Section 1- Acceptable Manufacturers

1.01 Manufacturer: Subject to compliance with these specifications, Eaton's B-Line series cable tray systems shall be as manufactured by Eaton.

Section 2- Cable Tray Sections and Components

2.01 General: Except as otherwise indicated, provide metal cable trays, of types, classes and sizes indicated; with splice plates, bolts, nuts and washers for connecting units. Construct units with rounded edges and smooth surfaces; in compliance with applicable standards; and with the following additional construction features. Cable tray shall be installed according to the latest revision of NEMA VE 2.

2.02 Pre-Galvanized Steel: Straight sections, fitting side rails, rungs, and covers shall be made from structural quality steel meeting the minimum mechanical properties and mill galvanized in accordance with ASTM A653 SS, Grade 33, coating designation G90. Hardware finish shall be electro-galvanized zinc per ASTM B633.

2.03 Hot dip Galvanized Steel: All side rails, covers, splice plates, and rungs shall be made from structural quality steel meeting the minimum mechanical properties of ASTM A1011 SS, Grade 33 for 14 gauge and heavier, ASTM A1008, Grade 33 Type 2 for 16 gauge and lighter, and shall be hot dip galvanized after fabrication in accordance with ASTM A123. Mill galvanized covers are not acceptable for hot dipped galvanized cable tray. Hardware finish shall be chromium zinc per ASTM F-1136-88.

2.04 Ladder Cable Trays shall consist of two longitudinal members (side rails) with transverse members (rungs) welded to the side rails. Rungs shall be spaced [6] [9] [12] inches apart. Rung spacing in radiused fittings shall be industry standard 9" and measured at the center of the tray's width. No portion of the rungs shall protrude below the bottom plane of the side rails.

2.06 Cable tray loading depth shall be [3] [4] [5] [6] inches per NEMA VE 1.

2.06 Straight sections shall be supplied in standard [12 foot] [10 foot (3 m)] lengths.

2.07 Cable tray widths shall be [6] [9] [12] [18] [24] [30] [36] inches or as shown on drawings.

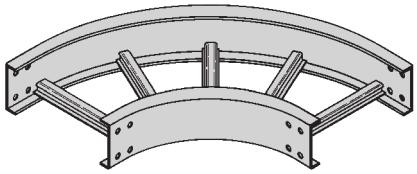
2.08 Splice plates shall be L-shaped with 4 nuts and bolts per plate. The resistance of fixed splice connections between an adjacent section of tray shall not exceed 0.00033 ohm.

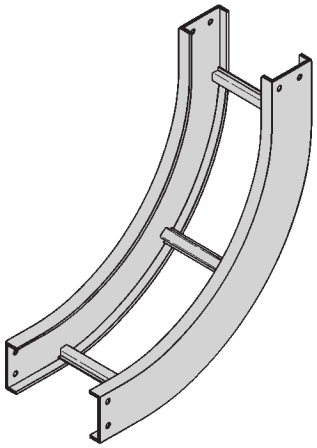
2.09 All fittings must have a minimum radius of [12] [24] inches.

Section 3- Loading Capacities and Testing

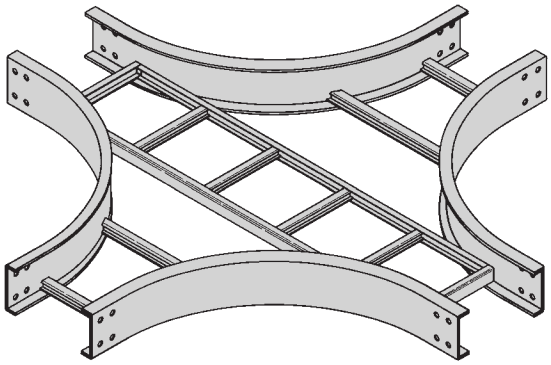
3.01 Cable tray shall be capable of carrying a uniformly distributed load of _____ lbs./ft. on a _____ ft. support span with a safety factor of 1.5 when supported as a simple span and tested per NEMA VE 1 5.2. Cable tray shall be made to manufacturing tolerances as specified by NEMA.

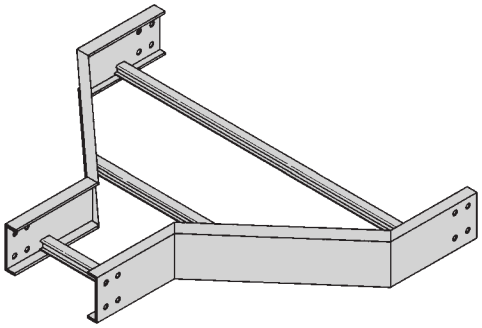
3.02 Upon request, manufacturer shall provide test reports in accordance with the latest revision of NEMA VE 1 or CSA C22.2 No. 126.





Fittings engineered with 3" tangents for splicing integrity.





Fittings Part Numbering

Example: **1 4 P - 24 - 90 HB 24** (9" rung spacing is standard)

Prefix

Series	Height	Material	Width	Angle	Type	Radius
1	● 4 = 148 ● 5 = 156 ● 6 = 166 ● 7 = 176	● P = Pre-Galvanized ● G = HDGAF	● 06 = 6" (152) ● 09 = 9" (228) ● 12 = 12" (305) ● 18 = 18" (457) ● 24 = 24" (609) ● 30 = 30" (762) ● 36 = 36" (914)	● 30 = 30° ● 45 = 45° ● 60 = 60° ● 90 = 90°	● HB = Horizontal Bend ● HT = Horizontal Tee ● HX = Horizontal Cross ● VI = Vertical Inside Bend ● VO = Vertical Outside Bend ● LR = Left Reducer ● RR = Right Reducer ● SR = Straight Reducer	● 12 = 12" (305) ● 24 = 24" (609) ● 36 = 36" (914)

For steel 4", 5", 6", 7" vented or non-ventilated add 04 or SB as shown below.

Prefix

15P04 - 24 - 90HB24

Vented Bottom

Prefix

15PSB - 24 - 90HB24

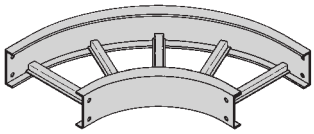
Non-Ventilated

● Green = Fastest shipped items ● Black = Normal lead-time items ● Red = Normally long lead-time items

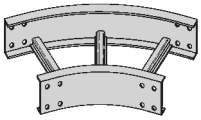
All dimensions in parentheses are millimeters unless otherwise specified.

Horizontal Bends 90° 60° 45° 30° (HB)

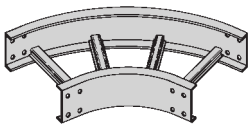
1 pair splice plates with hardware included.



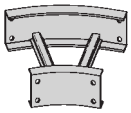
90˚ Horizontal Bend



45˚ Horizontal Bend

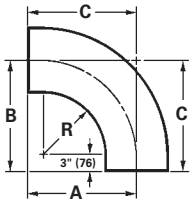


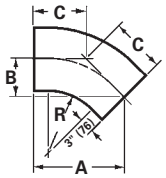
60˚ Horizontal Bend

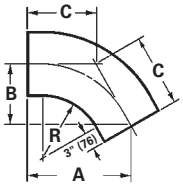


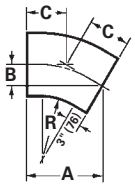
30˚ Horizontal Bend

Bottoms manufactured:
Ladder = 9" Rung Spacing
04 = 4" Rung Spacing
SB = Flat sheet over 12" Rung Spacing









Bend Radius R		Tray Width		90˚ Horizontal Bend Dimensions							60˚ Horizontal Bend Dimensions						
				Catalog No.	A		B		C		Catalog No.	A		B		C	
in.	(mm)	in.	(mm)		in.	(mm)	in.	(mm)	in.	(mm)		in.	(mm)	in.	(mm)	in.	(mm)
		6	(152)	**(Pre)-06-90HB12**	18	(457)	18	(457)	18	(457)	**(Pre)-06-60HB12**	17 1/2	(445)	10 1/8	(257)	11 11/16	(297)
		9	(228)	**(Pre)-09-90HB12**	19 1/2	(495)	19 1/2	(495)	19 1/2	(495)	**(Pre)-09-60HB12**	18 13/16	(478)	10 7/8	(276)	12 1/2	(318)
		12	(305)	**(Pre)-12-90HB12**	21	(533)	21	(533)	21	(533)	**(Pre)-12-60HB12**	20 1/16	(510)	11 5/8	(295)	13 3/8	(340)
12	(305)	18	(457)	**(Pre)-18-90HB12**	24	(610)	24	(610)	24	(610)	**(Pre)-18-60HB12**	22 11/16	(576)	13 1/8	(333)	15 1/8	(384)
		24	(609)	**(Pre)-24-90HB12**	27	(686)	27	(686)	27	(686)	**(Pre)-24-60HB12**	25 5/16	(643)	14 5/8	(372)	16 7/8	(429)
		30	(762)	**(Pre)-30-90HB12**	30	(762)	30	(762)	30	(762)	**(Pre)-30-60HB12**	27 7/8	(708)	16 1/8	(410)	18 9/16	(472)
		36	(914)	**(Pre)-36-90HB12**	33	(838)	33	(838)	33	(838)	**(Pre)-36-60HB12**	30 1/2	(775)	17 5/8	(448)	20 5/16	(516)
		6	(152)	**(Pre)-06-90HB24**	30	(762)	30	(762)	30	(762)	**(Pre)-06-60HB24**	27 7/8	(708)	16 1/8	(410)	18 9/16	(472)
		9	(228)	**(Pre)-09-90HB24**	31 1/2	(800)	31 1/2	(800)	31 1/2	(800)	**(Pre)-09-60HB24**	29 3/16	(741)	16 7/8	(429)	19 7/16	(494)
		12	(305)	**(Pre)-12-90HB24**	33	(838)	33	(838)	33	(838)	**(Pre)-12-60HB24**	30 1/2	(775)	17 5/8	(448)	20 5/16	(516)
24	(609)	18	(457)	**(Pre)-18-90HB24**	36	(914)	36	(914)	36	(914)	**(Pre)-18-60HB24**	33 1/16	(840)	19 1/8	(486)	22 1/16	(560)
		24	(609)	**(Pre)-24-90HB24**	39	(991)	39	(991)	39	(991)	**(Pre)-24-60HB24**	35 11/16	(907)	20 5/8	(524)	23 13/16	(605)
		30	(762)	**(Pre)-30-90HB24**	42	(1067)	42	(1067)	42	(1067)	**(Pre)-30-60HB24**	38 1/4	(972)	22 1/8	(562)	25 1/2	(648)
		36	(914)	**(Pre)-36-90HB24**	45	(1143)	45	(1143)	45	(1143)	**(Pre)-36-60HB24**	40 7/8	(1038)	23 5/8	(600)	27 1/4	(692

				45˚ Horizontal Bend							30˚ Horizontal Bend						
		6	(152)	**(Pre)-06-45HB12**	15 3/4	(400)	6 1/2	(165)	9 3/16	(233)	**(Pre)-06-30HB12**	13 1/8	(333)	3 1/2	(89)	7	(175)
		9	(228)	**(Pre)-09-45HB12**	16 13/16	(427)	6 15/16	(176)	9 13/16	(249)	**(Pre)-09-30HB12**	13 7/8	(352)	3 11/16	(94)	7 7/16	(189)
		12	(305)	**(Pre)-12-45HB12**	17 7/8	(454)	7 3/8	(187)	10 7/16	(265)	**(Pre)-12-30HB12**	14 5/8	(372)	3 15/16	(100)	7 13/16	(198)
12	(305)	18	(457)	**(Pre)-18-45HB12**	20	(500)	8 1/4	(210)	11 11/16	(297)	**(Pre)-18-30HB12**	16 1/8	(410)	4 5/16	(135)	8 5/8	(219)
		24	(609)	**(Pre)-24-45HB12**	22 1/16	(560)	9 1/8	(232)	12 15/16	(329)	**(Pre)-24-30HB12**	17 5/8	(448)	4 11/16	(119)	9 7/16	(240)
		30	(762)	**(Pre)-30-45HB12**	24 3/16	(614)	10	(250)	14 3/16	(360)	**(Pre)-30-30HB12**	19 1/8	(486)	5 1/8	(130)	10 1/4	(260)
		36	(914)	**(Pre)-36-45HB12**	26 5/16	(668)	10 15/16	(278)	15 7/16	(392)	**(Pre)-36-30HB12**	20 5/8	(524)	5 1/2	(140)	11 1/16	(281)
		6	(152)	**(Pre)-06-45HB24**	24 3/16	(614)	10	(250)	14 3/16	(360)	**(Pre)-06-30HB24**	19 1/8	(486)	5 1/8	(130)	10 1/4	(260)
		9	(228)	**(Pre)-09-45HB24**	25 1/4	(641)	10 1/2	(267)	14 13/16	(376)	**(Pre)-09-30HB24**	19 7/8	(505)	5 5/16	(135)	10 5/8	(270)
		12	(305)	**(Pre)-12-45HB24**	26 5/16	(668)	10 15/16	(278)	15 7/16	(392)	**(Pre)-12-30HB24**	20 5/8	(524)	5 1/2	(140)	11 1/16	(281)
24	(609)	18	(457)	**(Pre)-18-45HB24**	28 7/16	(722)	11 13/16	(300)	16 11/16	(424)	**(Pre)-18-30HB24**	22 1/8	(562)	5 15/16	(151)	11 13/16	(300)
		24	(609)	**(Pre)-24-45HB24**	30 9/16	(776)	12 11/16	(322)	17 15/16	(456)	**(Pre)-24-30HB24**	23 5/8	(600)	6 5/16	(160)	12 5/8	(321)
		30	(762)	**(Pre)-30-45HB24**	32 11/16	(830)	13 9/16	(345)	19 1/8	(486)	**(Pre)-30-30HB24**	25 1/8	(638)	6 3/4	(172)	13 7/16	(341)
		36	(914)	**(Pre)-36-45HB24**	34 13/16	(884)	14 7/16	(367)	20 3/8	(518)	**(Pre)-36-30HB24**	26 5/8	(676)	7 1/8	(181)	14 1/4	(362)

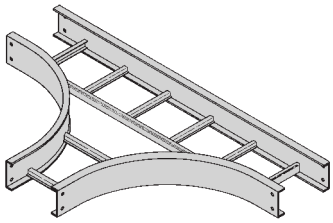
(Pre) See page H-18 for catalog number prefix.
Width dimensions are to inside wall. Manufacturing tolerances apply to all dimensions.

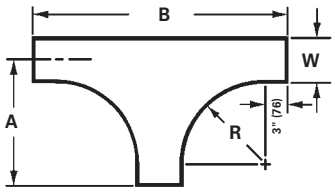
All dimensions in parentheses are millimeters unless otherwise specified.

Horizontal Tee (HT)

2 pair splice plates with hardware included.

Bend Radius R in. (mm)	Tray Width in. (mm)	Horizontal Tee Dimensions Catalog No.	A in. (mm)	B in. (mm)
12 (305)	6 (152)	**(Prefix)-06-HT12**	18 (457)	36 (914)
	9 (228)	**(Prefix)-09-HT12**	19½ (495)	39 (991)
	12 (305)	**(Prefix)-12-HT12**	21 (533)	42 (1067)
	18 (457)	**(Prefix)-18-HT12**	24 (610)	48 (1219)
	24 (609)	**(Prefix)-24-HT12**	27 (686)	54 (1372)
	30 (762)	**(Prefix)-30-HT12**	30 (762)	60 (1524)
	36 (914)	**(Prefix)-36-HT12**	33 (838)	66 (1676)
24 (609)	6 (152)	**(Prefix)-06-HT24**	30 (762)	60 (1524)
	9 (228)	**(Prefix)-09-HT24**	31½ (800)	63 (1600)
	12 (305)	**(Prefix)-12-HT24**	33 (838)	66 (1676)
	18 (457)	**(Prefix)-18-HT24**	36 (914)	72 (1829)
	24 (609)	**(Prefix)-24-HT24**	39 (991)	78 (1981)
	30 (762)	**(Prefix)-30-HT24**	42 (1067)	84 (2134)
	36 (914)	**(Prefix)-36-HT24**	45 (1143)	90 (2286)



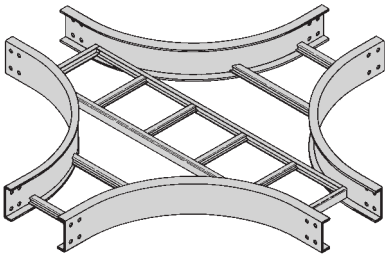


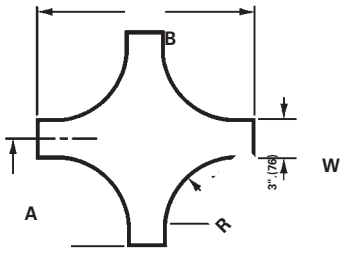
(Prefix) See page H-18 for catalog number prefix.

Horizontal Cross (HX)

3 pair splice plates with hardware included.

Bend Radius R in. (mm)	Tray Width in. (mm)	Horizontal Cross Dimensions Catalog No.	A in. (mm)	B in. (mm)
12 (305)	6 (152)	**(Prefix)-06-HX12**	18 (457)	36 (914)
	9 (228)	**(Prefix)-09-HX12**	19½ (495)	39 (991)
	12 (305)	**(Prefix)-12-HX12**	21 (533)	42 (1067)
	18 (457)	**(Prefix)-18-HX12**	24 (610)	48 (1219)
	24 (609)	**(Prefix)-24-HX12**	27 (686)	54 (1372)
	30 (762)	**(Prefix)-30-HX12**	30 (762)	60 (1524)
	36 (914)	**(Prefix)-36-HX12**	33 (838)	66 (1676)
24 (609)	6 (152)	**(Prefix)-06-HX24**	30 (762)	60 (1524)
	9 (228)	**(Prefix)-09-HX24**	31½ (800)	63 (1600)
	12 (305)	**(Prefix)-12-HX24**	33 (838)	66 (1676)
	18 (457)	**(Prefix)-18-HX24**	36 (914)	72 (1829)
	24 (609)	**(Prefix)-24-HX24**	39 (991)	78 (1981)
	30 (762)	**(Prefix)-30-HX24**	42 (1067)	84 (2134)
	36 (914)	**(Prefix)-36-HX24**	45 (1143)	90 (2286)





(Prefix) See page H-18 for catalog number prefix.

Width dimensions are to inside wall. Manufacturing tolerances apply to all dimensions.

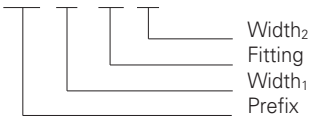
All dimensions in parentheses are millimeters unless otherwise specified.

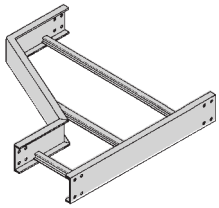
Reducers (LR, SR, RR)

1 pair splice plates with hardware included.

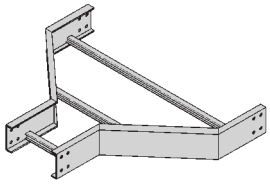
Reducer Part Numbering

14P - 24 - RR 18

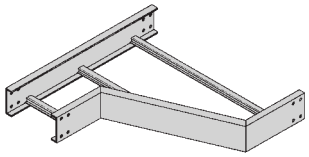




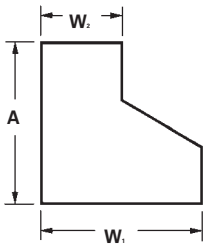
Left Reducer - LR

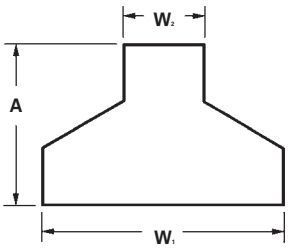


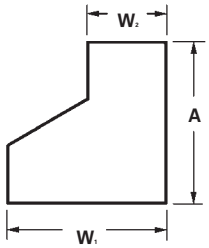
Straight Reducer - SR



Right Reducer - RR







Tray Width				Left Reducer - LR			Straight Reducer - SR			Right Reducer - RR		
W_1		W_2		Catalog No.	A		Catalog No.	A		Catalog No.	A	
in.	(mm)	in.	(mm)		in.	(mm)		in.	(mm)		in.	(mm)
9	(228)	6	(152)	**(Prefix)-09-LR06**	9 3/4	(248)	**(Prefix)-09-SR06**	8 7/8	(225)	**(Prefix)-09-RR06**	9 3/4	(248)
12	(305)	6	(152)	**(Prefix)-12-LR06**	11 1/2	(292)	**(Prefix)-12-SR06**	9 3/4	(248)	**(Prefix)-12-RR06**	11 1/2	(292)
		9	(228)	**(Prefix)-12-LR09**	9 3/4	(248)	**(Prefix)-12-SR09**	8 7/8	(225)	**(Prefix)-12-RR09**	9 3/4	(248)
18	(457)	6	(152)	**(Prefix)-18-LR06**	14 15/16	(379)	**(Prefix)-18-SR06**	11 1/2	(292)	**(Prefix)-18-RR06**	14 15/16	(379)
		9	(228)	**(Prefix)-18-LR09**	13 3/16	(335)	**(Prefix)-18-SR09**	10 5/8	(270)	**(Prefix)-18-RR09**	13 3/16	(335)
		12	(305)	**(Prefix)-18-LR12**	11 1/2	(292)	**(Prefix)-18-SR12**	9 3/4	(248)	**(Prefix)-18-RR12**	11 1/2	(292)
24	(609)	6	(152)	**(Prefix)-24-LR06**	18 3/8	(467)	**(Prefix)-24-SR06**	13 3/16	(335)	**(Prefix)-24-RR06**	18 3/8	(467)
		9	(228)	**(Prefix)-24-LR09**	16 11/16	(424)	**(Prefix)-24-SR09**	12 3/8	(314)	**(Prefix)-24-RR09**	16 11/16	(424)
		12	(305)	**(Prefix)-24-LR12**	14 15/16	(379)	**(Prefix)-24-SR12**	11 1/2	(292)	**(Prefix)-24-RR12**	14 15/16	(379)
		18	(457)	**(Prefix)-24-LR18**	11 1/2	(292)	**(Prefix)-24-SR18**	9 3/4	(248)	**(Prefix)-24-RR18**	11 1/2	(292)
30	(762)	6	(152)	**(Prefix)-30-LR06**	21 7/8	(555)	**(Prefix)-30-SR06**	14 15/16	(379)	**(Prefix)-30-RR06**	21 7/8	(555)
		9	(228)	**(Prefix)-30-LR09**	20 1/8	(511)	**(Prefix)-30-SR09**	14 1/16	(358)	**(Prefix)-30-RR09**	20 1/8	(511)
		12	(305)	**(Prefix)-30-LR12**	18 3/8	(467)	**(Prefix)-30-SR12**	13 3/16	(335)	**(Prefix)-30-RR12**	18 3/8	(467)
		18	(457)	**(Prefix)-30-LR18**	14 15/16	(379)	**(Prefix)-30-SR18**	11 1/2	(292)	**(Prefix)-30-RR18**	14 15/16	(379)
		24	(609)	**(Prefix)-30-LR24**	11 1/2	(292)	**(Prefix)-30-SR24**	9 3/4	(248)	**(Prefix)-30-RR24**	11 1/2	(292)
36	(914)	6	(152)	**(Prefix)-36-LR06**	25 5/16	(643)	**(Prefix)-36-SR06**	16 11/16	(424)	**(Prefix)-36-RR06**	23 5/16	(643)
		9	(228)	**(Prefix)-36-LR09**	23 9/16	(598)	**(Prefix)-36-SR09**	15 13/16	(402)	**(Prefix)-36-RR09**	23 9/16	(598)
		12	(305)	**(Prefix)-36-LR12**	21 7/8	(555)	**(Prefix)-36-SR12**	14 15/16	(379)	**(Prefix)-36-RR12**	21 7/8	(555)
		18	(457)	**(Prefix)-36-LR18**	18 3/8	(467)	**(Prefix)-36-SR18**	13 3/16	(335)	**(Prefix)-36-RR18**	18 3/8	(467)
		24	(609)	**(Prefix)-36-LR24**	14 15/16	(379)	**(Prefix)-36-SR24**	11 1/2	(292)	**(Prefix)-36-RR24**	14 15/16	(379)
		30	(762)	**(Prefix)-36-LR30**	11 1/2	(292)	**(Prefix)-36-SR30**	9 3/4	(248)	**(Prefix)-36-RR30**	11 1/2	(292)

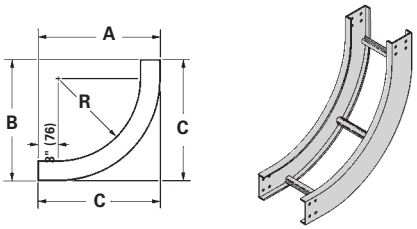
(Prefix) See page H-18 for catalog number prefix.

Width dimensions are to inside wall. Manufacturing tolerances apply to all dimensions.

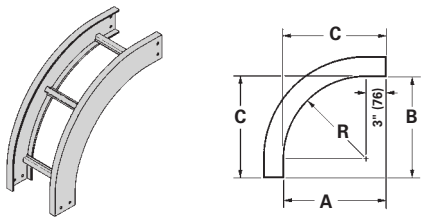
All dimensions in parentheses are millimeters unless otherwise specified.

Vertical Bend 90° (VO, VI)

1 pair splice plates with hardware included.



90° Vertical Inside



90° Vertical Outside

90° Vertical Inside Bend (VI)

Bend Radius R		Width		Catalog No.	VI Dimensions [in. (mm)]											
					Series 14 Steel			Series 15 Steel			Series 16 Steel			Series 17 Steel		
in.	(mm)	in.	(mm)		A	B	C	A	B	C	A	B	C	A	B	C
12	(305)	6	(152)	**(Pre)-06-90VI12**	$18^{7}/_{16}$ (468)	$18^{7}/_{16}$ (468)	$18^{7}/_{16}$ (468)	$19^{3}/_{16}$ (487)	$19^{3}/_{16}$ (487)	$19^{3}/_{16}$ (487)	$20^{3}/_{16}$ (513)	$20^{3}/_{16}$ (513)	$20^{3}/_{16}$ (513)	$21^{3}/_{16}$ (538)	$21^{3}/_{16}$ (538)	$21^{3}/_{16}$ (538)
		9	(228)	**(Pre)-09-90VI12**												
		12	(305)	**(Pre)-12-90VI12**												
		18	(457)	**(Pre)-18-90VI12**												
		24	(609)	**(Pre)-24-90VI12**												
		30	(762)	**(Pre)-30-90VI12**												
		36	(914)	**(Pre)-36-90VI12**												
24	(609)	6	(152)	**(Pre)-06-90VI24**	$30^{7}/_{16}$ (773)	$30^{7}/_{16}$ (773)	$30^{7}/_{16}$ (773)	$31^{3}/_{16}$ (792)	$31^{3}/_{16}$ (792)	$31^{3}/_{16}$ (792)	$32^{3}/_{16}$ (817)	$32^{3}/_{16}$ (817)	$32^{3}/_{16}$ (817)	$33^{3}/_{16}$ (843)	$33^{3}/_{16}$ (843)	$33^{3}/_{16}$ (843)
		9	(228)	**(Pre)-09-90VI24**												
		12	(305)	**(Pre)-12-90VI24**												
		18	(457)	**(Pre)-18-90VI24**												
		24	(609)	**(Pre)-24-90VI24**												
		30	(762)	**(Pre)-30-90VI24**												
		36	(914)	**(Pre)-36-90VI24**												

90° Vertical Outside Bend (VO)

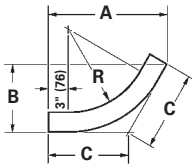
Bend Radius R		Width		Catalog No.	VO Dimensions [in. (mm)]		
					All Series 1		
in.	(mm)	in.	(mm)		A	B	C
12	(305)	6	(152)	**(Pre)-06-90VO12**	15 (381)	15 (381)	15 (381)
		9	(228)	**(Pre)-09-90VO12**			
		12	(305)	**(Pre)-12-90VO12**			
		18	(457)	**(Pre)-18-90VO12**			
		24	(609)	**(Pre)-24-90VO12**			
		30	(762)	**(Pre)-30-90VO12**			
		36	(914)	**(Pre)-36-90VO12**			
24	(609)	6	(152)	**(Pre)-06-90VO24**	27 (686)	27 (686)	27 (686)
		9	(228)	**(Pre)-09-90VO24**			
		12	(305)	**(Pre)-12-90VO24**			
		18	(457)	**(Pre)-18-90VO24**			
		24	(609)	**(Pre)-24-90VO24**			
		30	(762)	**(Pre)-30-90VO24**			
		36	(914)	**(Pre)-36-90VO24**			

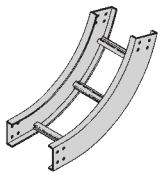
(Pre) See page H-18 for catalog number prefix.
Manufacturing tolerances apply to all dimensions.

All dimensions in parentheses are millimeters unless otherwise specified.

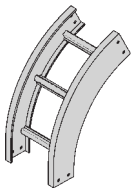
Vertical Bend 60° (VO, VI)

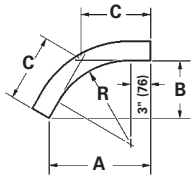
1 pair splice plates with hardware included.





60° Vertical Inside





60° Vertical Outside

60° Vertical Inside Bend (VI)

Bend Radius R in.	Bend Radius R (mm)	Width in.	Width (mm)	Catalog No.	VI Dimensions [in. (mm)] Series 14 Steel A	Series 14 Steel B	Series 14 Steel C	Series 15 Steel A	Series 15 Steel B	Series 15 Steel C	Series 16 Steel A	Series 16 Steel B	Series 16 Steel C	Series 17 Steel A	Series 17 Steel B	Series 17 Steel C
12	(305)	6	(152)	(Pre)-06-60VI12	$18\frac{1}{16}$ (459)	$10\frac{7}{16}$ (265)	12 (305)	$18\frac{1}{2}$ (470)	$10\frac{11}{16}$ (271)	$12\frac{3}{8}$ (314)	$19\frac{3}{8}$ (492)	$11\frac{3}{16}$ (284)	$12\frac{15}{16}$ (328)	$20\frac{1}{4}$ (514)	$11\frac{11}{16}$ (297)	$13\frac{1}{2}$ (343)
		9	(228)	(Pre)-09-60VI12												
		12	(305)	(Pre)-12-60VI12												
		18	(457)	(Pre)-18-60VI12												
		24	(609)	(Pre)-24-60VI12												
		30	(762)	(Pre)-30-60VI12												
		36	(914)	(Pre)-36-60VI12												
24	(609)	6	(152)	(Pre)-06-60VI24	$28\frac{7}{16}$ (722)	$16\frac{7}{16}$ (417)	$18\frac{15}{16}$ (481)	$28\frac{15}{16}$ (735)	$18\frac{11}{16}$ (424)	$19\frac{1}{4}$ (489)	$29\frac{3}{4}$ (755)	$17\frac{3}{16}$ (436)	$19\frac{7}{8}$ (505)	$30\frac{5}{8}$ (778)	$17\frac{11}{16}$ (449)	$20\frac{7}{16}$ (519)
		9	(228)	(Pre)-09-60VI24												
		12	(305)	(Pre)-12-60VI24												
		18	(457)	(Pre)-18-60VI24												
		24	(609)	(Pre)-24-60VI24												
		30	(762)	(Pre)-30-60VI24												
		36	(914)	(Pre)-36-60VI24												

60° Vertical Outside Bend (VO)

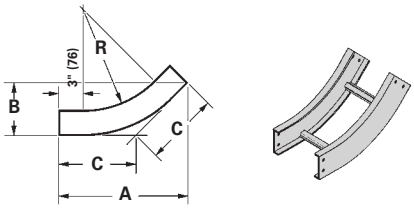
Bend Radius R in.	Bend Radius R (mm)	Width in.	Width (mm)	Catalog No.	VO Dimensions [in. (mm)] All Series 1 A	All Series 1 B	All Series 1 C
12	(305)	6	(152)	(Pre)-06-60VO12	$14\frac{7}{8}$ (378)	$8\frac{5}{8}$ (219)	$9\frac{15}{16}$ (252)
		9	(228)	(Pre)-09-60VO12			
		12	(305)	(Pre)-12-60VO12			
		18	(457)	(Pre)-18-60VO12			
		24	(609)	(Pre)-24-60VO12			
		30	(762)	(Pre)-30-60VO12			
		36	(914)	(Pre)-36-60VO12			
24	(609)	6	(152)	(Pre)-06-60VO24	$25\frac{5}{16}$ (643)	$14\frac{5}{8}$ (371)	$16\frac{7}{8}$ (428)
		9	(228)	(Pre)-09-60VO24			
		12	(305)	(Pre)-12-60VO24			
		18	(457)	(Pre)-18-60VO24			
		24	(609)	(Pre)-24-60VO24			
		30	(762)	(Pre)-30-60VO24			
		36	(914)	(Pre)-36-60VO24			

(Pre) See page H-18 for catalog number prefix.
Manufacturing tolerances apply to all dimensions.

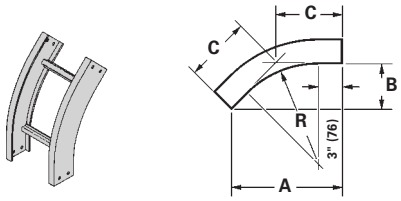
All dimensions in parentheses are millimeters unless otherwise specified.

Vertical Bend 45° (VO, VI)

1 pair splice plates with hardware included.



45° Vertical Inside



45° Vertical Outside

45° Vertical Inside Bend (VI)

Bend Radius R		Width		Catalog No.	VI Dimensions [in. (mm)]											
					Series 14 Steel			Series 15 Steel			Series 16 Steel			Series 17 Steel		
in.	(mm)	in.	(mm)		A	B	C	A	B	C	A	B	C	A	B	C
12	(305)	6	(152)	(Pre)-06-45VI12	$16^{3}/_{16}$ (411)	$6^{11}/_{16}$ (170)	$9^{1}/_{2}$ (241)	$16^{9}/_{16}$ (420)	$6^{7}/_{8}$ (174)	$9^{11}/_{16}$ (246)	$17^{1}/_{4}$ (438)	$7^{3}/_{16}$ (182)	$10^{1}/_{8}$ (257)	18 (457)	$7^{7}/_{16}$ (189)	$10^{9}/_{16}$ (268)
		9	(228)	(Pre)-09-45VI12												
		12	(305)	(Pre)-12-45VI12												
		18	(457)	(Pre)-18-45VI12												
		24	(609)	(Pre)-24-45VI12												
		30	(762)	(Pre)-30-45VI12												
		36	(914)	(Pre)-36-45VI12												
24	(609)	6	(152)	(Pre)-06-45VI24	$24^{11}/_{16}$ (627)	$10^{3}/_{16}$ (259)	$14^{7}/_{16}$ (367)	$25^{1}/_{16}$ (792)	$10^{3}/_{8}$ (792)	$14^{11}/_{16}$ (373)	$25^{3}/_{4}$ (654)	$10^{11}/_{16}$ (271)	$15^{1}/_{16}$ (382)	$26^{1}/_{2}$ (673)	11 (279)	$15^{1}/_{2}$ (394)
		9	(228)	(Pre)-09-45VI24												
		12	(305)	(Pre)-12-45VI24												
		18	(457)	(Pre)-18-45VI24												
		24	(609)	(Pre)-24-45VI24												
		30	(762)	(Pre)-30-45VI24												
		36	(914)	(Pre)-36-45VI24												

45° Vertical Outside Bend (VO)

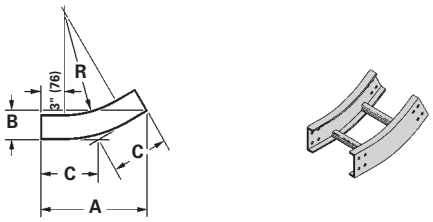
Bend Radius R		Width		Catalog No.	VO Dimensions [in. (mm)]		
					All Series 1		
in.	(mm)	in.	(mm)		A	B	C
12	(305)	6	(152)	(Pre)-06-45VO12	$13^{5}/_{8}$ (346)	$5^{5}/_{8}$ (143)	8 (203)
		9	(228)	(Pre)-09-45VO12			
		12	(305)	(Pre)-12-45VO12			
		18	(457)	(Pre)-18-45VO12			
		24	(609)	(Pre)-24-45VO12			
		30	(762)	(Pre)-30-45VO12			
		36	(914)	(Pre)-36-45VO12			
24	(609)	6	(152)	(Pre)-06-45VO24	$22^{1}/_{16}$ (560)	$9^{1}/_{8}$ (232)	$12^{15}/_{16}$ (328)
		9	(228)	(Pre)-09-45VO24			
		12	(305)	(Pre)-12-45VO24			
		18	(457)	(Pre)-18-45VO24			
		24	(609)	(Pre)-24-45VO24			
		30	(762)	(Pre)-30-45VO24			
		36	(914)	(Pre)-36-45VO24			

(Pre) See page H-18 for catalog number prefix.
Manufacturing tolerances apply to all dimensions.

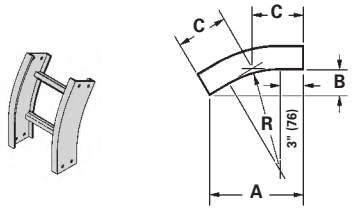
All dimensions in parentheses are millimeters unless otherwise specified.

Vertical Bend 30° (VO, VI)

1 pair splice plates with hardware included.



30° Vertical Inside



30° Vertical Outside

30° Vertical Inside Bend (VI)

Bend Radius R		Width		Catalog No.	VI Dimensions [in. (mm)]											
					Series 14 Steel			Series 15 Steel			Series 16 Steel			Series 17 Steel		
in.	(mm)	in.	(mm)		A	B	C	A	B	C	A	B	C	A	B	C
12	(305)	6	(152)	(Pre)-06-30VI12	13 7/16 (341)	3 5/8 (92)	7 3/16 (182)	13 11/16 (347)	3 11/16 (93)	7 5/16 (186)	14 3/16 (360)	3 13/16 (97)	7 5/8 (193)	14 11/16 (373)	3 15/16 (100)	7 7/8 (200)
		9	(228)	(Pre)-09-30VI12												
		12	(305)	(Pre)-12-30VI12												
		18	(457)	(Pre)-18-30VI12												
		24	(609)	(Pre)-24-30VI12												
		30	(762)	(Pre)-30-30VI12												
		36	(914)	(Pre)-36-30VI12												
24	(609)	6	(152)	(Pre)-06-30VI24	19 7/16 (494)	5 3/16 (132)	10 7/16 (265)	19 11/16 (500)	5 5/16 (135)	10 9/16 (268)	20 3/16 (513)	5 7/16 (138)	10 13/16 (274)	20 11/16 (525)	5 9/16 (141)	11 1/16 (281)
		9	(228)	(Pre)-09-30VI24												
		12	(305)	(Pre)-12-30VI24												
		18	(457)	(Pre)-18-30VI24												
		24	(609)	(Pre)-24-30VI24												
		30	(762)	(Pre)-30-30VI24												
		36	(914)	(Pre)-36-30VI24												

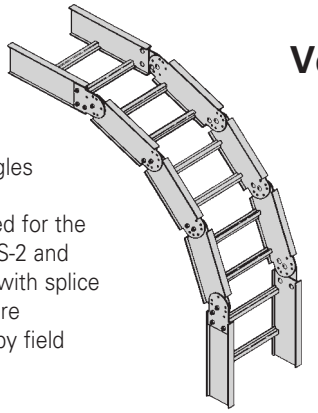
30° Vertical Outside Bend (VO)

Bend Radius R		Width		Catalog No.	VO Dimensions [in. (mm)]		
					All Series 1		
in.	(mm)	in.	(mm)		A	B	C
12	(305)	6	(152)	(Pre)-06-30VO12	11 5/8 (295)	3 1/8 (79)	6 3/16 (157)
		9	(228)	(Pre)-09-30VO12			
		12	(305)	(Pre)-12-30VO12			
		18	(457)	(Pre)-18-30VO12			
		24	(609)	(Pre)-24-30VO12			
		30	(762)	(Pre)-30-30VO12			
		36	(914)	(Pre)-36-30VO12			
24	(609)	6	(152)	(Pre)-06-30VO24	17 5/8 (448)	4 11/16 (119)	9 7/16 (240)
		9	(228)	(Pre)-09-30VO24			
		12	(305)	(Pre)-12-30VO24			
		18	(457)	(Pre)-18-30VO24			
		24	(609)	(Pre)-24-30VO24			
		30	(762)	(Pre)-30-30VO24			
		36	(914)	(Pre)-36-30VO24			

(Pre) See page H-18 for catalog number prefix.
Manufacturing tolerances apply to all dimensions.

All dimensions in parentheses are millimeters unless otherwise specified.

Vertical Bend Segments (VBS)



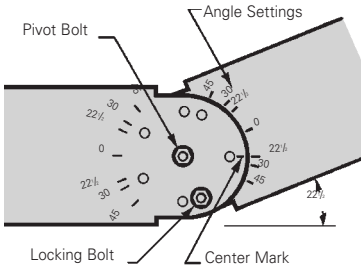
Adjustable Vertical Bends are made up of one or more vertical bend segments and can be used as a vertical inside (VI) or vertical outside (VO) bend. This design provides for vertical changes in direction with angles 45˚, 60˚ and 90˚ for 12" (305 mm) or 24" (609 mm) radius. The chart below shows the number of segments required for the various combinations of angles and radii. The VBS-1, VBS-2 and VBS-3 include one, two or three segments respectively with splice plates and hardware. Holes for setting standard angles are pre-punched in each segment. Other angles can be set by field drilling another hole for the locking bolt.

Available for 148P and 148G only.

Nominal Bend Radius in. (mm)	Catalog No.	Dimensions VO A in. (mm)	VO B in. (mm)	VO R in. (mm)	VI A in. (mm)	VI B in. (mm)	VI R in. (mm)
90˚ Vertical Inside or Outside							
12 (305)	**14(*)-(‡)-VBS-1**	8 1/4 (210)	8 1/4 (210)	6 1/2 (165)	12 1/8 (303)	12 1/8 (303)	10 1/2 (267)
24 (609)	**14(*)-(‡)-VBS-3**	24 (610)	24 (610)	22 1/4 (565)	27 7/8 (708)	27 7/8 (708)	26 1/4 (667)
60˚ Vertical Inside or Outside							
12 (305)	**14(*)-(‡)-VBS-1**	11 3/4 (298)	6 1/2 (165)	12 (305)	14 3/4 (375)	8 1/2 (216)	16 (406)
24 (609)	**14(*)-(‡)-VBS-2**	11 3/4 (298)	6 1/2 (165)	12 (305)	14 3/4 (375)	8 1/2 (216)	16 (406)
45˚ Vertical Inside or Outside							
12 (305)	**14(*)-(‡)-VBS-1**	12 3/4 (324)	5 1/4 (133)	17 1/8 (435)	15 1/2 (394)	6 7/8 (175)	21 (540)
24 (609)	**14(*)-(‡)-VBS-1**	12 3/4 (324)	5 1/4 (133)	17 1/8 (435)	15 1/2 (394)	6 7/8 (175)	21 (540)

Notes:
1. (*) Insert material type: P=Pre Galvanized, G=HDGAF
2. (‡) Insert width 6, 9, 12, 18, 24, 30, 36

Fitting Hole Pattern



Setting the Angle

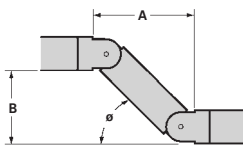
To find correct angle setting, divide angle of offset by the number of segments plus one. The result is equal to the angle setting stamped on the vertical bend segment and the splice plate. After inserting center pivot bolt, align the mark at the end of the segment or splice plate with the angle and insert locking bolt in the pre-punched hole.

Example: 90˚ bend, 24" radius requires 3 segments
3 segments + 1 = 4
90˚ divided by 4 = 22 1/2˚
Set all vertical segments at 22 1/2˚

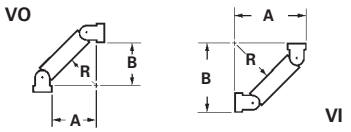
Offset Dimensions

One vertical bend segment can be used to complete a vertical offset. Offset dimensions are shown.

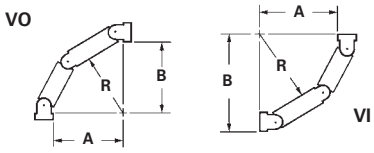
Angle ø	A in. (mm)	B in. (mm)
45˚	12 (305)	8 1/2 (216)
30˚	14 (355)	5 3/4 (146)
22 1/2˚	14 1/4 (362)	5 (127)



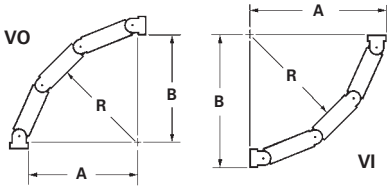
VBS-1 (1 Segment)



VBS-2 (2 Segments)



VBS-3 (3 Segments)



Green = Fastest shipped items Black = Normal lead-time items Red = Normally long lead-time items

All dimensions in parentheses are millimeters unless otherwise specified.