

# Dragon Tooth® Insulation Piercing Magnet Wire Connectors

⚠ **WARNING** ⚠

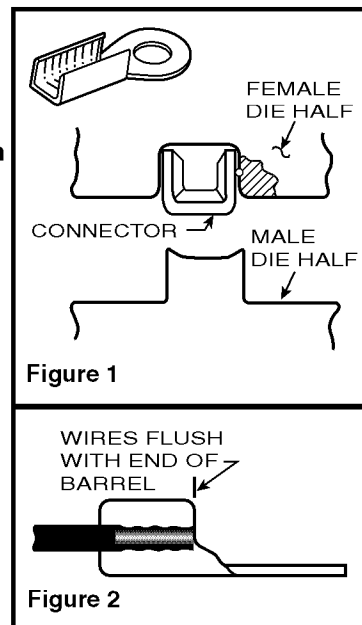
**KEEP FINGERS AND ALL OTHER BODY PARTS AWAY FROM CONNECTOR WHILE BEING CRIMPED.**

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## General Information

- For aluminum to aluminum, aluminum to copper or copper to copper magnet wire connections. Also, magnet wire to stranded lead wire (stripped) combinations.
- Eliminates stripping, brazing and soldering.
- Exclusive T&B® design provides highly reliable electrical and mechanical splice, tap or termination.
- For wire sizes from #18 AWG to #4 AWG in a variety of combinations.
- Applicable to most film type magnet wire insulations, such as plain enamel, polyvinyl formal, etc. (For non-film insulations, consult nearest sales office.)
- Low installed cost.

**NOTE: It is important that all wires in a connection run completely through the connector barrel. The ends of all wires should be at least flush with the end of the connector barrel (see Figure 2).**



- 4) Press the foot control switch to actuate the electric hydraulic pump. The switch must be depressed until the two die halves touch each other.
- 5) Release the pressure on the foot control switch. The ram of the tool will retract, opening the dies and allowing the connector to be removed.
- 6) The proper crimp is attained when the crimped height of connector is within the prescribed "A" dimension shown on the chart.

EXAMPLE OF TYPICAL APPLICATIONS	
A) LINE SPLICE	
B) PIGTAIL SPLICE	
C) IN LINE TAP	
D) SINGLE TERMINATION	
E) MULTIPLE WIRE TERMINATION	
F) MULTIPLE WIRE SPLICE	

## Recommended Wiring Arrangements

When installing magnet wires in a connector barrel, the following arrangements are recommended, as illustrated in Figures 3 through 8.

**Figure 3** illustrates the arrangement to be used when the combined diameters of the wires are equal to or less than the inside width of the connector barrel.

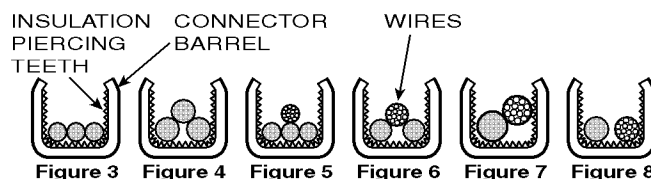
**Figure 4** illustrates the arrangement to be used when the combined diameter of the wires are greater than the inside width of the connector barrel.

**Figure 5 through 8** illustrate the arrangements to be used when combining magnet wire to stripped, standard lead wire.

Strip the insulation of the stranded lead wire to the length of the connector barrel before installing.

## Installation Instructions

- 1) Install crimping die in hydraulic crimping tool. See selection chart for correct die and tool.  
**NOTE: For proper use of hydraulic crimping tool and hydraulic pump, refer to the operation instructions enclosed with each item.**
- 2) Place the connector barrel into the female die nest as shown in Figure 1. The spring-loaded ball will hold the connector in place.
- 3) Insert the wires to be connected into the connector barrel.



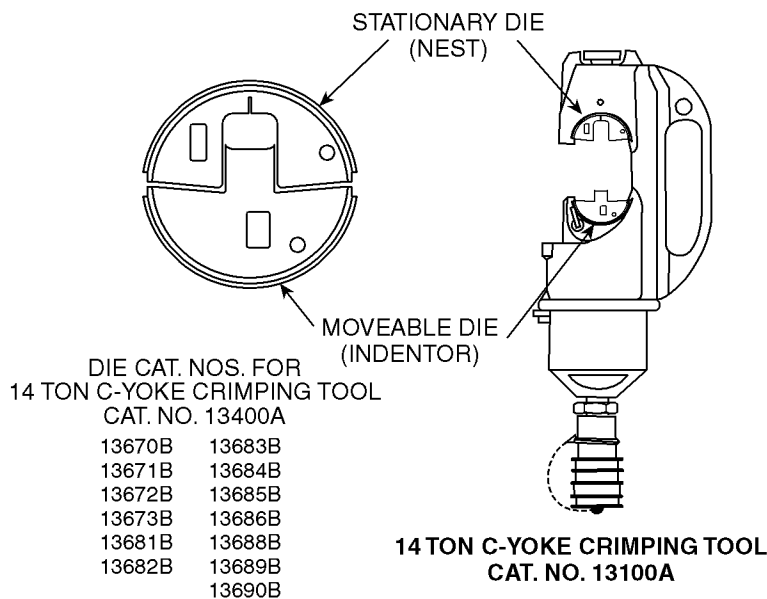
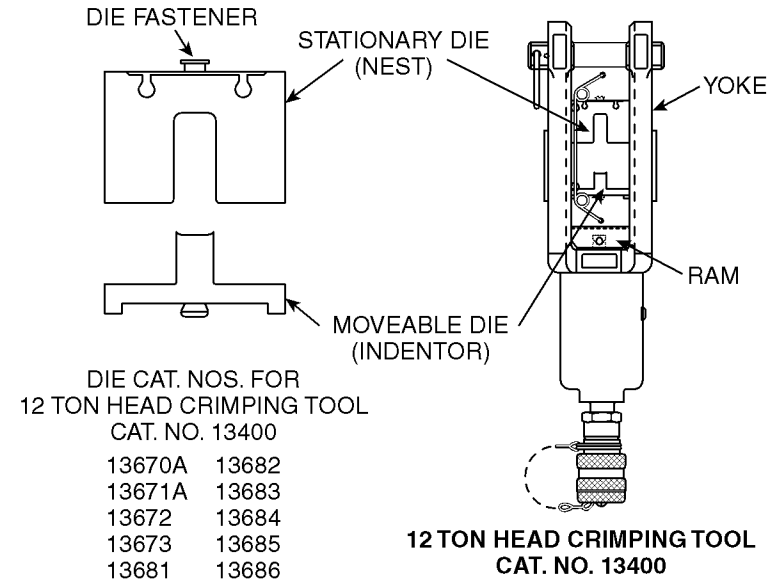
## How to Select a Connector

- Determine total circular mil area (CMA) of all wires to be installed in a connector barrel including stripped, standard wire. Eg., two #6 AWG = 52480CM.
- Refer to Circular Mil column of chart and find the connector series corresponding to the total CMA, eg., 204XXX.
- Next, refer to either Round Wire column, or Rectangular Wire column, depending on the type you are using, and check for any limitations. If there are limitations, you may have to make a selection from the next larger size. If there are no limitations, select one of the series depending on bolt hole and tongue size desired. When there is a choice between two sizes, select the smaller size.

### Formula for Calculating Circular Mil Area (CMA)

Square or rectangular wire: Thickness X Width X 1.273 x 10<sup>6</sup> = CMA

Round Wire: Diameter<sup>2</sup> x 10<sup>6</sup> = CMA

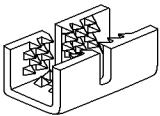
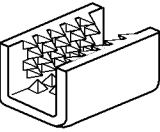
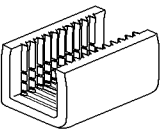
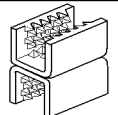
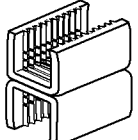


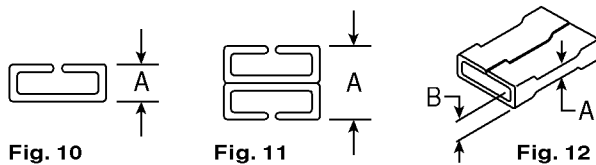
SOLID WIRE TABLE			
Wire Size AWG	Nom. Diameter		Circular Mils
	Inches	MM	
4/0	.4600	11.68	211600
3/0	.4096	11.40	167800
2/0	.3648	9.266	133100
1/0	.3249	8.252	105600
1	.2893	7.348	83690
2	.2576	6.543	66360
3	.2294	5.827	52620
4	.2043	5.189	41740
5	.1819	4.620	33090
6	.1620	4.115	26240
7	.1443	3.665	20820
8	.1285	3.264	16510
9	.1144	2.906	13090
10	.1019	2.588	10380
11	.0907	2.30	8230
12	.0808	2.05	6530
13	.0720	1.83	5180
14	.0641	1.63	4110
15	.0571	1.45	3260
16	.0508	1.29	2580
17	.0453	1.15	2050
18	.0403	1.02	1620
19	.0359	.912	1290
20	.032	.813	1020
21	.0285	.724	812
22	.0253	.643	640
23	.0226	.574	511
24	.0201	.511	404

**WARRANTY:** Thomas & Betts sells this product with the understanding that the user will perform all necessary tests to determine the suitability of this product for the user's intended application. Thomas & Betts warrants that this product will be free from defects in materials and workmanship for a period of two (2) years following the date of purchase. Upon prompt notification of any warranted defect, Thomas & Betts will, at its option, repair or replace the defective product or refund the purchase price. Proof of purchase is required. Misuse or unauthorized modification of the product voids all warranties.

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## SELECTION CHART FOR DRAGON TOOTH® SPLICES AND APPLICATION TOOLS

	Catalog Number	Crimped Height Max. / Min.		Circular Mil Area Max. / Min.	Round Wire Range AWG	Rectangular Wire Range (in.) Max. / Min. <small>Note 2</small>		Installing Tools	Dies <small>Note 4</small>
		A	B			Width	Thick		
	314118S	.140 / .124 Fig. 10	—	12,330 / 3,260	15 to 13	.180 / .050	.060 / .050	13400 13100A	13685 OR 13685B
	210214S	.178 / .162 Fig. 10	—	20,760 / 4,110	14 to 10 Exceptions: 14 to 4 wires max.	.180 / .080	.090 / .080	13400 13100A	13670A 13670B
	204210S	.252 / .235 Fig. 10	—	52,480 / 10,380	12 to 4 Exceptions: 12 to 6 wires max.	.250 / .100	.160 / .100	13400 13100A	13671A 13671B
	22L008	.120 / .102 Fig. 12	.119 / .134 Fig. 12	30,550 / 12,960	8 - #18 7 - #16 5 - #14	.375 / .064	.032 min (2 layer) .040 min. (1 layer) .064 max.	13400 13100A	13683 13683B
	22L009	.198 / .188 Fig. 10	—	86,000 / 36,120	14 - #16 10 - #14 8 - #12† 6 - #10†	.375 / .080	.180 / .080	13400 13100A	13684 13684B
	22L010	.219 / .199 Fig. 10	—	173,090 / 69,750 (Cu) 124,561 / 52,136 (AL)	—	.625 / .300	.230 (Cu) .185 (AL) / .100	13100A	13690B
	204210SH	.466 / .183 Fig. 11	—	52,480 / 10,380 each barrel	12 to 4 each barrel	.250 / .100	.160 / .100	13400 13100A	13673 13673B
	22L009H	.375 / .365 Fig. 11	—	66,000 / 36,120 each barrel	14-#16 10-#14 8-#12† 6-#10† each barrel	.375 / .080	.180 / .080	13400 13100A	13686 13686B

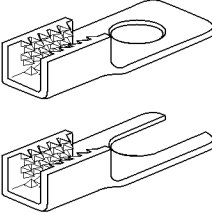
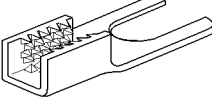
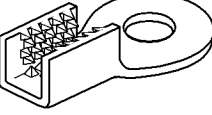

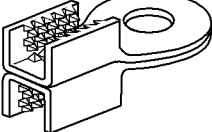


### NOTES:

1. For wire sizes other than shown, consult nearest sales office.
2. Maximum of two layers of conductors in each connector barrel.
3. When terminating wires with an AWG size difference of 4 or more, samples should be tested in complete connections before using.
4. Consult nearest sales office for gaging other than shown.

† For 8 - #12 Cu and 6 - #10 Cu, the crimp height is .200-.215 inches

# SELECTION CHART FOR DRAGON TOOTH® TERMINALS AND APPLICATION TOOLS

	Catalog Number	Stud Size (in.)	Crimped Height Max. / Min.	Circular Mil Area Max. / Min.	Round Wire Range AWG	Rectangular Wire Range (in.)		Installing Tools	Dies Note 4	
			A			Max. / Min. Note 2				
						Width	Thick			
	314123	1/4"	.140 / .124 Fig. 12	12,330 / 3,260	15 to 13	.060 / .050	.060 / .050	13400 OR 13100A	13685 OR 13685B	
	314125	No. 10								
	314219	No. 8								
		210216 210216F	1/4"	.178 / .162 Fig. 12	20,760 / 4,110	14 to 10 Exceptions: 14 to 4 wires max.	.018 / .080	.090 / .080	13400 OR 13100A	13670A OR 13670B
		210217 210217F	No. 10							
		210219 210219F	No. 8							
		204212	1/4"	.252 / .235 Fig. 12	52,480 / 10,380	12 to 4 Exceptions: 12 to 6 wires max.	.250 / .100	.160 / .100	13400 OR 13100A	13671A OR 13671B
No. 10										
(For applications over 52,450 cm, call local sales representative.)										
	210214-1	1/4"	.178 / .162 Fig. 12	20,760 / 4,110	14 to 10 Exceptions: 14 to 4 wires max.	.018 / .080	.090 / .080	13400 OR 13100A	13670A OR 13670B	
	210214-2	5/16"								
	210214-3	3/8"								
	204210-1	1/4"	.252 / .235 Fig. 12	52,480 / 10,380	12 to 4 Exceptions: 12 to 6 wires max.	.250 / .100	.160 / .100	13400 OR 13100A	13671A OR 13671B	
		204210-2								5/16"
		204210-3								3/8"
		204210-5								1/2"
	22R010-14	1/4"	.219 / .199	173,090 / 69,750 (CU)	—	.625 / .300	.230 (Cu) .185 (AL) / .100	13100A	13690B	
	22R010-38	3/8"		124,561 / 52,136 (AL)						
	22R010-12	1/2"								
	210214-1H	1/4"	.333 / .319 Fig. 13	20,760 / 4,110 (For each barrel)	14 to 10 Exceptions: 14 to 4 wires max. (For each barrel)	.018 / .080 (For each barrel)	.090 / .080 (For each barrel)	13400 OR 13100A	13672 OR 13672B	
	204210-1H	1/4"		.783 / .466 Fig. 13						52,480 / 10,380
	204210-3H	3/8"	(For applications over 52,450 cm, call local sales representative.)							

### NOTES:



Fig. 12

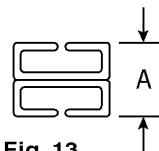


Fig. 13

1. For wire sizes other than shown, consult nearest sales office.
2. Maximum of two layers of conductors in each connector barrel.
3. When terminating wires with an AWG size difference of 4 or more, samples should be tested in complete connections before using.
4. Consult nearest sales office for gaging other than shown.



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