladder type cable trays with 18" rung spacing should be evaluated, since NEMA published load capacities are based on 12" rung spacing. Rung spacing can affect individual rung and side rail loading as well as system load capacity. Rung loads applied during cable installation should also be considered. (See page 29 for Cooper B-Line rung load capacities)

Cable Exposure

Tray cables are manufactured to withstand the environment without additional protection, favoring the use of the ladder type cable tray. Some areas may benefit from the limited exposure of solid or vented bottom cable tray. Solid Bottom metal cable tray with solid metal covers can be utilized in other spaces used for environmental air to support non plenum rated tray cables (2002 NEC® 300.22(C)(1))

Cable Attachment

The major advantage of ladder type cable tray is the freedom of entry and exit of the cables. Another advantage of ladder type cable tray is the ability to secure cables in the cable tray. With standard rungs the cables may be attached with either cable ties or cable clamps. The ladder type cable tray is also available with special purpose, slotted marine or strut rungs to facilitate banding or clamping cables. Cable attachment is particularly important on vertical runs or when the tray is installed on its side. Ladder rung spacing should be chosen to provide adequate cable attachment points while allowing the cables to exit the system.

Cable Tray Selection - Fitting Radius

Cable Flexibility

The proper bend radius for cable tray fittings is usually determined by the bend radius and stiffness of the tray cables to be installed. Typically, the tray cable manufacturer will recommend a minimum bend allowance for each cable. The fitting radius should be equal to or larger than the minimum bend radius of the largest cable which may ever be installed in the system. When several cables are to be installed in the same cable tray, a larger bend radius may be desirable to ease cable installation.

Space Limitations

The overall dimensions for a cable tray fitting will increase as the bend radius increases. Size and cost make the smallest acceptable fitting radius most desirable. When large radius fittings are required, the system layout must be designed to allow adequate space.