

Developed in 1988, **CADWELD EXOLON** is a significant advance in welded electrical connections. The metallurgy is the same as the standard CADWELD connection approved by over 70% of electric utilities in the USA — but the virtual elimination of visible smoke plus a unique electric starting system makes this improved process easier and more convenient than ever before.

Most connections listed in this catalog can be ordered in the CADWELD EXOLON configuration. Ordering information is shown below.

## HOW TO ORDER CADWELD EXOLON

1. To order CADWELD EXOLON products, just specify molds and weld metal from the catalog and add an "XL" prefix.  
  
**Example:** TAC2Q2Q becomes XLTAC2Q2Q, and 150 becomes XL150.
2. If the weld metal shown in the catalog shows more than one tube required such as 2-#200, you must specify #XL400 to get the correct size filters.  
  
**Example:** XLTAD-4L3Q: XL400
3. The following molds require a price key change:
  - "C" price key molds using 2-#150 weld metals change to XLD price key.
  - "E" price key molds using 2-#150 weld metals change to XLJ price key.
  - "H" price key molds using 2-#150 weld metals, contact ERICO.
  - "M" price key molds using 2-#150 weld metals change to XLV price key.
  - "R" price key molds using 2-#150 weld metals change to XLF price key.
  - "T" price key molds, ALL change to XLP price key.  
**Example:** TAC3Q3Q using 2-#150 weld metals change to XLTAD3Q3Q using #XL300 weld metal
4. Filters and ignitors are included with the weld metal. XL filters and ignitors are not sold separately.
5. The ignitor can be used only once and then must be discarded. Filters will last as specified in the instructions supplied with each mold.
6. A Relia-Start electric starter, part number XLB971A1 (battery, charger, carrying case and connecting cable), is required for XL weld metal. There is no starting material in the XL weld metal tube. Batteries operate about 200 starts before recharging from 120 VAC is required. The charger, all electrical connections and instructions are included in the battery case.
7. Baffle with cover is required for larger molds. Estimated life of the baffle is 500 welds.  
  
XLB972A1 Baffle is required for molds using XL200 and XL250 weld metals.  
  
XLB973A1 Baffle is required for molds using XL300 to XL750 weld metals.
8. For EZ Change Handles, add XL prefix. (Flint ignitor not included.)
9. Welding Tray, part number XLB974B2, is used under the mold to protect cables and equipment from hot materials.

# OTHER INFORMATION

## Certain tools may be required for various connections.

If required, these tools are listed on the same page as the connection and in Section A.

- Some tools listed in Section A can save you a lot of time.
- Also refer to A9E, Contractor Tips, to make your job easier, and learn about labor saving ideas.

Prices for standard products are shown in Price List G285P

For other CADWELD literature, videos and software, See Section C.

For all your connection needs — we're only a phone call away.

Phone: 800-677-9089

Fax: 800-677-8131

or call your local CADWELD distributor, agent, or CADWELD Regional Sales Manager

## REQUIRED TOOLS SUMMARY:

Required tools are listed with each mold. For your reference, handle clamps and/or frame are summarized below.

<u>MOLD</u>	<u>REQUIRED</u>
A*	Includes frame with handle
C, Q & R	Requires L160
D, F & Z	Requires L159
E*	Includes frame but also requires L160
J*	Includes frame but also requires L159
K*, M* & V*	Includes frame with handles

\* To order mold only – without handles or frame – add suffix “M” to mold part number.



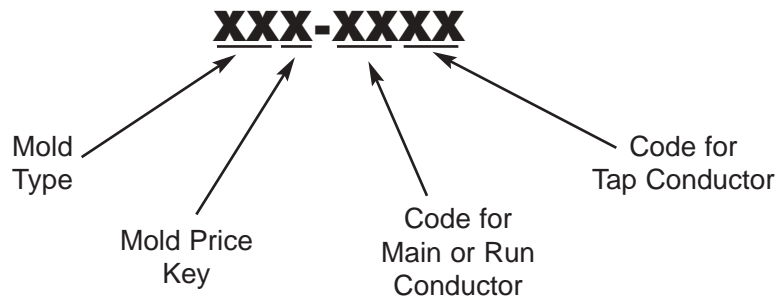
# GROUNDING CONNECTION SPECIFICATION

All grounding connections of copper to copper and copper to steel conductors of #8 and larger sized conductors shall be CADWELD exothermic welded connections. Conductors spliced with a CADWELD exothermic welded connection shall be considered as a continuous conductor, as stated in the notes accompanying NEC 250-50, 250-64, 250-68, 250-70 and IEEE Std 80 – 1986.

All grounding connections to equipment shall use bolted lugs. When the conductor is #8 and larger, the lug shall be joined to the conductor by the CADWELD process, otherwise use listed compression lugs which meet IEEE Std 837 – 1989.

## THE CADWELD MOLD NUMBERING SYSTEM

The CADWELD Mold Part Number gives, in code, the complete information about the mold  
– Type of connection, mold price key, and conductor size(s)



### EXAMPLES

**TAD-4L3Q**

Type TA      Price Key D      750 kcmil Run      500 kcmil Tap

**GTC-182V**

Type GT      Price Key C      3/4" Copper Clad Ground Rod      250 kcmil Tap

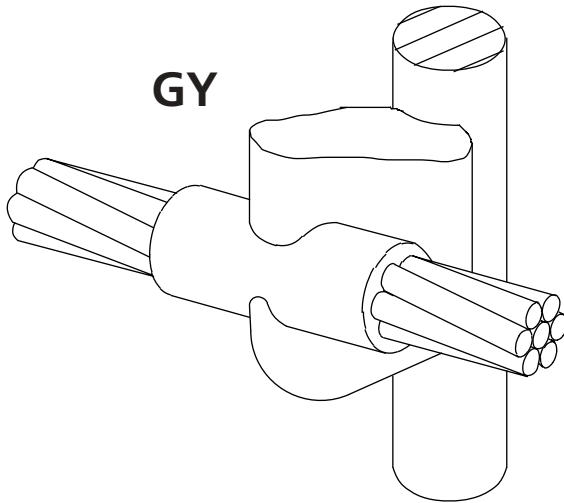
**SSC-3D**

Type SS      Price Key C      350 kcmil Tap

**VSC-2C-V3**

Type VS      Price Key C      1/0 Cable      Vertical Pipe      3" IPS

Conductor codes are listed in Section B



## CABLE TO GROUND ROD

- Through cable to side of ground rod.
- Concentric strand copper cable unless otherwise noted.
- Ground rods can be copper clad, galvanized, stainless clad or stainless steel.
- **Bold letter** in mold part number is the price key.

## REQUIRED TOOLS

**Handle Clamps** **L160** for *E* Price Key Molds  
**L159** for *J* Price Key Molds

*Frames included with E and J Price Key Molds.  
**B399ES** Frame required with P Price Key Molds*

**Flint Ignitor** **T320** (Included with handle clamp or frame but also available separately)

## SUGGESTED TOOLS

Cable Cleaning Brush	T313 or T314
Slag Removal Spade	B136A or B136B
Mold Cleaning Brush	T394
File	T329
Cable Clamp	B265
Torch Head	T111

## ACCESSORIES

See Section A

## NOTE:

All "P" priced GY molds require B399ES frame. (Sold separately.)

GROUND ROD SIZE	CABLE SIZE	MOLD PART NUMBER			WELD METAL
		Steel or Copper Clad Sectional (with 9/16" threads)	Copper Clad Plain (unthreaded)	Copper Clad Sectional (with 1/2" threads)	
1/2"	4 Str or Sol	GYP-14001M	GYP-15001M	GYP-13001M	65
	2 Str or Sol	GYP-14002M	GYP-15002M	GYP-13002M	65
	1 Str or Sol	GYP-14003M	GYP-15003M	GYP-13003M	65
	1/0	GYE-142C	GYE-152C	GYE-132C	115
	1/0 SOL	GYE-142B	GYE-152B	GYE-132B	115
	2/0	GYE-142G	GYE-152G	GYE-132G	115
	3/0	GYE-142L	GYE-152L	GYE-132L	150
	4/0	GYE-142Q	GYE-152Q	GYE-132Q	150
	250	GYE-142V	GYE-152V	GYE-132V	150
	300	GYE-143A	GYE-153A	GYE-133A	200

**NOTE:**

All "P" priced GY molds require B399ES frame. (Sold separately.)

GROUND ROD SIZE	CABLE SIZE	MOLD PART NUMBER		WELD METAL
		Copper Clad Sectional (threaded)	Steel	
5/8"	4 Str or Sol	GYP-16005M	GYP-31004M	65
	2 Str or Sol	GYP-16006M	GYP-31003M	65
	1 Str or Sol	GYP-16007M	GYP-31001M	65
	1/0	GYE-162C	GYE-312C	115
	1/0 SOL	GYE-162B	GYE-321B	115
	2/0	GYE-162G	GYE-312G	115
	3/0	GYE-162L	GYE-312L	150
	4/0	GYE-162Q	GYE-312Q	150
	250	GYE-162V	GYE-312V	150
	300	GYE-163A	GYE-313A	200
	350	GYE-163D	GYE-313D	250
	500	GYJ-163Q	GYJ-313Q	2-200
	3/4"	4 Str or Sol	GYP-18010M	GYP-33011M
2 Str or Sol		GYP-18009M	GYP-33010M	65
1 Str or Sol		GYP-18007M	GYP-33008M	65
1/0		GYE-182C	GYE-332C	115
1/0 SOL		GYE-182B	GYE-332B	115
2/0		GYE-182G	GYE-332G	115
3/0		GYE-182L	GYE-332L	150
4/0		GYE-182Q	GYE-332Q	150
250		GYE-182V	GYE-332V	200
300		GYE-183A	GYE-333A	250
350		GYJ-183D	GYJ-333D	2-150
500		GYJ-183Q	GYJ-333Q	500
1"		CONTACT ERICO FOR ORDERING INFORMATION		

## GROUNDING SYSTEM – CONDUCTORS AND CONNECTORS

The grounding conductor size is based on the maximum magnitude and duration of available fault current, and on the type of connections being used in the grounding system.

IEEE Std. 80-2000, Guide for Safety in Substation Grounding, the accepted industry standard, uses a fusing formula as the basis for selecting minimum conductor size to avoid fusing (melting) under fault conditions.

This formula can be simplified to the following:

$$A = K \cdot I \sqrt{S}$$

- Where: A = Conductor size in circular mils  
 K = Constant from the following table  
 I = RMS fault current in amperes  
 S = Fault time in seconds

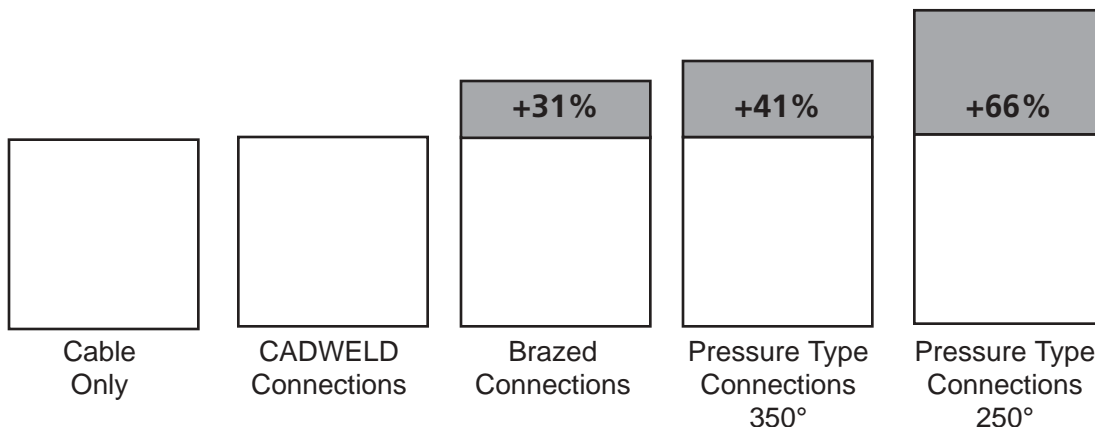
Based on the standard ambient temperature of 40°C.

MAX TEMP	CONSTANT K FOR ABOVE FORMULA		
	COPPER S.D.	COPPERWELD DSA 40%	COPPERWELD DSA 30%
1083 C	7.01	10.46	12.04
450 C	9.18	13.74	15.87
350 C	10.10	15.13	17.46
250 C	11.65	17.47	20.17

The temperatures listed above for each material are specified in IEEE Std. 80-2000 to be used for different types of connecting means;

- Pressure type connectors ..... 250° to 350°C\*
- Brazed connections ..... 450°C
- Exothermic welded connections ..... 1083°C

\*except those which have been tested to and passed the requirements of IEEE Std. 837-1989.



**EXAMPLE** – 25,000 Ampere, 2 second fault:

CONNECTION TYPE	CONDUCTOR SIZE
CADWELD .....	.246 kcmil – use 250 kcmil
Brazed .....	.322 kcmil – use 350 kcmil
Pressure Type (at 350 C) .....	.357 kcmil – use 350 kcmil
Pressure Type (at 250 C) .....	.408 kcmil – use 400 kcmil

## BARE CLASS A, B, AND C CONCENTRIC STRANDED CONDUCTOR

Based on A.S.T.M. Standard Specifications.

Size in Circular mils	Size A.W.G.	Conductor Dia. In.	NUMBER OF WIRES					CADWELD Cable code
			7	19	37	61	91	
1,000,000		1.152			.1644*	.1280	.1048	4Y
800,000		1.031			.1470*	.1145	.0938	4Q
750,000		.998			.1424*	.1109	.0908	4L
700,000		.964			.1375*	.1071	.0877	4G
600,000		.893			.1273	.0992	.0812	3X
500,000		.813		.1622*	.1162	.0905		3Q
400,000		.728		.1451	.1040	.0810		3H
350,000		.681		.1357	.0973	.0757		3D
300,000		.630		.1257	.0900	.0701		3A
250,000		.575		.1147	.0822	.0640		2V
211,600	4/0	.528	.1739	.1055	.0756			2Q
167,800	3/0	.470	.1548	.0940	.0673			2L
133,100	2/0	.419	.1379	.0837	.0600			2G
105,500	1/0	.373	.1228	.0745	.0534			2C
83,690	1	.332	.1093	.0664	.0476			1Y
66,370	2	.292	.0974	.0591				1V
52,630	3	.260	.0867	.0526				1Q
41,740	4	.232	.0772	.0469				1L
26,240	6	.184	.0612	.0372				1H
16,510	8	.146	.0486	.0295				1E
10,380	10	.116	.0385	.0234				1B
6,530	12	.0915	.0305	.0185				
4,110	14	.0726	.0242	.0147				

\*Class AA



## BARE SOLID COPPER WIRE

## DSA COPPERWELD CONDUCTOR

Based on A.S.T.M. Standard Specifications

Size A.W.G.	Cross Sectional Area Circular Mils	Wire Dia. In.	CADWELD Cable code
4/0	211,600	.4600	2P
3/0	167,800	.4096	2K
2/0	133,100	.3648	2F
1/0	105,500	.3249	2B
1	83,690	.2893	1X
2	66,370	.2576	1T
3	52,630	.2294	1P
4	41,740	.2043	1K
6	26,250	.1620	1G
8	16,510	.1285	1D
10	10,380	.1019	1A
12	6,530	.0808	
14	4,110	.0664	

Cable Stranding	Nominal Diameter	kcmil	Equivalent Copper Size*	CADWELD Cable code
7/#10	.306	72.7	3AWG	9A
7/#8	.385	115.6	1	9B
7/#7	.433	145.7	1/0	9C
7/#6	.486	183.8	2/0	9D
7/#5	.546	231.7	3/0	9E
19/#9	.572	248.8	3/0	9F
7/#4	.613	292.2	4/0	9L
19/#8	.642	313.7	4/0	9G
19/#7	.721	395.5	250 Kcmil	9H
37/#9	.801	484.4	300	7W
19/#6	.810	498.8	350	9J
37/#8	.899	610.9	400	7V
19/#5	.910	628.9	450	9K
37/#7	1.01	770.3	500	9M

\*Approximate based on Fusing Current calculations and tests by Copperweld Co.

## GROUND RODS

Nominal Size	Material	Type	Thread Size	Body Dia.	CADWELD Ground Rod Code
1/2"	Copperclad Steel*	Sectional	9/16"	.505	14
		Plain		.500	14
	Copperclad	Plain	1/2"	.475	15
	Copperclad	Sectional		.447	13
5/8"	Copperclad Steel*	Sectional	5/8"	.563	16
		Plain		.625	31
	Copperclad	Plain		.563	16
3/4"	Copperclad Steel*	Sectional	3/4"	.682	18
		Plain		.750	33
	Copperclad	Plain		.682	18
1"	Copperclad Steel*	Sectional	1"	.914	22
		Plain		1.00	37
	Copperclad	Plain		.914	22

\* Plain steel, stainless steel, stainless clad rods or galvanized steel.



## RECTANGULAR COPPER BUSBAR

Thickness Inches	Width Inches	Circular Mil Size	Weight Lbs. per Foot	CADWELD Bus Bar Code
1/8	1	159,200	.484	CE
	1-1/2	238,700	.726	CG
	2	318,300	.969	CH
3/16	1	238,700	.727	DE
	2	477,500	1.45	DH
1/4	1	318,300	.969	EE
	1-1/2	477,500	1.45	EG
	2	636,600	1.94	EH
	3	954,900	2.91	EK
	4	1,273,000	3.88	EM
3/8	1	477,500	1.45	GE
	1-1/2	716,200	2.18	GG
	2	954,900	2.91	GH
	3	1,432,000	4.36	GK
	4	1,910,000	5.81	GM
1/2	2	1,273,000	3.88	JH
	3	1,910,000	5.81	JK
	4	2,546,000	7.75	JM

## REINFORCING BARS

USEFUL CONVERSIONS	
<b>Area</b>	
Square Inches x 1273 = kcmil	
Square Millimeters x 1.974 = kcmil	
kcmil x 0.5067 = Square Millimeters	
<b>Density</b>	
Copper:	0.323lb/in <sup>3</sup>
Steel:	0.283lb/in <sup>3</sup>

Rebar Sizes	NOMINAL DIMENSIONS Dia. Inches	Cross-Sectional Area - Sq. Inches	Equivalent Copper Sizes*	CADWELD Rebar Code
3	.375	.11	9AWG	51
4	.500	.20	7	52
5	.625	.31	5	53
6	.750	.44	3	54
7	.875	.60	2	55
8	1.000	.79	1	56
9	1.128	1.00	1/0	57
10	1.270	1.27	2/0	58
11	1.410	1.56	3/0	59
14	1.693	2.25	250 kcmil	60
18	2.257	4.00	450	61

\* Based on 8% IACS, rounded to the next higher commercial copper size.



## STANDARD STEEL WIRE GAGE

(WASHBURN MOEN GAGE) SOLID

Gage No.	Dia. Inches	Gage No.	Dia. Inches
7/0	.490	6	.1920
6/0	.4615	7	.1770
5/0	.4305	8	.1620
4/0	.3938	9	.1483
3/0	.3625	10	.1350
2/0	.3310	11	.1205
1/0	.3065	12	.1055
1	.2830	13	.0915
2	.2625	14	.0800
3	.2437	15	.0720
4	.2253	16	.0625
5	.2070	17	.0540

## STEEL PIPE SIZES

STANDARD WEIGHT ASTM A53-90-B  
(SCHEDULE 40) ANSI/ASME B36.10M-1985

Nominal Size In	O.D. Inches	Wall Thickness Inches	CADWELD Mold Code
1	1.315	.133	1
1-1/4	1.660	.140	1.25
1-1/2	1.900	.145	1.50
2	2.375	.154	2
2-1/2	2.875	.203	2.50
3	3.500	.216	3
3-1/2	4.000	.226	3.50
4	4.500	.237	4
5	5.563	.258	5
6	6.625	.280	6
8	8.625	.322	8
10	10.750	.365	10

## CAST IRON PIPE – CLASS A THRU D

AWWA Specification 1908,  
ASA A21.2 Class 100-250.

Nominal Size (Inches)	Actual O.D. (Inches)
4	4.80 to 5.00
6	6.90 to 7.10
8	9.05 to 9.30
10	11.10 to 11.40
12	13.20 to 13.50
14	15.30 to 15.70
16	17.40 to 17.80
18	19.50 to 19.90
20	21.60 to 22.1
24	25.80 to 26.30
30	31.70 to 32.70
36	38.00 to 39.20
42	44.20 to 45.60
48	50.50 to 52.00
54	56.70 to 58.40
60	62.80 to 64.80
72	75.30 to 76.90
84	87.50 to 88.50

Other standard sections used for fence posts

Section	CADWELD Mold Code
1-1/2" square	PS15
2" square	PS20
2-1/2" square	PS25
3" square	PS30*
1.875 x 1.625 x .133 "H"	PH1
2.25 x 1.95 x .143 "H"	PH2

\* For D or F mold price only