

Overview

The Color-Keyed method is better

The Color-Keyed method of installing compression connectors on power cables is designed to provide a high degree of reliability in electrical wiring.

This method allows electrical workers to make installations with little effort and at a considerable savings in time. The benefit, of course, is a high-quality connection at a low installed cost.

Blackburn connectors featuring the Color-Keyed system are banded by colored stripes or engraving to indicate location of die on connector for compression. ABB uses full-width and half-width dies dependent on connector size and tool used.

Half-width dies are marked with the letter “H” after the die code number. Refer to the instruction sheet supplied with the connectors for information regarding strip length, die selection and number of compressions required.

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Just four easy steps to a perfect connection!



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01

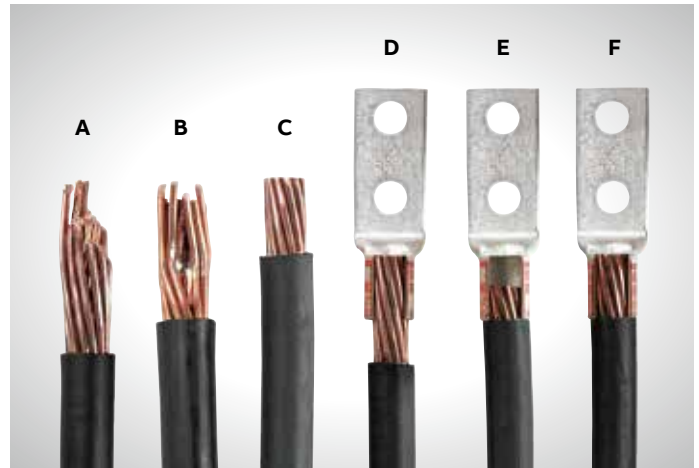
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01 Strip the insulation
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02 Stripping types and conductor connections

Step 1

Carefully strip the insulation on de-energized wires to avoid nicking or cutting conductors (wire brush if required).

Stripping types:

- **A** – Strand cut
- **B** – Nicked strands
- **C** – Good strip



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02

Strip the insulation to the proper length so that conductors can be fully inserted into the connector barrel.

Conductor connections:

- **D** – Strip length too long
- **E** – Strip length too short
- **F** – Strip length just right



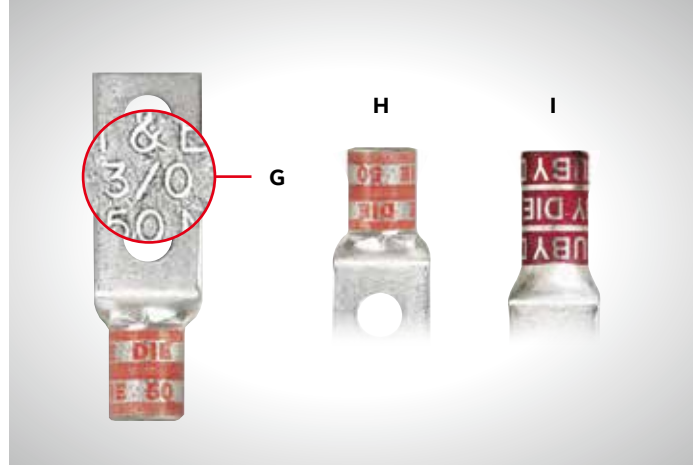
03

- * Aluminum lugs with a "9" indicate 90 °C rating
- 03 Select the connector for the cable size
- 04 Connector types and markings

Step 2

Determine the proper Color-Keyed connector for the cable size being used. Connectors are marked to show cable size and material:

- **G** – Cable size
- **H** – Copper (die located BETWEEN bands)
- **I** – Aluminum (die located ON bands)



04

Connector types:

- Connectors marked with just cable size or CU should be used on copper conductors only
- Connectors marked "AL9" with the cable size should be used on aluminum conductors only
- Connectors marked "AL9CU" with the cable size may be used on aluminum or copper conductors



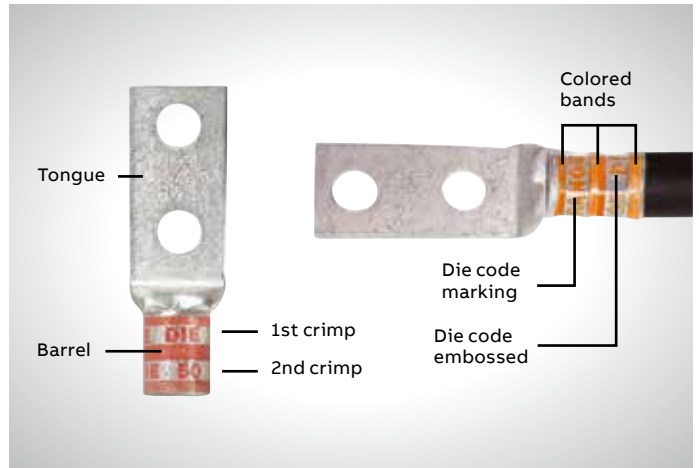
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- 05 Select the installing die
- 06 Color-Keyed bands and die location for compression

Step 3

Select the proper installing die and appropriate tool. Blackburn connectors featuring the Color-Keyed system have colored bands or colored dots that correspond to color markings on the dies.

Connectors and dies also have a die code number marked or stamped on them. Dies have a code number engraved in the crimp surface.



06

Step 4

Locate tool with correct die in proper position on connector and activate tool. When making multiple crimps, make the first crimp nearest the tongue and work towards the barrel end.

When properly crimped, the die code number will be embossed on the connector for easy inspection to determine if correct die and connector combination were used.

Overview

Precision dies for homogenous mass

The Color-Keyed method utilizing compression tools with matching dies forms the connector and conductor into a solid, homogenous mass to provide an optimum electrical bond between connector and conductor.

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01 Locate tool with correct die in proper position on connector and activate tool.

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02 Before compression, a typical cross section of cable and connector consists of about 75% metal and 25% air.

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03 After air compression by the Color-Keyed method, the cross section looks like this, nearly 100% metal with virtually no air spaces.

Color-Keyed method dies are designed to produce a circumferential, hex- or diamond-shaped compression rather than a simple indent. Precision dies are an integral part of the ABB method.

The precision hardened steel dies exert tremendous, controlled pressure on the connector and conductor. The dies compress the connector around the cable, converting the round strands to hexagonal or diamond shapes and forming the strands and connector into a solid mass. Each die is designed so that all conductors receive the same amount of compression force.

The circumferential compression creates a large area of high-pressure contact between cable and connector which, in turn, assures high conductivity, low resistance, and high pullout values which exceed UL requirements. These features result in a permanent, low installed cost connection. You can install it, and forget it.

The Color-Keyed system tells you where to place the installing die

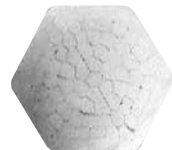
Blackburn connectors featuring the Color-Keyed system not only identify the correct installing die to be used for positive compressions, but also indicate the proper placement of the die on the connector. This is done by the bands of color on the connector which match the color on the dies. Compression is made between or on these color bands. The color name is also spelled on the connector as an added means of identification.

Color-Keyed dies offer inspection capability

Dies that are used in Color-Keyed hand and hydraulic tools contain the “die code” numbers which are engraved on the compression surface of the die. Under compression, this number becomes embossed on the completed connection for inspection purposes. The inspector compares the die code number embossed on the connector with the die table to ensure that the proper connector was compressed with the correct die for that particular size conductor.



02



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Battpac® LT Pump
350 kcmil AL. The battery-powered hydraulic pump, rated for 10,000 psi. Portable power for all Color-Keyed hydraulic heads, using just one Ni-MH 24V rechargeable battery.



TBM62PCR-LI
Designed for one-handed control ram advancement and retraction. Capacity up to Cu #8-600 kcmil Al #8-400 kcmil.



TBM6S Hand-operated crimping tool features Shure-Stake mechanism to ensure a completed crimp. For connectors up to 500 kcmil Cu, 350 kcmil Al.



Quality tooling with the Shure-Stake® mechanism

Color-Keyed manual tools with the exclusive Shure-Stake mechanism take the guesswork out of making compression connections. The Shure-Stake mechanism provides a full cycle compression stroke every time. Once the stroke has started, the tool will not release the connector until the proper amount of force has been applied. This is your assurance of a fully compressed connection. ABB compression tools develop uniform, controlled pressure to each connector within their size range. Color-Keyed offers electric and battery-powered hydraulic pumps with a Shure-Stake feature that guarantees a full cycle compression.

Color-Keyed method components meet industry standards

Depending on the application, all Color-Keyed copper connectors meet UL Std. 486A for code stranded and 24 gauge flex, CSA Std. C22.2, No. 65 600 V requirements for power and UL Std. 467, CSA Std. 22.2 No. 0.4 requirements for direct buried grounding.

Color-Keyed method connectors are available in a range of sizes and styles to accommodate #8 AWG through 1000 kcmil and larger copper or 2000 kcmil and larger aluminum cable. They may be compressed

on cable with either manual or hydraulic tools. They are offered with standard length or long barrels,

with one bolt or two bolt holes, or in two-way styles, for splicing applications. Two-way connectors are compact, providing high pullout values with low resistance.

Blackburn two-hole lugs featuring the Color-Keyed system are ideal for bus bar applications that require two bolts to prevent lug rotation. The Color-Keyed method is the most efficient, highest quality connection that has been engineered and delivers the best electrical performance and highest reliability.

Color-Keyed compression connectors eliminate risk of problems relating to loose connections when installed properly.

High-grade materials incorporated in Color-Keyed method

Low installed cost connections of superior quality can be achieved only through the use of high-grade components. That is an important part of the ABB method – quality products you can depend on.

Copper Blackburn connectors featuring the Color-Keyed system are made of high-conductivity wrought copper, and are electro tin plated to prevent corrosion and to improve conductivity. Color-Keyed Blackburn connectors featuring the Color-Keyed system offer the thickest tin plating in the industry. Other copper connectors for heavy-duty use and grid grounding applications are made of high-conductivity cast copper, bright finished.

High-conductivity cast aluminum connectors are available for heavy-duty application.

Overview

Special lugs – Angled, shaped and trimmed

ABB can solve your difficult wire bending and terminating problems in confined power distribution panels, switchgear and motor control enclosures.



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01 Special lugs – Angled, shaped and trimmed

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02 Examples of customized connectors for copper cables

We have the design and production capability to deliver exactly the type lug you need, shaped the way you need:

- Straight, 15°, 30°, 45°, 60° and 90° angle
- Stacking or non-stacking
- Narrow tongue or standard
- Tin, silver, lead, nickel

ABB offers an extensive line of copper Blackburn lugs featuring the Color-Keyed system for #8 AWG through 1000 kcmil flex and code cables. The lug tongues are modified in several different configurations to meet your exact needs: 45° and 90° bend angles, narrow tongues to fit into circuit breakers, offset tongues to stack two cables and special stud hole drilling.

These special configurations let you:

- 1) Run cable directly to the bus bar with no bending.
- 2) Terminate into very narrow spaces.
- 3) Utilize minimal bus bar space.

Customized connectors for copper cables

- Standard and special tongue angles, stacking and nonstacking, bolt holes sizes and centers, protective platings.
- Specially modified one- and two-hole copper compression lugs, series 54100, 54200, 54850BE and 54930BE for flex and code copper stranded cables. Material: high conductivity wrought copper.
- Minimum order quantity: Standard package quantity by cable size. Consult factory for price and delivery. All customized lugs are made to order. A.R.O. Non-cancelable.

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01



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02



Overview

Order form

Order form (For 54100, 54200, 54800 and 54900 series copper lugs only):

Catalogue number: **Quantity:**

Notes:

Notes:
 1) Lack of any of the extra features on the "MADE-UP" catalogue number means that the standard cat. no. features are prevalent.
 2) If either bolt hole size or distance between bolt holes needs to be changed from standard cat. no., both code numbers will appear on the "MADE-UP" cat. no. (See example below)

Code table

Tongue shape		Bolt holes		Bolt hole centers		Stacking		Finish (plating)		Inspection hole (long barrel)		Inspection hole (short barrel)	
Type	Code	Size	Code	Distance	Code	Type	Code	Type 1	Code	I.D.	Code	I.D.	Code
15°	UI	#8 0.173	02	½	08	Top	T**	Silver plate	SP	Peep hole	PH	Blind end	BE
30°	UT	#10 0.204	03	⅝	10	Bottom	B	Lead plate	LP				
45°	UF	¼ 0.281	04	¾	12			Nickel plate	NP	150°			
60°	US	⅝ ₁₆ 0.344	05	⅞	14			Plain finish	PF				
90°	UB	⅜ 0.406	06	1	16			No marking	NM				
Blank	BT	½ 0.531	08	1⅝	18								
(No bolt hole)		⅝ 0.656	10	1¾	20								
		¾ 0.812	12	1⅞	22								
		⅞ 0.937	14	1½	24								
		1 1.062	16	1⅞	26								
				1¾	28								
				1⅞*	30								
				2*	32								

Cable:

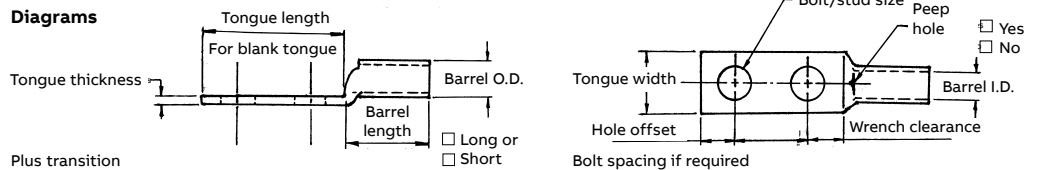
Code: **Weld:**

#8 #6 #4 #2 #1 1/0 2/0 3/0 4/0

250 kcmil and up (code only)

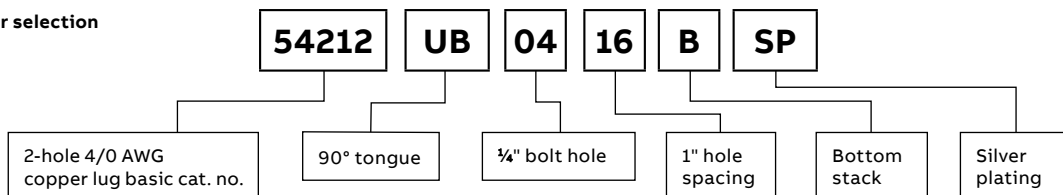
All "made-up" catalogue numbers start with a standard or basic catalogue number and are followed by the customer-required extra features: tongue shape, bolt hole size, distance between bolt holes, stacking, plating and inspection hole (peep hole). A code letter or a number has been assigned to each extra feature. See code table.

Diagrams



* These bolt centers not available for bolt holes larger than 1⅜".
 ** Not required for 45° and 90° top stacking.

Catalogue number selection

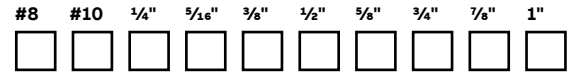


Overview

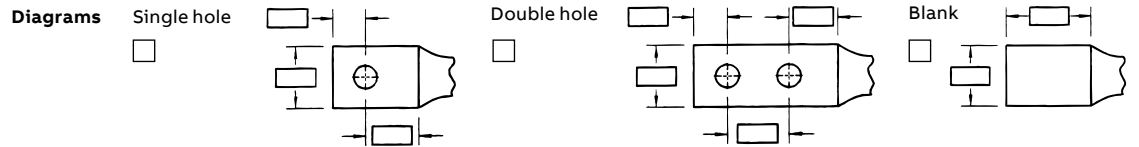
Tongue specifications (see chart “A” for dimensions)

Chart A

Stud sizes:



Nominal bolt hole size 0.015	Hole offset 0.030 (in.)	Wrench clearance min. (in.)	Tongue width cable size (in.)										
			#8 Code #8 Weld	#6 Code #6 Weld	#4 Code #4 Weld	#2 Code #4 Weld	#1 Code #2 Weld	1/0 Code #1 Weld	2/0 Code 1/0 Weld	3/0 Code 2/0 Weld	4/0 Code 3/0 Weld	250 Code	
#8	0.173	0.200	0.240	0.406	0.437	0.562	0.593	0.672	0.750	0.825	0.937	1.030	1.125
#10	0.204	0.218	0.250	0.406	0.437	0.562	0.593	0.672	0.750	0.825	0.937	1.030	1.125
1/4	0.281	0.250	0.312	0.469	0.500	0.562	0.593	0.672	0.750	0.825	0.937	1.030	1.125
5/16	0.344	0.375	0.406	0.562	0.562	0.562	0.675	0.672	0.750	0.825	0.937	1.030	1.125
3/8	0.406	0.375	0.440	0.578	0.578	0.594	0.675	0.672	0.750	0.825	0.937	1.030	1.125
1/2	0.531	0.500	0.562	-	-	-	0.750	0.750	0.750	0.825	0.937	1.030	1.125
5/8	0.656	0.625	0.875	-	-	-	-	-	-	-	0.937	1.030	1.125
3/4	0.812	0.750	0.770	-	-	-	-	-	-	-	-	-	-
7/8*	0.937	0.875	0.890	-	-	-	-	-	-	-	-	-	-
1*	1.062	0.937	1.000	-	-	-	-	-	-	-	-	-	-



* These bolt holes available in one-hole lug only.

Chart B

Cable size (AWG or kcmil)	Tongue thickness (in.)	Straight lug barrel length plus transition (in.)		Barrel (in.)		Dim "X" Stacked lugs (in.)			Dim "Y" (in.)		Dim "H" (in.)	
		Short	Long	O.D.	I.D.	Straight	45°	90°	Short	Long	Short	Long
#8	0.080	0.635	0.935	0.260	0.180	0.158	0.478	0.394	0.595	0.808	0.779	1.079
#6	0.081	0.675	0.975	0.296	0.215	0.134	0.544	0.432	0.587	0.799	0.767	1.067
#4	0.099	0.685	0.985	0.365	0.266	0.175	0.622	0.502	0.637	0.849	0.838	1.138
#2	0.108	0.815	1.115	0.410	0.302	0.216	0.649	0.535	0.711	0.923	0.958	1.258
#1	0.106	0.825	1.275	0.467	0.361	0.212	0.731	0.592	0.710	1.028	0.956	1.406
1/0	0.125	0.975	1.325	0.520	0.396	0.250	0.789	0.646	0.794	1.042	1.075	1.425
2/0	0.125	0.965	1.315	0.571	0.446	0.250	0.859	0.696	0.829	1.077	1.125	1.475
3/0	0.125	1.085	1.435	0.632	0.507	0.250	0.946	0.757	0.900	1.148	1.225	1.575
4/0	0.137	1.255	1.705	0.701	0.564	0.274	1.031	0.826	1.015	1.333	1.387	1.837
250	0.137	1.375	1.925	0.766	0.629	0.274	1.123	0.891	1.085	1.474	1.487	2.037
300	0.153	1.900	2.675	0.850	0.660	0.459	1.226	0.975	1.180	1.726	1.924	2.679
350	0.177	2.090	2.896	0.926	0.720	0.531	1.333	1.103	1.267	1.830	2.096	2.896
400	0.173	2.460	2.980	0.960	0.757	0.519	1.370	1.085	1.551	1.913	2.484	2.984
500	0.218	2.670	3.610	1.100	0.852	0.654	1.514	1.225	1.629	2.266	2.669	3.619
600	0.244	2.900	3.490	1.200	0.926	0.732	1.630	1.325	1.762	2.147	2.897	3.497
700	0.228	2.784	-	1.255	0.997	0.684	1.662	1.375	1.780	-	3.011	-
750	0.270	3.050	3.925	1.330	1.030	0.810	1.745	1.455	1.827	2.434	3.050	3.925
800	0.266	3.213	-	1.375	1.079	0.800	1.728	1.625	1.952	2.787	3.213	4.554
900	0.313	3.450	4.550	1.500	1.145	0.940	1.900	1.650	2.065	-	1.387	-
1,000	0.297	3.356	4.500	1.550	1.203	0.890	2.070	1.675	2.031	2.787	1.487	4.506

Note: Stacking lugs are available for one bolt only. Consult factory: straight: 700 kcmil & up - 45°: 400 kcmil & up, 90°: 500 kcmil & up.

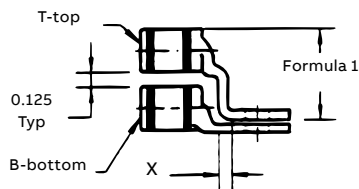
Chart C

Bolt hole size	Tongue width 0.030 code cable size (in.)										
	300 kcmil 4/0 Weld	350 kcmil	400 kcmil	500 kcmil 400 Weld	600 kcmil 500 Weld	1325/24	700 kcmil	750 kcmil	800 kcmil	900 kcmil	1,000 kcmil
#8	-	-	-	-	-	-	-	-	-	-	-
#10	-	-	-	-	-	-	-	-	-	-	-
¼	1.250	1.355	1.410	1.605	1.745	1.805	1.840	1.935	2.010	2.180	2.265
⅝	1.250	1.355	1.410	1.605	1.745	1.805	1.840	1.935	2.010	2.180	2.265
¾	1.250	1.355	1.410	1.605	1.745	1.805	1.840	1.935	2.010	2.180	2.265
½	1.250	1.355	1.410	1.605	1.745	1.805	1.840	1.935	2.010	2.180	2.265
⅝	1.250	1.355	1.410	1.605	1.745	1.805	1.840	1.935	2.010	2.180	2.265
¾	1.250	1.355	1.410	1.605	1.745	1.805	1.840	1.935	2.010	2.180	2.265
7/8*	-	-	-	1.605	1.745	1.805	1.840	1.935	2.010	2.180	2.265
1*	-	-	-	-	1.745	1.805	1.840	1.935	2.010	2.180	2.265

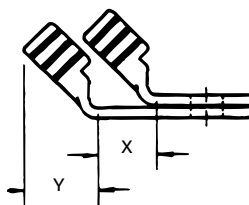
Diagrams

Formula 1 = (0.125 + 2 (O.D.) + 0.037 – Tongue thickness)

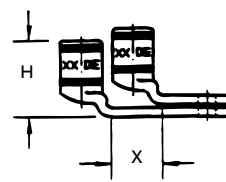
Straight stack



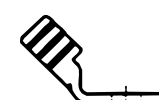
45° stack



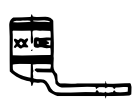
90° stack



45°



90°



* These bolt holes available in one-hole lug only.