

The following guidelines are based on the 1999 National Electrical Code, Article 318.

I) Number of Multiconductor Cables, Rated 2000 Volts or Less, in Data-Track™ and Half-Rack™ (Excluding Straight Rung)

(1) Multiconductor Control and/or Signal Cables Only

A ladder cable tray containing only control and/or signal cables, may have 50% of its total fill area filled with cable. When using continuous bottom pans, the allowable fill 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 tray fill area needed = 12.00 x 2 = 24.00 sq. in.; therefore, the tray width required for 4" loading depth tray = 24.00/4 = 6 inches.

(2) 4/0 or Larger Cables

The ladder cable tray must have an inside usable 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 continuous bottom pans, the sum of the cable diameters can not exceed 90% of the usable 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 a usable width of at least 12 inches is required.

(3) 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 1. When using continuous bottom pans, the allowable cable area is reduced by 22%.

Example: 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.

Table 1

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

The sum of the totals of the cross-sectional areas = 1.67 + 1.52 + 2.58 + 7.20 = 12.97 inches. Using Table 1, 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 cable fill area for power and lighting cables. The maximum allowable fill area for all cable tray with a 3 inch or greater loading depth is limited to the fill area for a 3 inch loading depth.

Cent-R-Rail™ Sizing Guide

(4) 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 must be placed in a single layer.

A direct method for determining the cable tray width is by figuring the cable tray widths that are required for each of the cable combinations, per steps (2) & (3); and then adding these widths together to select the proper cable tray width.

Example: Cable tray width is obtained as follows:

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

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 (Sd)
3/C - #500kcmil	2.26 inches	1	2.26 inches
3/C - #4/0 AGW	1.55 inches	2	3.10 inches

Cable tray width 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 = 1.67 + 3.44 + 1.60 = 6.71 sq. inches.

From Table 1, the cable tray width required for small cables is 6 inches.

The total cable tray width = 5.36 + 6.00 = 11.36 inches; therefore a 12 inch wide cable tray is required.

II) Number of Single Conductor Cables, Rated 2000 Volts or Less, in DATA-TRACK™ and HALF-RACK™ (Excluding Straight Rung)

Single conductor cables installed in cable tray must be 1/0 or larger, and they can not be installed with continuous bottom pans.

(1) 1000 KCMIL or Larger Cables

The sum of the diameters (Sd) of all single conductor cables shall not exceed the cable tray width. See Table 3, page 121.

(2) 250 KCMIL to 1000 KCMIL Cables

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 2.

Table 2

Inside Width of Cable Tray inches	Allowable Cable Area square inches
6	6.5
9	9.5
12	13.0
18	19.5
24	26.0

(3) Cables 1/0 through 4/0

These conductors must be installed in a single layer. See Table 3.

Note: It is the opinion of some that this practice may cause problems with unbalanced voltages. To avoid these potential problems, the cables for this type of cable tray wiring system should be bundled with ties. The bundle should contain the circuit's three phase conductors plus the neutral, if one is used. The single conductor cables should be firmly tied to the cable trays at intervals not greater than 6 feet.

Table 3
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) Sizing Verti-Rack™ and Multi-Tier Half-Rack™

Due to the unique nature of multiple-tier cable trays, there are no existing guidelines for sizing these types of cable trays. However, the following tables are provided to assist you in comparing the usable widths and fill areas for the different Cent-R-Rail™ trays available.

WARNING!

Do Not Use As A Walkway, Ladder,
Or Support For Personnel.

Use Only As A Mechanical Support For Cables, Tubing and Raceways.

Catalog Number: C3ADB09-12-144 STR SECTION
 Shipping Ticket: 260203 00 001
 Mark Number: 78101115400
 Purchase Order: D798981
 Minimum Area: 0.60 SQ. IN.
 Load Class: D1 179 KG/M 3 METER SPAN

1 of 1
 09/15/2005
 000291745

COOPER B-Line
 www.cooperbline.com
 (618) 654-2184

This product is classified by Underwriters Laboratories, Inc. as to its suitability as an equipment grounding conductor only. 556E

VENTILATED
Reference File #LR36026


30781011154005

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.

Cent-R-Rail™ Sizing Guide


Usable Tray Width & Overall Outside Width:

Data-Track™




Tray Width		Usable Width				Overall Outside Width			
in.	(mm)	Bottom Rung		Top Rung		Bottom Rung		Top Rung	
		in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)
6	(150)	6	(150)	6	(150)	8.7	(220)	7.1	(180)
9	(225)	9	(225)	9	(225)	11.7	(295)	10.1	(250)
12	(300)	12	(300)	12	(300)	14.7	(375)	13.1	(335)
18	(450)	16	(400)	18	(450)	19.1	(485)	19.1	(485)
24	(600)	22	(550)	24	(600)	25.1	(630)	25.1	(630)

Verti-Rack™



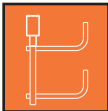
Tray Width		Total Usable Width										Overall Outside Width	
in.	(mm)	2 tier		3 tier		4 tier		5 tier		6 tier		in.	(mm)
		in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)		
3	(75)	6	(150)	9	(225)	12	(300)	15	(381)	18	(450)	4.4	(110)
6	(150)	12	(300)	18	(450)	24	(600)	30	(750)	36	(900)	7.4	(190)
9	(225)	18	(450)	27	(675)	36	(900)	45	(1125)	54	(1350)	10.4	(265)
12	(300)	24	(600)	36	(900)	48	(1200)	60	(1500)	72	(1800)	13.4	(340)

Half-Rack™



Tray Width		Usable Width		Overall Outside Width	
in.	(mm)	in.	(mm)	in.	(mm)
3	(75)	3	(75)	5.2	(130)
6	(150)	6	(150)	8.2	(210)
9	(225)	9	(225)	11.2	(285)
12	(300)	12	(300)	14.2	(360)

Multi-Tier Half-Rack™



Tray Width		Total Usable Width						Overall Outside Width	
in.	(mm)	2 tier		3 tier		4 tier		in.	(mm)
		in.	(mm)	in.	(mm)	in.	(mm)		
3	(75)	6	(150)	9	(225)	12	(300)	4.7	(120)
6	(150)	12	(300)	18	(450)	24	(600)	7.7	(195)
9	(225)	18	(450)	27	(675)	36	(900)	10.7	(270)
12	(300)	24	(600)	36	(900)	48	(1200)	13.7	(350)

Tray Fill Area & Overall Outside Height:

Loading Depth in. (mm)	Tray Width in. (mm)	Fill Area						Overall Outside Height			
		Bottom Rung		Top Rung		Bottom Rung		Top Rung			
		in. ²	(cm ²)	in. ²	(cm ²)	in.	(mm)	in.	(mm)		
3	(75)	6	(150)	18	(120)	18	(120)	3.7	(95)	6.1	(155)
		9	(225)	27	(180)	27	(180)				
		12	(300)	36	(240)	36	(240)				
		18	(450)	49	(325)	54	(360)				
		24	(600)	67	(450)	72	(480)				
4	(100)	6	(150)	24	(160)	24	(160)	4.7	(120)	7.1	(180)
		9	(225)	36	(240)	36	(240)				
		12	(300)	48	(320)	48	(320)				
		18	(450)	65	(420)	72	(480)				
		24	(600)	89	(575)	96	(640)				
6	(150)	6	(150)	36	(240)	36	(240)	6.7	(170)	9.1	(230)
		9	(225)	54	(360)	54	(360)				
		12	(300)	72	(480)	72	(480)				
		18	(450)	98	(630)	108	(700)				
		24	(600)	134	(865)	144	(930)				

Data-Track™



Cent-R-Rail

Loading Depth in. (mm)	Tray Width in. (mm)	Fill Area											
		2 tier		3 tier		4 tier		5 tier		6 tier			
		in. ²	(cm ²)	in. ²	(cm ²)	in. ²	(cm ²)	in. ²	(cm ²)	in. ²	(cm ²)		
2	(50)	3	(75)	12	(80)	18	(120)	24	(160)	30	(200)	36	(240)
		6	(150)	24	(160)	36	(240)	48	(320)	60	(400)	72	(480)
		9	(225)	36	(240)	54	(360)	72	(480)	90	(600)	108	(700)
		12	(300)	48	(320)	72	(480)	96	(640)	120	(800)	144	(930)

Verti-Rack™



Overall Outside Height									
2 tier		3 tier		4 tier		5 tier		6 tier	
in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)
9.3	(235)	13.3	(340)	17.3	(440)	21.3	(540)	25.3	(645)

Half-Rack™



Loading Depth in. (mm)	Tray Width in. (mm)	Fill Area		Overall Outside Height	
		in. ²	(cm ²)	in.	(mm)
3	(75)	3	(60)	3.7	(95)
		6	(120)		
		9	(180)		
		12	(240)		
4	(100)	3	(80)	4.7	(120)
		6	(160)		
		9	(240)		
		12	(320)		
6	(150)	3	(120)	6.7	(170)
		6	(240)		
		9	(360)		
		12	(480)		

Multi-Tier Half-Rack™



Loading Depth in. (mm)	Tray Width in. (mm)	Fill Area					
		2 tier		3 tier		4 tier	
		in. ²	(cm ²)	in. ²	(cm ²)	in. ²	(cm ²)
3	(75)	3	(120)	27	(180)	36	(240)
		6	(240)	54	(360)	72	(480)
		9	(360)	81	(525)	108	(700)
		12	(480)	108	(700)	144	(930)
4	(100)	3	(160)	36	(240)	48	(320)
		6	(320)	72	(480)	96	(640)
		9	(480)	108	(700)	144	(930)
		12	(640)	144	(930)	192	(1240)

Overall Outside Height					
2 tier		3 tier		4 tier	
in.	(mm)	in.	(mm)	in.	(mm)
11.3	(285)	17.3	(440)	23.3	(590)