

Grounding Connectors and Accessories

Flexible Braids for Continuous current, Grounding and Bonding Applications (i.e: Cable Tray)

Standard construction using 30 AWG individual wires are suitable for medium duty applications. If needed, all constructions and/or configurations in this Guide, can be supplied using 36 AWG for extra flexibility.

Rating of the Connectors

It is important to note that the Ampere ratings in this Guide are suggested for use as a reference only. If needed, we can certify ampacity of all connectors in our top of the line automatic heat cycle laboratory using CEI60694 standards. Performance certificate gives you the assurance that our connectors are suitable for your application. Actual values used for a given application will depend on such factors as temperature rise, number of braids, voltage ratings and other conditions of service needs to be verified by application engineers.



Length of the assemblies

All braid lengths are measured in inches and are measured from end to end. The last digits of the part numbers determine the length of the connector. (i.e.: FBD12, "12" = 12 inches)



Ferrules and Plating

Ferrules are made of high conductivity seamless 99.9% pure copper that are electro-tin plated prior to forming on each end of the assembly. This procedure is important to eliminate surface corrosion between the inside of the ferrule and the braids before compression can affect the connector's performance.

For increased pad conductivity, 30, 50 or 100 micron silver plated ferrules are available. Nickel plating or bare copper also available upon request.

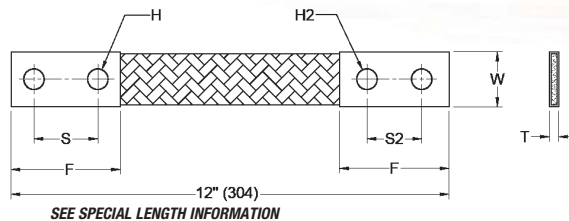
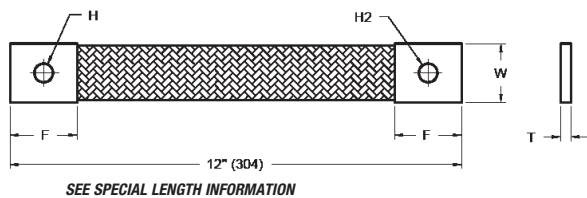


Options

For special requests, provide a copy of your drawing with your specific requirements so we can design and build the flexible connectors to your exact specifications.

If needed, a wide range of insulation products are available depending on the application, voltage and temperature ratings.

Grounding Connectors and Accessories



C o m p r e s s i o n

CAT. NO.	Circular Mils	Bolt Hole (H or H2)	No. of Braids in Ferrule	Dimensions in. (mm)			
				(T) Thickness	(W) Width	(F) Ferrule Length	(S or S2) Distance Ctr. to Ctr
FB812-1*	24000	1/4	1	0.140 (3.6)	0.625 (15.9)	0.750 (19.1)	N/A
FBC12-1*	48000	7/16	1	0.148 (3.8)	1.000 (25.4)	1.300 (33.0)	N/A
FBD12-1*	76800	7/16	1	0.200 (5.1)	1.000 (25.4)	1.300 (33.0)	N/A
FBD12*	76800	7/16	1	0.200 (5.1)	1.000 (25.4)	2.500 (63.5)	1.25 (31.8)
FB2D12-1*	153600	7/16	2	0.250 (6.4)	1.250 (31.8)	1.500 (38.1)	N/A
FB2D12*	153600	7/16	2	0.250 (6.4)	1.250 (31.8)	2.500 (63.5)	1.25 (31.8)
FB3D12-1*	230400	7/16	3	0.350 (8.9)	1.250 (31.8)	1.500 (38.1)	N/A
FB3D12*	230400	7/16	3	0.350 (8.9)	1.250 (31.8)	2.500 (63.5)	1.25 (31.8)
FBXD12-1*	105600	9/16	1	0.250 (6.4)	1.250 (31.8)	1.500 (38.1)	N/A
FBXD12*	105600	9/16	1	0.250 (6.4)	1.250 (31.8)	2.500 (63.5)	1.25 (31.8)
FB2XD12-1*	211200	9/16	2	0.350 (8.9)	1.250 (31.8)	1.500 (38.1)	N/A
FB2XD12*	211200	9/16	2	0.350 (8.9)	1.250 (31.8)	2.500 (63.5)	1.25 (31.8)
FB3XD12-1*	316800	9/16	3	0.400 (10.2)	1.250 (31.8)	1.500 (38.1)	N/A
FB3XD12*	316800	9/16	3	0.400 (10.2)	1.250 (31.8)	2.500 (63.5)	1.25 (31.8)
FBE12-1*	168000	9/16	1	0.500 (12.7)	1.250 (31.8)	2.500 (63.5)	N/A
FBD12*	168000	9/16	1	0.250 (6.4)	1.250 (31.8)	3.500 (88.9)	1.75 (44.5)
FB2E12-1*	336000	9/16	1	0.500 (12.7)	1.250 (31.8)	2.500 (63.5)	N/A
FB2E12*	336000	9/16	2	0.500 (12.7)	1.250 (31.8)	3.500 (88.9)	1.75 (44.5)
FB3E12	504000	9/16	3	0.750 (19.1)	1.250 (31.8)	3.500 (88.9)	1.75 (44.5)
FB4E12	672000	9/16	4	1.000 (25.4)	1.250 (31.8)	3.500 (88.9)	1.75 (44.5)
FBF12	230400	9/16	1	0.300 (7.6)	1.500 (38.1)	3.500 (88.9)	1.75 (44.5)
FB2F12	460800	9/16	2	0.450 (11.4)	1.500 (38.1)	3.500 (88.9)	1.75 (44.5)
FB3F12	691200	9/16	3	0.600 (15.2)	1.625 (41.2)	3.500 (88.9)	1.75 (44.5)
FB4F12	921600	9/16	4	0.750 (19.1)	1.625 (41.2)	3.500 (88.9)	1.75 (44.5)
FBG12	307200	9/16	1	0.380 (9.7)	1.500 (38.1)	3.500 (88.9)	1.75 (44.5)
FB2G12	614400	9/16	2	0.630 (16.0)	1.625 (41.2)	3.500 (88.9)	1.75 (44.5)
FB3G12	921600	9/16	3	0.850 (21.6)	1.625 (41.2)	3.500 (88.9)	1.75 (44.5)
FB4G12	1228800	9/16	4	1.000 (25.4)	1.880 (47.9)	3.500 (88.9)	1.75 (44.5)

* Listed UL 467 and 486A, certified CSA C22.2 No. 41 as Grounding and Bonding Equipment.
 Special lengths offered in 6, 18, 24, 30 and 36 inches (end to end).
 Change the 12 in the above catalogue numbers to the desired length.
 (-1) indicates 1 bolt hole per ferrule.
 S2 and H2 measurements are used for customized braids only.

Flexible Braid in a roll (10 foot minimum)













CAT. NO.	Circular Mils	Thickness (in.)	Width (in.)
FB8RL	24000	0.140 (3.6)	0.625 (15.9)
FBCRL	48000	0.148 (3.8)	1.000 (25.4)
FBDRL	76800	0.200 (5.1)	1.000 (25.4)
FBXDRL	105600	0.250 (6.4)	1.250 (31.8)

Ferrules or lugs not included.
 Add suffix for desired length, i.e.: FBCRL "-10" for 10' roll.

Grounding Connectors and Accessories

C o m p r e s s i o n







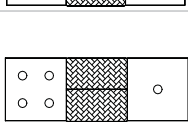
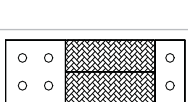

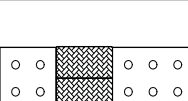
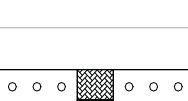
Technical Specifications

Configuration	Type	Ind. Wire Gauge Size	Width Range (in.)	Rating Range (Amps)	Comments
Extra-flexible Links for Heavy-Duty Application					
	FBEXA	36 AWG	1-1/2 – 1-5/8	350 – 1000 A	Extra Flexible 1 hole NEMA Boreal's Top of the line
	FBEXB	36 AWG	1-1/2 – 1-5/8	400 – 2000 A	Extra Flexible 2 hole NEMA Boreal's Top of the line
	FBEXG	36 AWG	1-3/4 – 2	900 – 1650 A	Extra Flexible Transformer Link
	FBEXH	36 AWG	3 – 4	1400 – 4000 A	Extra Flexible 4 hole NEMA Boreal's Top of the line
	FBEXJ	36 AWG	3-1/4 – 3-3/4	2300 – 3600 A	Extra Flexible 90° 4 hole NEMA Boreal's Top of the line
Standard flexible Links for Medium-Duty Application					
	FBB**-1 FBC**-1 FBD**-1	30 AWG	1-1/4 – 1-3/4	350 – 1000 A	NEMA std. Grounding Connectors
	FBD** FB2D** FB3D** FBXD** FB2XD**	30 AWG	1-1/2 – 1-5/8	400 – 2000 A	Same as FBEXB with 30 awg wires
		30 AWG	1-1/2 – 2	700 – 1750 A	Standard Transformer Link
	FBSWB	30 AWG	1-1/2 – 2	700 – 1750 A	Same construction as FBSWB with different hole pattern
	FBSWC	30 AWG	3	1300 – 2350 A	4 hole pads also available in wider configuration, refer to FBEXH, FBSWD and FBLTL series
	FBSWC	30 AWG	3	1300 – 2350 A	Same construction as FBSWC Type A with different hole configuration
	FBSWC	30 AWG	3	1300 – 2350 A	Same construction as FBSWC Type A with different hole configuration
	FBSWC	30 AWG	3	1300 – 2350 A	Same construction as FBSWC Type A with different hole configuration

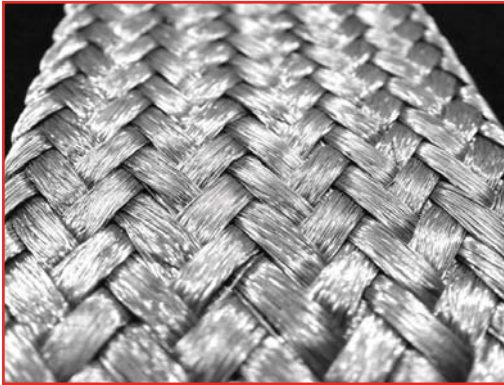
** specify desired length

Grounding Connectors and Accessories

Technical Specifications

Configuration	Type	Ind. Wire Gauge Size	Width Range (in.)	Rating Range (Amps)	Comments
Standard Flexible Links for Medium-Duty Application					
	FBSWC	30 AWG	3	1300 – 2350 A	Same construction as FBSWC with different hole configuration
	FBSWC	30 AWG	3	1300 – 2350 A	Same construction as FBSWC with different hole configuration
	FBSWC	30 AWG	3	1300 – 2350 A	Same construction as FBSWC with different hole configuration
	FBSWC	30 AWG	3	1300 – 2350 A	Same construction as FBSWC with different hole configuration
	FBSWC	30 AWG	2 – 4	600 – 1850 A	Same construction as FBSWC with different hole configuration
	FBSWD	30 AWG	3-3/4 – 4-3/4	1600 – 2100 A	4 holes Transformer Link
	FBSWC	30 AWG	3	1300 – 2100 A	1 to 4 holes Transformer Link
	FBSWD	30 AWG	3-3/4 – 4-3/4	1300 – 2100 A	1 to 4 holes Transformer Link
	FBSWD	30 AWG	3-3/4 – 4-3/4	1600 – 2100 A	2 to 4 holes Transformer Link
	FBSWD	30 AWG	3-3/4 – 4-3/4	1600 – 2100 A	3 to 4 holes transformer Link
	FBSWE	30 AWG	3	1400 – 1600 A	6 to 4 holes Transformer Link
	FBSWF	30 AWG	3-3/4 – 4-3/4	1700 – 2300 A	6 to 4 holes Transformer Link
	FBSWE	30 AWG	3	1400 – 1600 A	6 holes Transformer Link
	FBSWF	30 AWG	3-3/4 – 4-3/4	1700 – 2300 A	6 holes Transformer Link

Grounding Connectors and Accessories



Conductors

Strands are soft-drawn bare or tinned copper.

Construction

Strands are woven into a tubular braid and rolled flat.

Application

For bonding, grounding or connecting moving parts.

Specification

ASTM-B33

Assemblies

Factory Installed molded connectors also available.

The following listing represents the most popular flat braid constructions used in specialized electrical industry applications. For other constructions, contact a T&B sales representative or your regional T&B sales office.

Cat. No.	AWG Size	Circular Mil Area	Numbers and Size of Wires	Construction	Nominal Width (in.)	Nominal Thick. (in.)	Approx Weight (lb/m)
FB-4243230-1*	300 kcmil	307,200	3,072 / 30	4 x (24 x 32/30)	1-3/8	0.420	1,110
FB-1485230-1	250 kcmil	249,600	2,496 / 30	48 x 52/30	2-1/2	0.190	900
FB-3243230-1	4/0	230,400	2,304 / 30	3 x (24 x 32/30)	1-1/4	0.375	825
FB-2243230-1	3/0	153,600	1,536 / 30	2 x (24 x 32/30)	1-1/8	0.250	560
FBXDRL	1/0	105,600	1,056 / 30	24 x 44/30	1	0.135	365
FB-1482230-1	1/0	105,600	1,056 / 30	48 x 22/30	1-3/8	0.120	365
FB-1488436-1	1/0	100,800	4,032 / 36	48 x 84/36	1-5/8	0.080	360
FBDRRL	1	76,800	768 / 30	24 x 32/30	1	0.125	200
FB-12412036-1	2	72,000	2,880 / 36	24 x 120/36	1	0.135	240
FB-1485036-1	2	60,000	2,400 / 36	48 x 50/36	1-1/4	0.090	205
FB-CRL	3	48,000	480 / 30	24 x 20/30	3/4	0.110	170
FB-1484036-1	3	48,000	1,920 / 36	48 x 40/36	1	0.090	160
FB-1488640-1	4	41,280	4,128 / 40	48 x 86/40	1	0.060	140
FB-1246736-1	4	40,200	1,608 / 36	24 x 67/36	3/4	0.090	135
FB-1241630-1	4	38,400	384 / 30	24 x 16/30	5/8	0.085	125
FB-BRL	6	24,000	210 / 30	24 x 10/30	1/2	0.080	83
FB-1244036-1	6	24,000	960 / 36	24 x 40/36	1/2	0.090	80
FB-14810644-2	7	20,350	5,088 / 44	48 x 106/44	5/8	0.050	68
FB-1480836-1	10	9,600	384 / 36	48 x 8/36	1/2	0.030	39
FB-1241636-1	10	9,600	384 / 36	24 x 16/36	3/8	0.060	39
FB-1480636-1	12	7,200	288 / 36	48 x 6/36	3/8	0.030	28
FB-1481036-1	12	6,000	240 / 36	24 x 10/36	1/4	0.030	23

* The suffix "-1" denotes tinned copper braid. For bare copper braid, replace "-1" with "-2".
NOTE: Dimensions shown are only approximate due to the extreme flexibility of braided cables.

Grounding Connectors and Accessories

C o m p r e s s i o n

Conductors

Strands are soft-drawn bare or tinned copper.

Construction

Strands are woven into a tubular braid.

Application

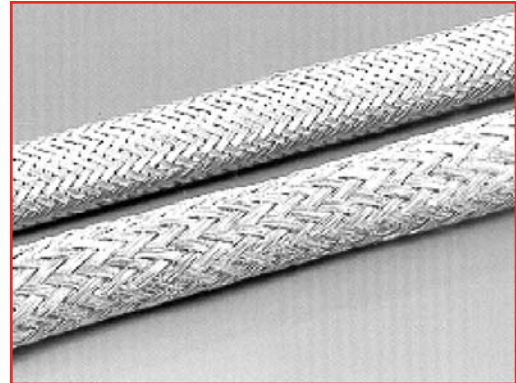
For bonding, grounding or connecting moving parts.

Specification

ASTM-B33, QQ-B-375

Shield Coverage

Braid is formed to maintain coverages of 90% shielding over the nominal diameters specified.



The following listing represents the most popular tubular braid constructions used in today's electrical and electronic industries. For other constructions, contact our customer service department.

Cat. No.	Nominal I.D. when Rounded	Nominal Circular Mil Area	AWG Size Equivalent	Number and Size of Wires	Construction	Approx. Weight (lb / m)
TB - 481630	2-1/4	77,180	1	768 / 30	48 x 16 / 30	260
TB - 481430*	2	67,540	2	672 / 30	48 x 14 / 30	230
TB - 481230*	1-1/2	57,890	3	576 / 30	48 x 12 / 30	200
TB - 481130*	1-3/8	53,060	3	528 / 30	48 x 11 / 30	185
TB - 481030	1-1/4	48,240	3	480 / 30	48 x 10 / 30	168
TB - 480930*	1-1/8	43,420	4	432 / 30	48 x 9 / 30	155
TB - 480830*	1	38,600	4	384 / 30	48 x 8 / 30	140
TB - 480730*	7/8	33,770	5	336 / 30	48 x 7 / 30	123
TB - 481234	13/16	22,896	7	576 / 34	48 x 12 / 34	85
TB - 481836*	25/32	21,600	7	864 / 36	48 x 18 / 36	79
TB - 480734*	1/2	13,356	9	336 / 34	48 x 7 / 34	53
TB - 481136*	1/2	13,200	9	528 / 36	48 x 11 / 36	53
TB - 240730*	3/8	16,880	8	168 / 30	24 x 7 / 30	62
TB - 480836*	3/8	9,600	10	384 / 36	48 x 8 / 36	40
TB - 240834	3/8	7,632	11	192 / 34	24 x 8 / 34	30
TB - 241336*	13/64	7,800	11	312 / 36	24 x 13 / 36	31
TB - 240734	1/4	6,678	12	168 / 34	24 x 7 / 34	26
TB - 240536*	1/8	3,000	15	120 / 36	24 x 5 / 36	13
TB - 240436*	7/64	2,400	16	96 / 36	24 x 4 / 36	11

* Denotes QQ-B-575 construction
 NOTE: Because Tubular Braid is very pliable, the I.D.'s are nominal.

Grounding Connectors and Accessories

Flexible Braids Selection Guide

Minimum Size Flexible Braid for Continuous Current Applications



Cat. No.	Circular Mils	Amperage Capacity
FBB12-1	24000	95
FBC12-1	48000	145
FBD12-1	76800	190
FBD12	76800	190
FB2D12-1	153600	330
FB2D12	153600	630
FB3D12-1	230400	470
FB312	230400	470
FBXD12-1	105600	235
FBXD12	105600	235
FB2XD12-1	211200	400
FB2XD12	211200	400
FB3XD12-1	316800	600
FB3XD12	316800	600

Cat. No.	Circular Mils	Amperage Capacity
FBE12-1	16800	340
FBE12	16800	340
FB2E12-1	336000	530
FB2E12	336000	530
FB3E12	504000	700
FB4E12	672000	805
FBF12	230400	360
FB2F12	460800	600
FB3F12	691200	820
FB4F12	921600	1000
FBG12	307200	415
FB2G12	614400	700
FB3G12	921600	760
FB4G12	1228800	1200

C o m p r e s s i o n

Grounding and Bonding Information

Minimum Size Conductors for Bonding Raceways and Equipment

Rating or Setting of overcurrent Device in Circuit Ahead of Equipment, Conduit, etc. Not Exceeding – Amperes	Copper Wire Circular Mils
200	26 240 (6 AWG)
300	41 740 (4 AWG)
400	52 620 (3 AWG)
500	66 360 (2 AWG)
600	83 690 (1 AWG)
800	105 600 (1/0)
1000	133 100 (2/0)
1200	167 800 (3/0)
1600	211 600 (4/0)
2000	250 000
2500	350 000
3000	400 000
4000	500 000
5000	700 000
6000	800 000

Based on table 16 C.E.C.

Minimum Size of Bare Copper Grounding Conductor

Maximum Available Short Circuit Current Amperes	Maximum Fault Duration with Exothermic Weld, Compression or Bolted Joint	
	0.5 Second Circular Mils	1.0 Second Circular Mils
5000	26 240	41 740
10 000	52 620	83 690
15 000	83 690	105 600
20 000	105 600	167 800
25 000	133 100	211 600
35 000	211 600	250 000
40 000	211 600	300 000
50 000	250 000	350 000
60 000	30 000	500 000
70 000	350 000	600 000
80 000	400 000	600 000
90 000	500 000	700 000
100 000	500 000	700 000

Based on table 51 C.E.C.
Size calculated in accordance with IEEE No. 80.