For over 40 years innovation has been the hallmark of CenterLine (Windsor) Limited, resulting in products and services that best meet customer needs and expectations. The CenterLine Electrodes and Allied Products Division is dedicated to the manufacture and supply of cold-formed electrodes, welding tips and fixtures, adapters, holders, seam welding wheels, patented weld nut electrodes, special welding dies, shunts and cables, and a host of other consumable products.

**PRODUCTION CAPACITY**

The CenterLine Electrodes Division operates in a modern, highly efficient, well-equipped facility, managed and operated to meet delivery and quality expectations on a daily basis.
DESIGN ASSISTANCE
CenterLine prides itself on its ability to quickly react to special electrode and fixture needs. With its wealth of application experience, CenterLine can design and manufacture components that are specifically suited to unique applications.

MANUFACTURING EXCELLENCE
In order to maintain its reputation as a quality supplier, CenterLine continues to invest in machinery, tooling, and people. This has enabled the company to effectively respond to ever changing industry challenges.

INVENTORY SUPPORT
CenterLine maintains an extensive inventory to guarantee part supply and to satisfy emergency needs. CenterLine is a true partner with its customers, constantly assisting them in fulfilling their commitments.

The Complete Joining Company
QUALITY COMMITMENT

Because customers depend on CenterLine for quality components, strict adherence to material and part specification is of primary importance. CenterLine can be relied upon to consistently supply electrode needs with the quality customers demand and expect.

PRODUCT DIVERSIFICATION

In addition to offering an abundance of resistance welding consumable products, the CenterLine Electrodes Division is also a manufacturer and supplier of wire welding contact tips, insulating materials and bushings, weld gun replacement parts, castings, forgings, shunts, cables, spot welding machine arms and caps, seam welding wheels and many other production related items. This diversification truly makes CenterLine a full service supplier.

SPECIAL MATERIALS

The variety of materials and coatings used in today's manufactured components can create demanding weld conditions. CenterLine can assist in choosing the right electrode material to maximize tip life and effectively weld these components. Available material options such as tungsten faced tips and assorted classes of copper can resolve many welding problems.

EXCLUSIVE DEVELOPMENTS

CenterLine continuously introduces new products to satisfy challenges presented by our customers' requirements. Now, CenterLine has combined its proven nut electrode technology with proven sensing technology to create the patented Smart Electrode nut detection system. The Smart Electrode System can help you determine if a weld nut is present and in the correct orientation. This diagnostic device provides a reliable method for enhancing the quality of the projection welding process.
# Table of Contents

1. Stud & Weld Nut Electrodes
2. Smart Electrodes
3. Electrode Caps
4. Standard Adapters
5. Resistance Welding Electrodes
6. Holders
7. Spot Welding Machine Arms & Caps
8. Shunts & Cables
9. Water Tubes
10. Seam Welding Wheels
11. Grease Equalizers
12. Accessories
13. Reference Data
14. Other Products
CenterLine manufactures a wide variety of stud & nut welding electrodes. The high quality design and assembly provides a number of features and benefits including:

- Accurate on center positioning of pilotless nuts provided automatically.
- Insulated pin and sleeve prevents pin arcing in the threads.
- Unit converts from welding nuts to studs in seconds by removal of pilot pin and/or welding head.
- Used by automotive, mass transit, farm implement, stamping and appliance manufacturers.
- Internal water cooling reduces heat build-up.
- Minimum maintenance.
STUD & WELD NUT ELECTRODES

Stud & Weld Nut Model Number Breakdown

CODING EXAMPLE

LENGTH
USE U FOR STANDARD LENGTH (SHOWN BELOW)
USE X FOR EXTENDED LENGTH (.50 (12.70) LONGER THAN STANDARD LENGTH)

BODY STYLE
USE A FOR BASE MOUNT
USE B FOR 4 RW TAPER
USE C FOR 5 RW TAPER
USE D FOR 6 RW TAPER
USE E FOR 7 RW TAPER
USE F FOR 7/8-14 THREAD
USE G FOR 1-12 THREAD
USE H FOR BASE MOUNT WITH CABLE LUG (17/32" clearance hole for 1/2 screw)
USE J FOR BASE MOUNT WITH CABLE LUG (Tapped hole for 1/2-13 screw)
USE K FOR BASE MOUNT WITH CONTACT (CL-200-37)

SERIES
USE 2 FOR SERIES 2 (.88" WELD FACE)
USE 3 FOR SERIES 3 (1.25" WELD FACE)
USE 4 FOR SERIES 4 (1.50" WELD FACE)
USE R2 FOR RETRACTABLE PIN SERIES 2 (.88" WELD FACE)
USE R3 FOR RETRACTABLE PIN SERIES 3 (1.25" WELD FACE)
USE R4 FOR RETRACTABLE PIN SERIES 4 (1.50" WELD FACE)

Note: Leave blank if generating a complete nut or stud welding unit because information is contained in the pin or head number.

COMPONENTS
USE NHP FOR UNIT WITH NO HEAD OR PIN
USE GENERATED PIN # FOR COMPLETE NUT WELDING UNIT
USE GENERATED HEAD # FOR COMPLETE STUD WELDING UNIT

Standard Length of Series Body Styles

* Note: On Body Style 'B' add .25 to length shown.

Spare Parts List (Not including Pin or Head)

U2 SPRINGSTOP-L2
X2 SPRINGSTOP-X2
L3 SPRINGSTOP-L3
X3 SPRINGSTOP-X3
U4 SPRINGSTOP-U4
X4 SPRINGSTOP-X4

LE2 SPRINGNO3037013050
L3 & L4 SPRINGNO3037025075
X2 SPRINGNO303702100
X3 & X4 SPRINGNO3037034125

Spring Stop
Spring
Screw Insulator 230-012
Screw Insulator Washer W-203NP
O-Ring Set CL-206, CL-306, CL-406
Water Tube CLT-309-32
Air Connector BF1

Standard Length with 5 RW Body Style Retractable Series 3 with no Head or Pin.
Extended Length, Base Mount Style, head #. This describes a complete stud welding unit.
Standard Length, 1-12 Threaded Body Style, pin #. This describes a complete nut welding unit.
## Stud & Weld Nut Electrodes

### Manual Load Weld Nut Pins

<table>
<thead>
<tr>
<th>Pin Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GP</td>
<td>Stainless Steel Pin, Supported by spring and/or air</td>
</tr>
<tr>
<td>CP</td>
<td>Coated, D2 Steel Pin, Supported by spring and/or air</td>
</tr>
<tr>
<td>RP</td>
<td>Retractable, Stainless Steel Pin, Movement controlled by Air Pressure only, Special Application please contact CenterLine</td>
</tr>
<tr>
<td>KP</td>
<td>Coated Retractable, D2 Steel Pin, Movement controlled by Air Pressure only, Special Application please contact CenterLine</td>
</tr>
</tbody>
</table>

### Pin Type Breakdown

<table>
<thead>
<tr>
<th>Series</th>
<th>Thread Size</th>
<th>Weld Face Diameter</th>
<th>Maximum Hole in Head*</th>
<th>Head Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>5/8-18</td>
<td>7/8 Standard</td>
<td>0.427 (10.85) ID</td>
<td>0.500</td>
</tr>
<tr>
<td>3</td>
<td>7/8-14</td>
<td>1-1/4 Standard</td>
<td>0.642 (16.31) ID</td>
<td>0.500</td>
</tr>
<tr>
<td>4</td>
<td>1-1/8-12</td>
<td>1-1/2 Standard</td>
<td>0.852 (21.64) ID</td>
<td>0.625</td>
</tr>
</tbody>
</table>

* Special weld nut electrodes are available for larger IDs and areas with clearance restrictions.

### Nose Type Description

<table>
<thead>
<tr>
<th>Nose Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Preferred when locating nut and stamping, no stamping contact during weld, no hole in upper electrode</td>
</tr>
<tr>
<td>B</td>
<td>Preferred when locating nut only, no stamping contact, no hole in upper electrode</td>
</tr>
<tr>
<td>C</td>
<td>Preferred when locating nut only, no stamping contact, no hole in upper electrode</td>
</tr>
<tr>
<td>D</td>
<td>Locates nut at a point on the pin nose. Upper electrode requires clearance hole for pin tip</td>
</tr>
<tr>
<td>E</td>
<td>Preferred when locating nut and stamping, no hole in upper, good for hard to load applications</td>
</tr>
</tbody>
</table>

### Application Sizes

- **Example**
  - Hole in Stamping: .353
  - Hole in Nut: .275
  - .05

### CAUTION

Do not select B & C nose types when pilot thickness exceeds stamping thickness.

### Generate Your Own Number (Total 14 Characters)

<table>
<thead>
<tr>
<th>Example</th>
<th>GP</th>
<th>2</th>
<th>A</th>
<th>348</th>
<th>270</th>
<th>05</th>
<th>25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breakdown</td>
<td>Pin Type</td>
<td>Series Number</td>
<td>Nose Type</td>
<td>Hole in Stamping - .005&quot; (3 Dec.) - see note below</td>
<td>Hole in Nut - .005&quot; (3 Dec.) - see note below</td>
<td>Stamping Thickness (2 Dec.)</td>
<td>Nut Thickness (2 Dec.)</td>
</tr>
<tr>
<td>Part Number</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** For B & C style pins, the “Hole in Stamping” value is the “Hole in Nut” value (i.e. GP22702700525)


**STUD & WELD NUT ELECTRODES**

Auto Load Weld Nut Pins

<table>
<thead>
<tr>
<th>Pin Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GA</td>
<td>Stainless Steel Pin, Supported by spring and/or air</td>
</tr>
<tr>
<td>CA</td>
<td>Coated, D2 Steel Pin, Supported by spring and/or air</td>
</tr>
<tr>
<td>RA</td>
<td>Retractable, Stainless Steel Pin, Movement controlled by Air Pressure only, Special Application please contact CenterLine</td>
</tr>
<tr>
<td>KA</td>
<td>Coated Retractable, D2 Steel Pin, Movement controlled by Air Pressure only, Special Application please contact CenterLine</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Series</th>
<th>Thread Size</th>
<th>Weld Face Diameter</th>
<th>Maximum Hole in Head*</th>
<th>Head Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>5/8-18</td>
<td>7/8 Standard</td>
<td>0.427 (10.85) ID</td>
<td>0.500</td>
</tr>
<tr>
<td>3</td>
<td>7/8-14</td>
<td>1-1/4 Standard</td>
<td>0.642 (16.31) ID</td>
<td>0.500</td>
</tr>
<tr>
<td>4</td>
<td>1-1/8-12</td>
<td>1-1/2 Standard</td>
<td>0.852 (21.64) ID</td>
<td>0.625</td>
</tr>
</tbody>
</table>

* Special weld nut electrodes are available for larger IDs and areas with clearance restrictions.

<table>
<thead>
<tr>
<th>Nose Type</th>
<th>Application Sizes</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>For auto loading nuts where the stamping is being located.</td>
</tr>
<tr>
<td>P</td>
<td>For auto loading nuts where the stamping is not being located. Refer to caution note.</td>
</tr>
</tbody>
</table>

**APPLICATION SIZES**

**EXAMPLE**

Generate Your Own Number (Total 14 Characters)

<table>
<thead>
<tr>
<th>Example</th>
<th>Breakdown</th>
</tr>
</thead>
<tbody>
<tr>
<td>GA</td>
<td>Pin Type</td>
</tr>
<tr>
<td>3</td>
<td>Series Number</td>
</tr>
<tr>
<td>N</td>
<td>Nose Type</td>
</tr>
<tr>
<td>497</td>
<td>Hole in Stamping - .005&quot; (3 Dec) - see note below</td>
</tr>
<tr>
<td>357</td>
<td>Hole in Nut - .005&quot; (3 Dec) - see note below</td>
</tr>
<tr>
<td>07</td>
<td>Stamping Thickness (2 Dec)</td>
</tr>
<tr>
<td>47</td>
<td>Measurement from Center to Outermost Edge (2 Dec)</td>
</tr>
</tbody>
</table>

**NOTE:** For P style pins, the “Hole in Stamping” value is the “Hole in Nut” value (i.e. GA3PB3573570747)

Part Number
STUD & WELD NUT ELECTRODES

Special Application Auto Load Weld Nut Pins

<table>
<thead>
<tr>
<th>PinType</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GA</td>
<td>Stainless Steel Pin, Supported by spring and/or air</td>
</tr>
<tr>
<td>CA</td>
<td>Coated, D2 Steel Pin, Supported by spring and/or air</td>
</tr>
<tr>
<td>RA</td>
<td>Retractable, Stainless Steel Pin, Movement controlled by Air Pressure only, Special Application please contact CenterLine</td>
</tr>
<tr>
<td>KA</td>
<td>Coated Retractable, D2 Steel Pin, Movement controlled by Air Pressure only, Special Application please contact CenterLine</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Series</th>
<th>Thread Size</th>
<th>Weld Face Diameter</th>
<th>Maximum Hole in Head*</th>
<th>Head Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>5/8-18</td>
<td>7/8 Standard</td>
<td>0.427 (10.85) ID</td>
<td>0.500</td>
</tr>
<tr>
<td>3</td>
<td>7/8-14</td>
<td>1-1/4 Standard</td>
<td>0.642 (16.31) ID</td>
<td>0.500</td>
</tr>
<tr>
<td>4</td>
<td>1-1/8-12</td>
<td>1-1/2 Standard</td>
<td>0.852 (21.64) ID</td>
<td>0.625</td>
</tr>
</tbody>
</table>

* Special weld nut electrodes are available for larger IDs and areas with clearance restrictions.

Nose Type

**M**

For auto loading nuts where the stamping is not being located and pilot thickness is greater than material thickness.

APPLICATION SIZES

EXAMPLE

Generate Your Own Number (Total 14 Characters)

<table>
<thead>
<tr>
<th>Example</th>
<th>Pin Type</th>
<th>Series Number</th>
<th>Nose Type</th>
<th>Pilot Diameter + .005” (3 Dec.)</th>
<th>Hole in Nut -.005” (3 Dec.)</th>
<th>Stamping Thickness (2 Dec.)</th>
<th>Measurement from Center to Outermost Edge (2 Dec.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breakdown</td>
<td>GA 3 M 507 357 07 47</td>
<td>07</td>
<td>47</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part Number</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**STUD & WELD NUT ELECTRODES**

Nut Welding Heads

<table>
<thead>
<tr>
<th>Series</th>
<th>Thread Size</th>
<th>Weld Face Diameter</th>
<th>Maximum Hole in Head*</th>
<th>Head Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>5/8-18</td>
<td>7/8 Standard</td>
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<tr>
<td>3</td>
<td>7/8-14</td>
<td>1-1/4 Standard</td>
<td>0.642 (16.31) ID</td>
<td>0.500</td>
</tr>
<tr>
<td>4</td>
<td>1-1/8-12</td>
<td>1-1/2 Standard</td>
<td>0.852 (21.64) ID</td>
<td>0.625</td>
</tr>
</tbody>
</table>

*Special weld nut electrodes are available for larger IDs and areas with clearance restrictions.

**EXAMPLE**

- **PART NUMBER INSTRUCTIONS**
  - Example: Z Dimension = .348
  - **Step 1** Establish the major diameter of pin (Z dimension).
  - **Step 2** The final 3 digits in the nut welding head # are represented by the following formula.
    \[ Z \ (.348) + .002 = .350 \]
  - **Step 3** Lastly, insert the result from **Step 2** to the end of the series part number prefix below.

**Final Nut Welding Head Number**

**Example** Series 2 - GH2050T087350

**Generate Your Own Number (Total 13 Characters)**

<table>
<thead>
<tr>
<th>Series</th>
<th>Part Number Prefix</th>
<th>Z + .002” Specify to 3 decimal places.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>GH2050T087</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>GH3050T125</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>GH4062T150</td>
<td></td>
</tr>
</tbody>
</table>
**STUD & WELD NUT ELECTRODES**

Stud Welding Heads

**PART NUMBER INSTRUCTIONS**

Example:  
- **X Dimension** - .75  
- **Y Dimension** - 1.25  
- **Z Dimension** - .430

**Step 1**  
In this case, **X & Y** indicates Series 2 however, **Z** dimension dictates **Series 3** or larger.

**Step 2**  
The final 3 digits in the stud welding head # is represented by the following formula.  
\[ Z (.430) + .010" = .440 \]

**Step 3**  
Lastly, insert the result from **Step 2** to the end of the **series part number**.

**Final Stud Welding Head Number**  
Example Series 3 - GH3050T125440

<table>
<thead>
<tr>
<th>Series</th>
<th>Thread Size</th>
<th>Weld Face Diameter</th>
<th>Maximum Hole in Head*</th>
<th>Head Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>5/8-18</td>
<td>7/8 Standard</td>
<td>0.427 (10.85) ID</td>
<td>0.500</td>
</tr>
<tr>
<td>3</td>
<td>7/8-14</td>
<td>1-1/4 Standard</td>
<td>0.642 (16.31) ID</td>
<td>0.500</td>
</tr>
<tr>
<td>4</td>
<td>1-1/8-12</td>
<td>1-1/2 Standard</td>
<td>0.852 (21.64) ID</td>
<td>0.625</td>
</tr>
</tbody>
</table>

*Special weld nut electrodes are available for larger studs and areas with clearance restrictions.*

### Generate Your Own Number (Total 13 Characters)

<table>
<thead>
<tr>
<th>Series</th>
<th>Part Number Prefix</th>
<th><em>Z + .010” Specify to 3 decimal places.</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>GH2050T087</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>GH3050T125</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>GH4062T150</td>
<td></td>
</tr>
</tbody>
</table>
Mounting Dimensions
For Base Mount Body Styles

Body Style A

Body Style H&J

Body Style K

PART NUMBER
EXAMPLE

COMPLETE BODY REPLACEMENT UNIT

UCR3NHP

NHP - No Head or Pin
R3 - Retractable Pin series 3
C - 5 RW Taper
U - Standard Length

COMPLETE STUD WELDING UNIT

XAGH3050T125440

GH3050T125440
Head # created from Stud welding head sheet.
A - Base Mount
X - Extended Length

COMPLETE NUT WELDING UNIT

UGGP2A3482700525

GP2A3482700525
Pin # created from manual load weld nut pins sheet.
G - 1” - 12 Thread
U - Standard Length

NOTE: Base units come with 1/4-20 screws for mounting.
CenterLine has combined its proven nut electrode technology with proven sensing technology to create the patented Smart Electrode nut detection system. The Smart Electrode System can help you determine if a weld nut is present and in the correct orientation. This diagnostic device provides a reliable method for enhancing the quality of the projection welding process.

**System Features**

- Available for CenterLine’s 2, 3 and 4 series nut weld units.
- Fiber optics communicate data directly from electrode to the monitoring system.
- No PLC or PC is required and there is no software to purchase.
- Able to sense the presence of a single nut at the point-of-weld.
- Capable of sensing piloted and non-piloted nuts.

- Bypass switches to deactivate “gun open” and “single nut” sensors.
- Able to detect when the weldgun has returned to the open position.
- Available for “special electrodes” at a modest additional cost.
- Standard components for quick turnaround time.

The CenterLine Smart Electrode System can be integrated into simple, stand-alone applications or fully integrated monitoring systems. It is compact and easy to install with the aid of the detailed installation manual included with every unit and the tooling change required to incorporate the Smart Electrode is minimal. Set-up and calibration are maintained electronically – no mechanical adjustments are necessary.

**Example Explanation Coding**

<table>
<thead>
<tr>
<th>PRODUCT TYPE</th>
<th>USE</th>
<th>SE FOR SMART ELECTRODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODEL</td>
<td>USE</td>
<td>01 FOR UNIT WITH INTEGRATED AMPLIFIER</td>
</tr>
<tr>
<td></td>
<td>USE</td>
<td>02 FOR UNIT WITH REMOTE AMPLIFIER</td>
</tr>
<tr>
<td></td>
<td>USE</td>
<td>03 FOR REMOTE AMPLIFIER ONLY (USE WITH MODEL SE-02)</td>
</tr>
<tr>
<td>AIR OPTION</td>
<td>USE</td>
<td>N FOR WITHOUT AIR OPTION</td>
</tr>
<tr>
<td></td>
<td>USE</td>
<td>A FOR WITH AIR OPTION</td>
</tr>
<tr>
<td>BODY LENGTH</td>
<td>USE</td>
<td>U FOR STANDARD LENGTH BODY</td>
</tr>
<tr>
<td></td>
<td>USE</td>
<td>X FOR EXTENDED LENGTH BODY (0.5 (12.70) LONGER THAN STANDARD LENGTH)</td>
</tr>
<tr>
<td>BODY STYLE</td>
<td>USE</td>
<td>A FOR BASE MOUNT</td>
</tr>
<tr>
<td></td>
<td>USE</td>
<td>B, C, D OR E FOR TAPER MOUNT</td>
</tr>
<tr>
<td></td>
<td>USE</td>
<td>F OR G FOR THREAD MOUNT</td>
</tr>
<tr>
<td></td>
<td>USE</td>
<td>H OR J FOR BASE MOUNT WITH CABLE LUG</td>
</tr>
<tr>
<td></td>
<td>USE</td>
<td>K FOR WELD-THRU BASE MOUNT WITH CONTACT</td>
</tr>
<tr>
<td>SERIES</td>
<td>USE</td>
<td>2 FOR 200 SERIES .88 DIA. WELD FACE</td>
</tr>
<tr>
<td></td>
<td>USE</td>
<td>3 FOR 300 SERIES 1.25 DIA. WELD FACE</td>
</tr>
<tr>
<td></td>
<td>USE</td>
<td>4 FOR 400 SERIES 1.50 DIA. WELD FACE</td>
</tr>
</tbody>
</table>

T. J. SNOW CO., INC.
Resistance Welding Equipment & Supplies
Service • Sales • Consulting • Seminars
## COMPONENTS

<table>
<thead>
<tr>
<th>Feature</th>
<th>SE-01</th>
<th>SE-02</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiber optic sensor up to 5' (1.5m)</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Fiber optic integrated control interface (24 volt DC versions available)</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Fiber optic non-integrated control interface (24 volt DC versions available)</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Smart Electrode Remote Amplifier (additional Remote Amplifiers available – Model SE-03)</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Optional filter regulator (order separately)</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>M-12 five pin shielded cord 16.4' (5m)</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>CenterLine nut weld unit (2, 3 and 4 series available)</td>
<td>•</td>
<td>•</td>
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<tr>
<td>Custom CenterLine nut weld bodies and/or copper details are available to suit if required</td>
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**FIGURE 2-1**

*SE-01 Smart Electrode Unit with Integrated Amplifier*

**FIGURE 2-2**

*SE-02 Smart Electrode Unit with Remote Amplifier*
### ITEM NO. DIMENSIONS

<table>
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<tr>
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<td>CLFA-24S</td>
<td>.19 (4.76)</td>
<td>.12 (3.17)</td>
<td>.32 (8.13)</td>
<td>.394 (10.01)</td>
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<td>.12 (3.17)</td>
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<td>.12 (3.17)</td>
<td>.32 (8.13)</td>
<td>.394 (10.01)</td>
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</tr>
<tr>
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<td>CLFF-24S</td>
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<td>2.00 (50.80) sphere. rad.</td>
<td></td>
<td>.38 (9.53)</td>
<td>.495 (12.57)</td>
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</tr>
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<td>.12 (3.17)</td>
<td>.32 (8.13)</td>
<td>.394 (10.01)</td>
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<td>CLFE-25S</td>
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<td>.12 (3.17)</td>
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<td>.394 (10.01)</td>
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<td>2.00 (50.80) sphere. rad.</td>
<td></td>
<td>.38 (9.53)</td>
<td>.495 (12.57)</td>
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<td>.394 (10.01)</td>
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<td>CLFB-25S</td>
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<td>.12 (3.17)</td>
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<td>CLFC-25S</td>
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<td>.12 (3.17)</td>
<td>.32 (8.13)</td>
<td>.394 (10.01)</td>
<td></td>
<td></td>
<td></td>
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<td>.12 (3.17)</td>
<td>.32 (8.13)</td>
<td>.394 (10.01)</td>
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<tr>
<td>CLFE-26</td>
<td>CLFE-26S</td>
<td>.19 (4.76)</td>
<td>.12 (3.17)</td>
<td>.32 (8.13)</td>
<td>.394 (10.01)</td>
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<tr>
<td>CLFF-26</td>
<td>CLFF-26S</td>
<td>2.00 (50.80)</td>
<td>2.00 (50.80) sphere. rad.</td>
<td></td>
<td>.38 (9.53)</td>
<td>.495 (12.57)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Dimensions Shown Are: inches (mm).
- ADDITIONAL LENGTHS ARE AVAILABLE UPON REQUEST.

FOR ALL OTHER ITEMS:
- Check Key To Item Numbers For Availability
- Use Example For Ordering Available Items

**KEY TO ITEM NUMBERS**

- CLF - Cap Designation
- A, B, C, D, E, F - Nose Designation
- 2, 3 - RWMA Alloy Class
- Z - Zirconium
- G - Dispersion Strengthened Copper
- 4 THRU 6 - Major Diameter In .125 (3.18) Increments
- S - Short overall length

**EXAMPLE:**

FEMALE CAP | A NOSE | ZIRCONIUM | A = .750 (19.05) DIAMETER

**Gfidcop®** is a registered trademark of SCM Metal Products Inc.
### ELECTRODE CAPS

**Replaceable Male Spot Welding Caps**

- Dimensions Shown Are: inches (mm).

**FIGURE 3-2 (Material RWMA Class 2, 3, Zirconium & Dispersion Strengthened Copper)**

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>CLASS 2 Standard</th>
<th>DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>Major Diameter</td>
<td>Overall Length</td>
</tr>
<tr>
<td>WA-24</td>
<td>.19  (4.76)</td>
<td></td>
</tr>
<tr>
<td>WB-24</td>
<td>.19  (4.76)</td>
<td></td>
</tr>
<tr>
<td>WC-24</td>
<td>.482 (12.24)</td>
<td>.12 (28.45)</td>
</tr>
<tr>
<td>WD-24</td>
<td>.28  (7.14)</td>
<td></td>
</tr>
<tr>
<td>WE-24</td>
<td>.19  (4.76)</td>
<td></td>
</tr>
<tr>
<td>WF-24-2</td>
<td></td>
<td>2.00 (50.80)</td>
</tr>
<tr>
<td>WA-25</td>
<td>.25  (6.35)</td>
<td></td>
</tr>
<tr>
<td>WB-25</td>
<td>.19  (4.76)</td>
<td></td>
</tr>
<tr>
<td>WC-25</td>
<td>.625 (15.88)</td>
<td>.25 (41.15)</td>
</tr>
<tr>
<td>WD-25</td>
<td>.25  (6.35)</td>
<td></td>
</tr>
<tr>
<td>WE-25</td>
<td>.25  (6.35)</td>
<td></td>
</tr>
<tr>
<td>WF-25-2</td>
<td></td>
<td>2.00 (50.80)</td>
</tr>
<tr>
<td>WA-26</td>
<td>.31  (7.94)</td>
<td></td>
</tr>
<tr>
<td>WB-26</td>
<td>.19  (4.76)</td>
<td></td>
</tr>
<tr>
<td>WC-26</td>
<td>.750 (19.05)</td>
<td>.62 (41.15)</td>
</tr>
<tr>
<td>WD-26</td>
<td>.31  (7.94)</td>
<td></td>
</tr>
<tr>
<td>WE-26</td>
<td>.31  (7.94)</td>
<td></td>
</tr>
<tr>
<td>WF-26-4</td>
<td></td>
<td>4.00 (101.60)</td>
</tr>
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<td>WA-27</td>
<td>.31  (7.94)</td>
<td></td>
</tr>
<tr>
<td>WB-27</td>
<td>.25  (6.35)</td>
<td></td>
</tr>
<tr>
<td>WC-27</td>
<td>.875 (22.23)</td>
<td>.62 (41.15)</td>
</tr>
<tr>
<td>WD-27</td>
<td>.31  (7.94)</td>
<td></td>
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<tr>
<td>WE-27</td>
<td>.31  (7.94)</td>
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</tr>
<tr>
<td>WF-27-6</td>
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<td>6.00 (152.40)</td>
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</tbody>
</table>

For all other items:
- Check Key to Item Numbers For Availability
- Use Example For Ordering Available Items

**KEY TO ITEM NUMBERS**
- **W** - Cap Designation
- **A, B, C, D, E, F** - Nose Designation
- **2, 3** - RWMA Alloy Class
- **Z** - Zirconium
- **G** - Dispersion Strengthened Copper
- **4 THRU 7** - Major Diameter In .125 (3.18) Increments

**EXAMPLE:**
- MALE CAP, A NOSE, CLASS 3, A = .875 (22.23) DIAMETER
- **Class 2** (CuCrZr) Copper-Zirconium **Glidcop®**

**Glidcop®** is a registered trademark of SCM Metal Products Inc.
Replaceable Button Caps

For Paddle Holder Type 1 - See Page 6-4

For Paddle Holder Type 3 - See Page 6-4

- Dimensions Shown Are: inches (mm).

FIGURE 3-3 (Material RWMA Class 2)

FIGURE 3-4 (Material RWMA Class 2)
**ELECTRODE CAPS**

**Button Caps**

For Paddle Holder Type 2 – See Page 6-4

**EXAMPLE – CLR2-78-AY**

CLR2-78 = RWMA Class 2  
CLR3-78 = RWMA Class 3  
CLRZ-78 = Zirconium

![Diagram of CLR2-78-AY]

- .62 (15.88) DIAMETER
- .375 (9.53)
- 3/8-16 THD.

**ITEM NO.**

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>&quot;A&quot; = HEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLR2-78-31C</td>
<td>.312 (7.92)</td>
</tr>
<tr>
<td>CLR2-78-37C</td>
<td>.375 (9.53)</td>
</tr>
<tr>
<td>CLR2-78-43C</td>
<td>.437 (11.10)</td>
</tr>
<tr>
<td>CLR2-78-50C</td>
<td>.500 (12.70)</td>
</tr>
<tr>
<td>CLR2-78-62C</td>
<td>.625 (15.88)</td>
</tr>
<tr>
<td>CLR2-78-75C</td>
<td>.750 (19.05)</td>
</tr>
<tr>
<td>ETC.</td>
<td>See Example</td>
</tr>
</tbody>
</table>

**EXAMPLE – CLH3-78-AY**

CLH2-78 = RWMA Class 2  
CLH3-78 = RWMA Class 3

![Diagram of CLH3-78-AY]

- .50 (12.70) HEX
- .375 (9.53)
- 3/8-16 THD.

**“Y” = NOSE DESIGNATION**

* A = Pointed  
* B = Dome  
* C = Flat (Shown)  
* E = Truncated (20°)  
* F = .62 (15.88) Radius

* .25(6.35) Weld Face Diameter

**EXAMPLE:** .50 (12.70) HEX, CLASS 3, “A” = .50 (12.70) HEIGHT, C = FLAT NOSE.

**• CLH3-78-50C**

- Item No.  
- Use H for Hex Material  
- Use R for Round Material  
- RWMA Alloy Class

**NOTE:** Other thread sizes and shapes are available.
### STANDARD ADAPTERS

Straight Male Adapter Shanks For Female Caps

**FIGURE 4-1 (Material RWMA Class 2 & 3)**

- Dimensions Shown Are: inches (mm).
- See pg. 3-1 For Caps.

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>A Diameter</th>
<th>B Shank Overall Length</th>
<th>C Minor Taper Diameter</th>
<th>D Gauging Taper Diameter</th>
<th>E Water Hole Diameter</th>
<th>F Cap End Taper Diameter</th>
<th>G Taper Water Hole Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>QLF-2405T</td>
<td>1.25 (31.75)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QLF-2406T</td>
<td>1.50 (38.10)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QLF-2407T</td>
<td>1.75 (44.45)</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>QLF-2408T</td>
<td>2.00 (50.80)</td>
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<td></td>
<td></td>
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<tr>
<td>QLF-2409T</td>
<td>2.25 (57.15)</td>
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<td></td>
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<td></td>
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</tr>
<tr>
<td>QLF-2410T</td>
<td>2.50 (63.50)</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>QLF-2411T</td>
<td>.482 (12.24)</td>
<td>2.75 (69.85)</td>
<td>.438 (11.13)</td>
<td>.463 (11.76)</td>
<td>.28 (7.14)</td>
<td>.402 (10.21)</td>
<td>.25 (6.35)</td>
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<td>QLF-2412T</td>
<td>3.00 (76.20)</td>
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<td></td>
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<tr>
<td>QLF-2413T</td>
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<td></td>
</tr>
<tr>
<td>QLF-2414T</td>
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<td></td>
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<tr>
<td>QLF-2415T</td>
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<tr>
<td>QLF-2507T</td>
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<td></td>
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<tr>
<td>QLF-2508T</td>
<td>1.93 (49.02)</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QLF-2509T</td>
<td>2.18 (55.37)</td>
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<td></td>
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<td></td>
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<td>QLF-2510T</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>QLF-2511T</td>
<td>.625 (15.88)</td>
<td>2.68 (68.02)</td>
<td>.588 (14.94)</td>
<td>.613 (15.57)</td>
<td>.34 (8.73)</td>
<td>.502 (12.75)</td>
<td>.265 (6.73)</td>
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<td>QLF-2514T</td>
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<td>QLF-2516T</td>
<td>3.93 (99.82)</td>
<td></td>
<td></td>
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<td></td>
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</tbody>
</table>
STANDARD ADAPTERS

Straight Male Adapter Shanks For Female Caps

FIGURE 4-2 (Material RWMA Class 2 & 3)

**KEY TO ITEM NUMBERS**

<table>
<thead>
<tr>
<th>CLF -</th>
<th>Adapter Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 or 3 -</td>
<td>RWMA Alloy Class</td>
</tr>
<tr>
<td>4 Thru 7 -</td>
<td>RW Taper Number</td>
</tr>
<tr>
<td>05 Thru 16 -</td>
<td>Overall Length in .25 (6.35) Increments</td>
</tr>
<tr>
<td>T -</td>
<td>Thru Water Hole</td>
</tr>
</tbody>
</table>

Delete “T” if Blind Hole Is Required

**EXAMPLE:**

MALE ADAPTER, CLASS 2, RW 6 TAPER, 2.50 (63.50) O.A.L., THRU WATER HOLE

**ADD extra lengths are available upon request.**

```
<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLF-2608T</td>
<td>A: 2.00 (50.80)</td>
</tr>
<tr>
<td>CLF-2610T</td>
<td>B: 2.50 (63.50)</td>
</tr>
<tr>
<td>CLF-2612T</td>
<td>C: .750 (19.05)</td>
</tr>
<tr>
<td>CLF-2614T</td>
<td>D: 3.00 (76.20)</td>
</tr>
<tr>
<td>CLF-2616T</td>
<td>E: .706 (17.93)</td>
</tr>
<tr>
<td>CLF-2618T</td>
<td>F: .731 (18.57)</td>
</tr>
<tr>
<td>CLF-2621T</td>
<td>G: .38 (9.53)</td>
</tr>
<tr>
<td>CLF-2622T</td>
<td>H: .633 (16.08)</td>
</tr>
<tr>
<td>CLF-2623T</td>
<td>I: .343 (8.71)</td>
</tr>
<tr>
<td>CLF-2624T</td>
<td>J: 1.50 (34.80)</td>
</tr>
<tr>
<td>CLF-2625T</td>
<td>K: 2.00 (50.80)</td>
</tr>
</tbody>
</table>
```

FOR ALL OTHER ITEMS:
- Check Key To Item Numbers For Availability
- Use Example For Ordering Available Items

Dimensions Shown Are: inches (mm).
- See pg. 3-1 For Caps.
Straight Female Adapter Shanks For Male Caps

**FIGURE 4-3 (Material RWMA Class 2 & 3)**

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CLASS 2</strong></td>
<td><strong>A</strong> Major Diameter</td>
</tr>
<tr>
<td>WG-2405</td>
<td>1.25 (31.75)</td>
</tr>
<tr>
<td>WG-2406</td>
<td>1.50 (38.10)</td>
</tr>
<tr>
<td>WG-2407</td>
<td>1.75 (44.45)</td>
</tr>
<tr>
<td>WG-2408</td>
<td>2.00 (50.80)</td>
</tr>
<tr>
<td>WG-2409</td>
<td>2.25 (57.15)</td>
</tr>
<tr>
<td>WG-2410</td>
<td>2.50 (63.50)</td>
</tr>
<tr>
<td>WG-2411</td>
<td>.482 (12.24) 2.75 (69.85) .438 (11.13) .463 (11.76) .28 (7.14) .375 (9.53)</td>
</tr>
<tr>
<td>WG-2412</td>
<td>3.00 (76.20)</td>
</tr>
<tr>
<td>WG-2413</td>
<td>3.25 (82.55)</td>
</tr>
<tr>
<td>WG-2414</td>
<td>3.50 (88.90)</td>
</tr>
<tr>
<td>WG-2415</td>
<td>3.75 (95.25)</td>
</tr>
<tr>
<td>WG-2416</td>
<td>4.00 (101.60)</td>
</tr>
<tr>
<td>WG-2505</td>
<td>1.25 (31.75)</td>
</tr>
<tr>
<td>WG-2506</td>
<td>1.50 (38.10)</td>
</tr>
<tr>
<td>WG-2507</td>
<td>1.75 (44.45)</td>
</tr>
<tr>
<td>WG-2508</td>
<td>2.00 (50.80)</td>
</tr>
<tr>
<td>WG-2509</td>
<td>2.25 (57.15)</td>
</tr>
<tr>
<td>WG-2510</td>
<td>2.50 (63.50)</td>
</tr>
<tr>
<td>WG-2511</td>
<td>.625 (15.88) 2.75 (69.85) .588 (14.94) .613 (15.57) .38 (9.53) .415 (10.54)</td>
</tr>
<tr>
<td>WG-2512</td>
<td>3.00 (76.20)</td>
</tr>
<tr>
<td>WG-2513</td>
<td>3.25 (82.55)</td>
</tr>
<tr>
<td>WG-2514</td>
<td>3.50 (88.90)</td>
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<tr>
<td>WG-2515</td>
<td>3.75 (95.25)</td>
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<tr>
<td>WG-2516</td>
<td>4.00 (101.60)</td>
</tr>
</tbody>
</table>

- Dimensions Shown Are: inches (mm).
- See pg. 3-2 For Caps.
- ADDITIONAL LENGTHS ARE AVAILABLE UPON REQUEST.
STANDARD ADAPTERS

Straight Female Adapter Shanks For Male Caps

FIGURE 4-4 (Material RWMA Class 2 & 3)

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>A Major Diameter</th>
<th>B Shank Overall Length</th>
<th>C Minor Taper Diameter</th>
<th>D Gauging Taper Diameter</th>
<th>E Water Hole Diameter</th>
<th>F Major Female Taper Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>WG-2608</td>
<td>2.00 (50.80)</td>
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<td></td>
<td></td>
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<tr>
<td>WG-2610</td>
<td>2.50 (63.50)</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>WG-2612</td>
<td>.750 (19.05)</td>
<td>3.00 (76.20)</td>
<td>.706 (17.93)</td>
<td>.731 (18.57)</td>
<td>.44 (11.11)</td>
<td>.501 (12.73)</td>
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<td>WG-2614</td>
<td>3.50 (88.90)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WG-2616</td>
<td>4.00 (101.60)</td>
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<td></td>
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<td></td>
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<td>WG-2708</td>
<td>2.00 (50.80)</td>
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<td>WG-2710</td>
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<tr>
<td>WG-2712</td>
<td>.875 (22.23)</td>
<td>3.00 (76.20)</td>
<td>.819 (20.80)</td>
<td>.844 (21.44)</td>
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<td>.613 (15.57)</td>
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<tr>
<td>WG-2716</td>
<td>4.00 (101.60)</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

- ADDITIONAL LENGTHS ARE AVAILABLE UPON REQUEST.

FOR ALL OTHER ITEMS:
- Check Key To Item Numbers For Availability
- Use Example For Ordering Available Items

KEY TO ITEM NUMBERS
- WG - Adapter Designation
- 2 or 3 - RWMA Alloy Class
- 4 Thru 7 - RW Taper Number
- 05 Thru 16 - Overall Length in .25 (6.35) Increments

EXAMPLE:
FEMALE ADAPTER, CLASS 3, RW 4 TAPER, 1.25 (31.75) O.A.L.

- WG - 3405
  - Adapter Designation
  - RWMA Alloy Class
  - Overall Length
  - RW Taper No.
STANDARD ADAPTERS

Offset Male Adapter Shanks For Female Caps

FOR ALL OTHER ITEMS:
- Check Key To Item Numbers For Availability
- Use Example For Ordering Available Items

KEY TO ITEM NUMBERS
- CLF - Adapter Designation
- 2 or 3 - RWMA Alloy Class
- 4 Thru 6 - RW Taper Number
- 10 Thru 20 - Overall Length in .25 (6.35) Increments
- 04 Thru 16 - Offset in .06 (1.59) Increments
- T - Thru Water Hole
  Delete “T” If Blind Hole Is Required

ADDITIONAL LENGTHS ARE AVAILABLE UPON REQUEST.

EXAMPLE:
- MALE ADAPTER, CLASS 3, RW 4 TAPER, 2.50 (63.50) O.A.L., .25 (6.35) OFFSET, THRU WATER HOLE
- CLF - 3410 - 04T

Dimensions Shown Are: inches (mm).

See pg. 3-1 For Caps.
STANDARD ADAPTERS

Offset Female Adapter Shanks for Male Caps

FIGURE 4-6 (Material RWMA Class 2 & 3)

- Dimensions Shown Are: inches (mm).
- See pg. 3-2 For Caps.

FOR ALL OTHER ITEMS:
- Check Key To Item Numbers For Availability
- Use Example For Ordering Available Items

EXAMPLE:
FEMALE ADAPTER, CLASS 2,
RW 5 TAPER, 3.25 (82.55) O.A.L., 1.0 (25.40) OFFSET.

- WG - 2513 - 16

KEY TO ITEM NUMBERS
WG - Adapter Designation
2 or 3 - RWMA Alloy Class
4 Thru 6 - RW Taper Number
10 Thru 20 - Overall Length
in .25 (6.35) Increments
04 Thru 16 - Offset in .06 (1.59) Increments
STANDARD ADAPTERS

Single Bend Male Adapter Shanks For Female Caps

FIGURE 4-7 (Material RWMA Class 3)

DIMENSION CHARTS

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Code 5</th>
<th>Code 6</th>
<th>Code 7</th>
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<tbody>
<tr>
<td>A – OVERALL LENGTH</td>
<td>AS CODED</td>
<td>AS CODED</td>
<td>AS CODED</td>
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<tr>
<td>B – OFFSET</td>
<td>AS CODED</td>
<td>AS CODED</td>
<td>AS CODED</td>
</tr>
<tr>
<td>C – DIAMETER</td>
<td>.625 (15.88)</td>
<td>.750 (19.05)</td>
<td>.88 (22.35)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Code 5</th>
<th>Code 6</th>
<th>Code 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>H – CAP SIZE</td>
<td>.500 (12.70)</td>
<td>.625 (15.88)</td>
<td>.750 (19.05)</td>
</tr>
<tr>
<td>E – HOLE DIAMETER</td>
<td>.28 (7.11)</td>
<td>.31 (7.87)</td>
<td>.34 (8.64)</td>
</tr>
<tr>
<td>F – HOLE DIAMETER</td>
<td>.38 (9.65)</td>
<td>.38 (9.65)</td>
<td>.38 (9.65)</td>
</tr>
<tr>
<td>G – TAPER DIAMETER</td>
<td>.402 (10.21)</td>
<td>.502 (12.75)</td>
<td>.633 (16.08)</td>
</tr>
</tbody>
</table>

• TO ORDER YOUR SPECIALS USE CODING CHART - SEE PG. 4-8

T. J. SNOW CO., INC.
Resistance Welding Equipment & Supplies
Service • Sales • Consulting • Seminars
STANDARD ADAPTERS

Single Bend Male Adapter Shanks For Female Caps

EXAMPLE EXPLANATION CODING

CENTERLINE SPECIALS
USE CF FOR SINGLE BEND MALE ADAPTERS FOR FEMALE CAPS

CAP SIZE
USE 0 FOR .50 (12.70) NOMINAL DIAMETER
USE 1 FOR .62 (15.88) NOMINAL DIAMETER
USE 2 FOR .75 (19.05) NOMINAL DIAMETER

MATERIAL
USE 3 FOR CLASS 3 RWMA

C = ADAPTER DIAMETER
(IN .125 (3.18) INCREMENTS)
USE 5 FOR .62 (15.88) NOMINAL DIAMETER STRAIGHT SHANK
USE 6 FOR .75 (19.05) NOMINAL DIAMETER STRAIGHT SHANK
USE 7 FOR .88 (22.35) NOMINAL DIAMETER STRAIGHT SHANK
USE 6E FOR .62 (15.88) NOMINAL DIAMETER ELECTRODE TAPER SHANK
USE 7E FOR .75 (19.05) NOMINAL DIAMETER ELECTRODE TAPER SHANK
USE 8E FOR .88 (22.35) NOMINAL DIAMETER ELECTRODE TAPER SHANK

A = OVERALL LENGTH
(IN .25 (6.35) INCREMENTS)
USE 10 FOR 2.50 (63.50) MINIMUM LENGTH

B = OFFSET LENGTH
(IN .125 (3.18) INCREMENTS)
USE 8 FOR 1.0 (25.40) MINIMUM OFFSET

D = OFFSET ANGLE
(AS CODED)
USE 45 FOR 45° OFFSET
USE 60 FOR 60° OFFSET
USE 75 FOR 75° OFFSET
USE 90 FOR 90° OFFSET

WATER HOLE THRU
USE T FOR WATER HOLE THRU
OMIT T FOR BLIND HOLE CAP TAPER END ONLY

SAMPLE
TYPICAL CAP ADAPTER CODING
CAP ADAPTER WATER HOLE WILL BE DRILLED THRU
CAP ADAPTER OFFSET ANGLE WILL BE 90°
CAP ADAPTER OFFSET WILL BE 1.0 (25.40) LONG
CAP ADAPTER WILL BE 2.50 (63.50) LONG
CAP ADAPTER WILL HAVE .62 (15.88) DIAMETER
CAP ADAPTER WILL BE MADE OF CLASS 3 RWMA MATERIAL
CAP ADAPTER WILL HAVE A STRAIGHT SHANK
CAP ADAPTER WILL BE SINGLE BEND MALE FOR FEMALE CAPS

EXAMPLE:
• CF1-3510890T

• Dimensions Shown Are: inches (mm)
STANDARD ADAPTERS

Single Bend Female Adapter Shanks For Male Caps

DIMENSION CHARTS

<table>
<thead>
<tr>
<th>C – DIAMETER</th>
<th>.625 (15.88)</th>
<th>.750 (19.05)</th>
<th>.875 (22.23)</th>
<th>1.00 (25.40)</th>
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<tbody>
<tr>
<td>DIAMETER CODE</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
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<td>A – OVERALL LENGTH</td>
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<td>AS CODED</td>
<td>AS CODED</td>
<td>AS CODED</td>
</tr>
<tr>
<td>B – OFFSET</td>
<td>AS CODED</td>
<td>AS CODED</td>
<td>AS CODED</td>
<td>AS CODED</td>
</tr>
<tr>
<td>D – DIAMETER</td>
<td>AS CODED</td>
<td>AS CODED</td>
<td>AS CODED</td>
<td>AS CODED</td>
</tr>
</tbody>
</table>

| H – CAP SIZE                 | .500 (12.70) | .625 (15.88) | .750 (19.05) | .875 (22.23) |
| E – TAPER DIAMETER           | .374 (9.50)  | .414 (10.52) | .500 (12.70) | .613 (15.57) |
| F – HOLE DIAMETER            | .28 (7.11)   | .34 (8.64)   | .44 (11.18)  | .50 (12.70)  |
| G – HOLE DIAMETER            | .38 (9.65)   | .38 (9.65)   | .44 (11.18)  | .50 (12.70)  |

Dimensions Shown Are: inches (mm).

See pg. 3-2 For Caps.

FIGURE 4-8 (Material RWMA Class 3)

TO ORDER YOUR SPECIALS USE CODING CHART - SEE PG. 4-10
STANDARD ADAPTERS

Single Bend Female Adapter Shanks For Male Caps

EXAMPLE EXPLANATION CODING

CENTERLINE SPECIALS
USE CM FOR SINGLE BEND FEMALE ADAPTER FOR MALE CAPS

CAP SIZE
USE 0 FOR .50 (12.70) NOMINAL DIAMETER
USE 1 FOR .625 (15.88) NOMINAL DIAMETER
USE 2 FOR .75 (19.05) NOMINAL DIAMETER
USE 3 FOR .75 (19.05) NOMINAL DIAMETER (INCREASED WATER FLOW)
USE 4 FOR .875 (22.23) NOMINAL DIAMETER

MATERIAL
USE 3 FOR CLASS 3 RWMA

C = ADAPTER DIAMETER
USE 5 FOR .62 (15.88) NOMINAL DIAMETER STRAIGHT SHANK
USE 6 FOR .75 (19.05) NOMINAL DIAMETER STRAIGHT SHANK
USE 7 FOR .88 (22.35) NOMINAL DIAMETER STRAIGHT SHANK
USE 8 FOR 1 (25.40) NOMINAL DIAMETER STRAIGHT SHANK
USE 5E FOR .62 (15.88) NOMINAL ELECTRODE TAPERED SHANK
USE 6E FOR .75 (19.05) NOMINAL ELECTRODE TAPERED SHANK
USE 7E FOR .88 (22.35) NOMINAL ELECTRODE TAPERED SHANK

A = OVERALL LENGTH
USE 10 FOR 2.50 (63.50) MINIMUM LENGTH

B = OFFSET LENGTH
USE 8 FOR 1.0 (25.40) MINIMUM OFFSET

D = OFFSET ANGLE
USE 45 FOR 45° OFFSET
USE 60 FOR 60° OFFSET
USE 75 FOR 75° OFFSET
USE 90 FOR 90° OFFSET

SAMPLE
TYPICAL CAP ADAPTER CODING

CAP ADAPTER OFFSET ANGLE WILL BE 90°
CAP ADAPTER OFFSET WILL BE 1.0 (25.40) LONG
CAP ADAPTER WILL BE 2.50 (63.50) LONG
CAP ADAPTER WILL HAVE .62 (15.88) DIAMETER
CAP ADAPTER WILL BE MADE OF CLASS 3 RWMA MATERIAL
CAP ADAPTER WILL HAVE A STRAIGHT SHANK
CAP ADAPTER WILL BE SINGLE BEND FEMALE FOR MALE CAPS

EXAMPLE:

• CM1-3610690

• Dimensions Shown Are: inches (mm)
J Shape Cap Adapters

STANDARD ADAPTERS

EXAMPLE:
- CL JA5-35-10166M

TYPE M = For Male Caps
TYPE F = For Female Caps

FIGURE 4-9 (Material RWMA Class 3)

EXAMPLE EXPLANATION CODING

CENTERLINE SPECIALS
USE CL

GROUP
USE JA FOR J SHAPE CAP ADAPTER

D = TAPER DIA.
USE 5 FOR .625 (15.88) DIAMETER CAP
USE 6 FOR .750 (19.05) DIAMETER CAP

MATERIAL
USE 3 FOR CLASS 3 RWMA

E = ADAPTER DIAMETER
USE 5 FOR .62 (15.88) NOMINAL DIAMETER
USE 6 FOR .75 (19.05) NOMINAL DIAMETER

(A) IN .125 (3.18) INCREMENTS

A = OVERALL LENGTH
USE 10 FOR 2.50 (63.50) MINIMUM LENGTH

(B) IN .25 (6.35) INCREMENTS

B = OFFSET LENGTH
USE 16 FOR 2.00 (50.80) MINIMUM OFFSET

(C) IN .125 (3.18) INCREMENTS

C = NOSE HEIGHT
USE 6 FOR .75 (19.05) MINIMUM HEIGHT FOR MALE
USE 8 FOR 1.00 (25.40) MINIMUM HEIGHT FOR FEMALE

TYPE
M FOR MALE CAP
F FOR FEMALE CAP

SAMPLE TYPICAL J SHAPE CAP ADAPTER CODING

CAP ADAPTER TYPE WILL BE FOR MALE CAPS
CAP ADAPTER NOSE WILL BE .75 (19.05) HIGH
CAP ADAPTER OFFSET WILL BE 2.00 (50.80) LONG
CAP ADAPTER WILL BE 2.50 (63.50) LONG
CAP ADAPTER WILL HAVE .62 (15.88) DIAMETER
CAP ADAPTER WILL BE MADE OF CLASS 3 RWMA MATERIAL
CAP ADAPTER NOSE WILL BE .625 (15.88) DIAMETER CAP TAPER
J SHAPE CAP ADAPTER

Dimensions Shown Are: inches (mm).
See pg. 3-1 & 3-2 For Caps
STANDARD ADAPTERS

CenterLine Hex Adapters
Straight Thread

FIGURE 4-10
• Dimensions Shown: inches (mm).

EXAMPLE:
• CLHA - 875E10
HEX ADAPTER, 7/8-14 THD., #5 RW TAPER, ELECTRODE ADAPTER, LENGTH = 1.25 (31.75).

EXAMPLE EXPLANATION CODING

CENTERLINE SPECIALS
USE CL

GROUP
USE HA FOR HEX ADAPTERS

X=THREAD
USE 87 FOR 7/8-14 THREAD
USE 10 FOR 1-12 THREAD
USE 12 FOR 1-1/4-12 THREAD

Y=TAPER
USE 4 FOR #4RW
USE 5 FOR #5RW
USE 6 FOR #6RW
USE 7 FOR #7RW

ADAPTER TYPE
USE E FOR ELECTRODE ADAPTER
USE C FOR CAP ADAPTER

A=LENGTH
(IN .125 (3.18) INCREMENTS)
USE 10 FOR 1.25 (31.75) LENGTH

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<tr>
<th>TAPER NO.</th>
<th>7/8-14</th>
<th>1-12</th>
<th>1-1/4-12</th>
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<tbody>
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<td>0.25</td>
<td>0.25</td>
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<tr>
<td>#5RW</td>
<td>0.625 (15.88)</td>
<td>0.25</td>
<td>0.25</td>
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<tr>
<td>#6RW</td>
<td>0.750 (19.05)</td>
<td>1.13</td>
<td>0.25</td>
</tr>
<tr>
<td>#7RW</td>
<td>0.875 (22.35)</td>
<td>1.38</td>
<td>1.25</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>THREAD</th>
<th>&quot;X&quot;</th>
<th>B</th>
<th>C</th>
<th>HEX</th>
<th>O-RING</th>
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<tr>
<td>7/8-14</td>
<td>87</td>
<td>0.25 (6.35)</td>
<td>1 (25.40)</td>
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<td>1-12</td>
<td>10</td>
<td>0.25 (6.35)</td>
<td>1.13 (28.58)</td>
<td>1/1/4</td>
<td>SLORD-119</td>
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<td>1-1/4-12</td>
<td>12</td>
<td>0.25 (6.35)</td>
<td>1.38 (34.93)</td>
<td>1/1/2</td>
<td>SLORD-123</td>
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Cap and Electrode Hex Adapters

Pipe Thread

STANDARD ADAPTERS

ELECTRODE ADAPTER CHART

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<td>0.94 (23.88)</td>
<td>0.88 (22.35)</td>
<td>0.94 (23.88)</td>
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<td>1.09 (27.69)</td>
<td>1.24 (31.50)</td>
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<td>B– LENGTH</td>
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<td>AS CODED</td>
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<tr>
<td>LENGTH (Minimum)</td>
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</tr>
<tr>
<td>C– HOLE DIAMETER</td>
<td>0.42 (10.67)</td>
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<td>0.42 (10.67)</td>
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<td>0.50 (12.70)</td>
<td>0.56 (14.22)</td>
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<tr>
<td>D– TAPER DIAMETER</td>
<td>0.463 (11.76)</td>
<td>0.625 (15.88)</td>
<td>0.463 (15.88)</td>
<td>0.625 (15.88)</td>
<td>0.625 (15.88)</td>
<td>0.750 (19.05)</td>
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<tr>
<td>E– HEX LENGTH</td>
<td>0.88 (22.35)</td>
<td>0.88 (22.35)</td>
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<tr>
<td>F– THREAD LENGTH</td>
<td>0.62 (15.75)</td>
<td>0.62 (15.75)</td>
<td>0.75 (19.05)</td>
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<td>G– HEX</td>
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CAP ADAPTER CHART

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</thead>
<tbody>
<tr>
<td>A– DIAMETER</td>
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<td>0.62 (15.75)</td>
<td>0.50 (12.70)</td>
<td>0.62 (15.75)</td>
<td>0.62 (15.75)</td>
<td>0.75 (19.05)</td>
<td>0.75 (19.05)</td>
<td>0.88 (22.35)</td>
<td></td>
</tr>
<tr>
<td>B– LENGTH</td>
<td>AS CODED</td>
<td>AS CODED</td>
<td>AS CODED</td>
<td>AS CODED</td>
<td>AS CODED</td>
<td>AS CODED</td>
<td>AS CODED</td>
<td>AS CODED</td>
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</tr>
<tr>
<td>LENGTH (Minimum)</td>
<td>0.88 (22.35)</td>
<td>0.88 (22.35)</td>
<td>1.00 (25.40)</td>
<td>1.00 (25.40)</td>
<td>1.12 (28.45)</td>
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</tr>
<tr>
<td>C– HOLE DIAMETER</td>
<td>0.28 (7.11)</td>
<td>0.38 (9.65)</td>
<td>0.28 (7.11)</td>
<td>0.38 (9.65)</td>
<td>0.38 (9.65)</td>
<td>0.44 (11.18)</td>
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</table>

• Dimensions Shown Are: inches (mm).
• See Pg. 3-2 For Caps.

TO ORDER YOUR SPECIALS USE CODING CHART - SEE PG. 4-14
STANDARD ADAPTERS

Cap and Electrode Hex Adapters
Pipe Thread

EXAMPLE EXPLANATION CODING

CENTERLINE SPECIALS
USE WB

GROUP
USE 4 FOR PIPE THREAD

TYPE
USE C FOR CAP ADAPTER
USE E FOR ELECTRODE ADAPTER

MATERIAL
USE 2 FOR CLASS 2 RWMA
USE 3 FOR CLASS 3 RWMA

CAP OR ELECTRODE DIAMETER
(IN .125 (3.18) INCREMENTS)
USE 4 FOR .50 (12.70) NOMINAL DIAMETER
USE 5 FOR .62 (15.88) NOMINAL DIAMETER
USE 6 FOR .75 (19.05) NOMINAL DIAMETER
USE 6-1 FOR .75 (19.05) NOMINAL DIAMETER (INCREASED WATER FLOW)
USE 7 FOR .88 (22.23) NOMINAL DIAMETER

THREAD SIZE - N.P.T.
USE A FOR 1/2 N.P.T.
USE B FOR 3/4 N.P.T.
USE C FOR 5/8 N.P.T.

OVERALL LENGTH
(IN .125 (3.18) INCREMENTS)
SEE PG. 4-13 FOR MINIMUM LENGTHS

SAMPLE
TYPICAL THREADED ADAPTER CODING

ADAPTER WILL BE 1.25 (31.75) LONG
ADAPTER WILL HAVE 1/2 N.P.T. (THREAD SIZE)
ADAPTER WILL BE USED WITH .62 (15.88) DIAMETER CAP
ADAPTER WILL BE MADE OF CLASS 3 RWMA
ADAPTER WILL BE MADE FOR CAP TYPE ELECTRODE
ADAPTER WILL HAVE PIPE THREAD

EXAMPLE:

• WB4C-35A10

• Dimensions Shown Are: inches (mm)

T. J. SNOW CO., INC.
Resistance Welding Equipment & Supplies
Service • Sales • Consulting • Seminars
RESISTANCE WELDING ELECTRODES

Tips With Tapered Shanks
Nose Types A, B, C, D, E & F

EXAMPLE EXPLANATION CODING

CENTERLINE SPECIALS
USE W FOR TIPS WITH TAPERED SHANKS

NOSE TYPE
USE A FOR POINTED NOSE
USE B FOR DOME NOSE
USE C FOR FLAT NOSE
USE D FOR OFFSET NOSE
USE E FOR TRUNCATED NOSE
USE F FOR RADIUS NOSE

MATERIAL
USE 2 FOR CLASS 2 RWMA ALLOY
USE 3 FOR CLASS 3 RWMA ALLOY
USE Z FOR ZIRCONIUM

RW TAPER
USE 4 FOR 4 RW TAPER
USE 5 FOR 5 RW TAPER
USE 6 FOR 6 RW TAPER
USE 7 FOR 7 RW TAPER

OVERALL LENGTH
USE 05 FOR 1.25 (31.75) MINIMUM LENGTH
USE 06 FOR 1.50 (38.10) LENGTH
USE 07 FOR 1.75 (44.45) LENGTH
USE 08 FOR 2.00 (50.80) LENGTH
USE 09 FOR 2.25 (57.15) LENGTH
ETC.

SAMPLE
TYPICAL TIP WITH TAPERED SHANK CODING

EXAMPLE:

WA-2405

* Dimensions Shown Are: inches (mm).
### Key to Item Numbers

<table>
<thead>
<tr>
<th>W</th>
<th>Standard Prefix</th>
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<td>*</td>
<td>Nose Designation (see pg. 5-1 for nose types)</td>
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<tr>
<td>2, 3 or Z</td>
<td>RWMA Alloy Class</td>
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<td>4</td>
<td>RW Taper</td>
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<tr>
<td>05 thru 16</td>
<td>Overall Length – in .25 (6.35) Increments</td>
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#### Dimensions

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<th>ITEM NO.</th>
<th>A Major Diameter</th>
<th>B Nose Length</th>
<th>C Angle Offset</th>
<th>D Overall Length</th>
<th>E RW Taper</th>
<th>F Water Hole Diameter</th>
<th>G Water Hole Depth</th>
<th>H Weld Face Diameter</th>
<th>I Nose Sphere Radius</th>
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Replace * with nose types A, B, C, D, E, or F.
**EXAMPLE EXPLANATION CODING**

- **CENTERLINE SPECIALS**
  - USE W

- **NOSE TYPE**
  - USE A FOR NOSE "A"
  - USE B FOR NOSE "B"
  - USE C FOR NOSE "C"
  - USE D FOR NOSE "D"

- **GROUP**
  - USE 0 FOR DOUBLE BEND OFFSET ELECTRODE

- **MATERIAL**
  - USE 2 FOR CLASS 2 RWMA
  - USE 3 FOR CLASS 3 RWMA

- **RW TAPER**
  - USE 4 FOR 4 RW TAPER (.482 (12.24) DIAMETER)
  - USE 5 FOR 5 RW TAPER (.625 (15.88) DIAMETER)

- **A = OVERALL LENGTH**
  - (IN. .25 (6.35) INCREMENTS)

- **B = OFFSET LENGTH**
  - (IN. .06 (1.59) INCREMENTS)

**SAMPLE TYPICAL DOUBLE BEND OFFSET CODING**

- ELECTRODE OFFSET WILL BE .50 (12.70)
- ELECTRODE WILL BE 2.00 (50.80) LONG
- ELECTRODE WILL HAVE 4 RW TAPER
- ELECTRODE WILL BE MADE OF CLASS 2 RWMA MATERIAL
- DOUBLE BEND OFFSET ELECTRODE
- ELECTRODE NOSE TYPE WILL BE "A" NOSE

* Dimensions Shown Are inches (mm).
**RESISTANCE WELDING ELECTRODES**

**Single Bend Electrodes**

- **"A" Nose**
- **B**
- **C**
- **D**

**EXAMPLE EXPLANATION CODING**

- **CENTERLINE SPECIALS**
  - USE CL
- **GROUP**
  - USE L FOR SINGLE BEND ELECTRODE
- **NOSE TYPE**
  - USE A FOR NOSE "A"
  - USE B FOR NOSE "B"
  - USE C FOR NOSE "C"
  - USE D FOR NOSE "D"
  - USE E FOR NOSE "E"
  - USE F FOR NOSE "F"
- **MATERIAL**
  - USE 2 FOR CLASS 2 RWMA
  - USE 3 FOR CLASS 3 RWMA
  - USE Z FOR ZIRCONIUM
- **C** = ADAPTER DIAMETER
  - (IN .125 (3.18) INCREMENTS)
- **A** = OVERALL LENGTH
  - (IN .25 (6.35) INCREMENTS)
- **B** = OFFSET LENGTH
  - (IN .125 (3.18) INCREMENTS)
- **D** = OFFSET ANGLE

- **SAMPLE**

**TYPICAL ELECTRODE CODING**

- ELECTRODE OFFSET ANGLE WILL BE 90°
- ELECTRODE OFFSET WILL BE 75 (19.05) LONG
- ELECTRODE WILL BE 2.50 (63.50) LONG
- ELECTRODE WILL HAVE .62 (15.88) DIAMETER
- ELECTRODE WILL BE MADE OF CLASS 2 RWMA MATERIAL
- ELECTRODE NOSE TYPE WILL BE TYPE "A"
- SINGLE BEND ELECTRODE

**Dimensions Shown Are: inches (mm).**

---

**FIGURE 5-3 (Material RWMA Class 2, 3 & Zirconium)**

- **SAMPLE**
  - **CLLA-25-10690**

---

**Centerline**

5-4
J Shape Electrodes

EXAMPLE EXPLANATION CODING

CENTERLINE SPECIALS

GROUP

USE CL

D = NOSE TYPE

USE JE FOR "J" SHAPE ELECTRODE

USE 1 FOR NOSE - .62 (15.88) DIAMETER "A" NOSE

USE 2 FOR NOSE - .75 (19.05) DIAMETER "A" NOSE

USE 3 FOR NOSE - .88 (22.23) DIAMETER "A" NOSE

MATERIAL

USE 2 FOR CLASS 2 RWMA

USE 3 FOR CLASS 3 RWMA

E = ADAPTER DIAMETER

USE 5 FOR .62 (15.88) NOMINAL DIAMETER

USE 6 FOR .75 (19.05) NOMINAL DIAMETER

USE 7 FOR .88 (22.23) NOMINAL DIAMETER

A = OVERALL LENGTH

USE 10 FOR 2.50 (63.50) MINIMUM LENGTH

B = OFFSET LENGTH

USE 16 FOR 2.00 (50.80) MINIMUM OFFSET

C = NOSE HEIGHT

USE 6 FOR .75 (19.05) MINIMUM HEIGHT

SAMPLE TYPICAL J SHAPE ELECTRODE CODING

ELECTRODE NOSE WILL BE .75 (19.05) HIGH

ELECTRODE OFFSET WILL BE 2.00 (50.80) LONG

ELECTRODE WILL BE 2.50 (63.50) LONG

ELECTRODE WILL HAVE .62 (15.88) DIAMETER

ELECTRODE WILL BE MADE OF CLASS 2 RWMA MATERIAL

J SHAPE ELECTRODE

• Dimensions Shown Are: inches (mm).
**RESISTANCE WELDING ELECTRODES**

**Irregular-Offset Electrodes With Taper Shanks**

- Dimensions Shown Are: inches (mm).

---

**Spade Electrodes**

- Dimensions Shown Are: inches (mm).

---

**Item No.**

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<th>ITEMS</th>
<th>DIMENSIONS</th>
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<td>.588 (14.94)</td>
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**Item No.**

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<td>WEM100-2</td>
<td>3.56 (90.49)</td>
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<td>WEM100-3</td>
<td>3.81 (96.84)</td>
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<td>WEM100-4</td>
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1.25 (31.75) Irregular-Offset Electrodes With Taper Shanks

- Dimensions Shown Are: inches (mm).

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**Item No.**

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### Backup Electrodes

**Example Explanation Coding**

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<td>Use 2 for Class 2 RWMA Material</td>
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<td>Use 3 for Class 3 RWMA Material</td>
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<td>Use 2 for Zirconium</td>
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<td>B=Taper</td>
<td>Use RWMA Taper from Chart Above</td>
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<td>Ce=Stickout Length</td>
<td>Use 03 for Minimal .375 (9.53) Stickout Length</td>
</tr>
<tr>
<td></td>
<td>Use 04 for .50 (12.70) Stickout Length</td>
</tr>
<tr>
<td></td>
<td>Use 05 for .625 (15.88) Stickout Length</td>
</tr>
<tr>
<td></td>
<td>Use 06 for .75 (19.05) Stickout Length</td>
</tr>
<tr>
<td></td>
<td>Use 07 for .875 (22.35) Stickout Length</td>
</tr>
<tr>
<td></td>
<td>Use 08 for 1 (25.40) Stickout Length</td>
</tr>
<tr>
<td>D=Weld Face Diameter</td>
<td>Use 03 for .375 (9.53) Minimum Dia.</td>
</tr>
<tr>
<td></td>
<td>Use 04 for .50 (12.70) Dia.</td>
</tr>
<tr>
<td></td>
<td>Use 05 for .625 (15.88) Dia.</td>
</tr>
<tr>
<td></td>
<td>Use 06 for .75 (19.05) Dia.</td>
</tr>
<tr>
<td></td>
<td>Use 07 for .875 (22.35) Dia.</td>
</tr>
<tr>
<td></td>
<td>Use 08 for 1 (25.40) Dia.</td>
</tr>
<tr>
<td>(Minimum weld face dia. is taper dia.)</td>
<td></td>
</tr>
<tr>
<td>E=Clearance Hole Dia. in Weld Face</td>
<td>Use Required Dia. to 2 Dec. Places, i.e. .23</td>
</tr>
<tr>
<td>F=Clearance Hole Depth in Weld Face</td>
<td>Use Required Depth to 2 Dec. Places, i.e. .63</td>
</tr>
<tr>
<td>Optional Weld Face</td>
<td>Use 11 for Class 11 RWMA Alloy Weld Face</td>
</tr>
<tr>
<td></td>
<td>Use 12 for Class 12 RWMA Alloy Weld Face</td>
</tr>
<tr>
<td></td>
<td>Leave Blank for No Optional Weld Face</td>
</tr>
</tbody>
</table>

**Sample Typical Cap Adapter Coding**

- Electrode Weld Face is Class 11 RWMA Alloy
- Clearance Hole Depth in Weld Face is 0.63
- Clearance Hole Dia. in Weld Face is 0.63
- Weld Face Dia. is 1.25 (31.75)
- Stickout Length is 1.0 (25.4)
- Electrode Taper is 5E
- Class 2 RWMA Alloy
- Back-Up Electrode

---

**Backup Electrodes**

**Backup Electrodes for Material RWMA Class 2&3**

<table>
<thead>
<tr>
<th>RWMA Taper</th>
<th>B</th>
<th>X</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>3E</td>
<td>.375 (9.52)</td>
<td>.500 (12.70)</td>
<td>9/32</td>
</tr>
<tr>
<td>4E</td>
<td>.463 (11.76)</td>
<td>.500 (12.70)</td>
<td>9/32</td>
</tr>
<tr>
<td>5E</td>
<td>.625 (15.88)</td>
<td>.750 (19.05)</td>
<td>3/8</td>
</tr>
<tr>
<td>6E</td>
<td>.750 (19.05)</td>
<td>.875 (22.23)</td>
<td>7/16</td>
</tr>
<tr>
<td>7E</td>
<td>.875 (22.23)</td>
<td>1.125 (28.57)</td>
<td>1/2</td>
</tr>
<tr>
<td>4C</td>
<td>.375 (9.52)</td>
<td>.285 (7.26)</td>
<td>9/32</td>
</tr>
<tr>
<td>5C</td>
<td>.415 (10.52)</td>
<td>.390 (9.52)</td>
<td>5/16</td>
</tr>
<tr>
<td>6C</td>
<td>.501 (12.70)</td>
<td>.500 (12.70)</td>
<td>3/8</td>
</tr>
<tr>
<td>7C</td>
<td>.613 (15.57)</td>
<td>.500 (12.70)</td>
<td>1/2</td>
</tr>
</tbody>
</table>
RESISTANCE WELDING ELECTRODES

Block Type Electrodes

FIGURE 5-9 (Material RWMA Class 2&3)

EXAMPLE EXPLANATION CODING

ELECTRODE IDENTIFIER
USE RBE FOR RECTANGLE BACKUP ELECTRODE

RWMA ALLOY CLASS
USE 2 FOR CLASS 2 RWMA ALLOY
USE 3 FOR CLASS 3 RWMA ALLOY
USE Z FOR ZIRCONIUM

B=TAPER
USE RWMA TAPER FROM CHART ABOVE

C=STICKOUT LENGTH
(IN .125 (3.18) INCREMENTS)
USE 03 FOR MINIMAL .375 (9.53) STICKOUT LENGTH
USE 04 FOR .50 (12.35) STICKOUT LENGTH
USE 05 FOR .625 (15.88) STICKOUT LENGTH
USE 06 FOR .75 (19.05) STICKOUT LENGTH
USE 07 FOR .875 (22.23) STICKOUT LENGTH
USE 08 FOR 1 (25.40) STICKOUT LENGTH

D=WELD FACE WIDTH
(IN .125 (3.18) INCREMENTS)
USE 03 FOR MINIMUM .375 (9.53) WIDTH
USE 04 FOR .50 (12.35) WIDTH
USE 05 FOR .625 (15.88) WIDTH
USE 06 FOR .75 (19.05) WIDTH
USE 07 FOR .875 (22.23) WIDTH
USE 08 FOR 1 (25.40) WIDTH

E=WELD FACE LENGTH
(IN .125 (3.18) INCREMENTS)
USE 03 FOR MINIMUM .375 (9.53) LENGTH
USE 04 FOR .50 (12.35) LENGTH
USE 05 FOR .625 (15.88) LENGTH
USE 06 FOR .75 (19.05) LENGTH
USE 07 FOR .875 (22.23) LENGTH
USE 08 FOR 1 (25.40) LENGTH

OPTIONAL WELD FACE
USE 11 FOR CLASS 11 RWMA ALLOY WELD FACE
USE 12 FOR CLASS 12 RWMA ALLOY WELD FACE
LEAVE BLANK FOR NO OPTIONAL WELD FACE

SAMPLE
TYPICAL CAP ADAPTER CODING

ELECTRODE WELD FACE IS CLASS 11 RWMA ALLOY
WELD FACE LENGTH IS 1.0 (25.4)
WELD FACE LENGTH IS 1.0 (25.4)
STICKOUT LENGTH IS 1.0 (25.4)
ELECTRODE TAPER IS 5E
CLASS 2 RWMA ALLOY
RECTANGLE BACK-UP ELECTRODE

RWMA TAPER | B | X | Y |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3E</td>
<td>.375 (9.52)</td>
<td>.500 (12.70)</td>
<td>9/32</td>
</tr>
<tr>
<td>4E</td>
<td>.463 (11.76)</td>
<td>.500 (12.70)</td>
<td>9/32</td>
</tr>
<tr>
<td>5E</td>
<td>.625 (15.88)</td>
<td>.750 (19.05)</td>
<td>3/8</td>
</tr>
<tr>
<td>6E</td>
<td>.750 (19.05)</td>
<td>.875 (22.23)</td>
<td>7/16</td>
</tr>
<tr>
<td>7E</td>
<td>.875 (22.23)</td>
<td>1.125 (28.57)</td>
<td>1/2</td>
</tr>
<tr>
<td>4C</td>
<td>.375 (9.52)</td>
<td>.285 (2.86)</td>
<td>9/32</td>
</tr>
<tr>
<td>5C</td>
<td>.415 (10.52)</td>
<td>.390 (9.52)</td>
<td>1/2</td>
</tr>
<tr>
<td>6C</td>
<td>.501 (12.70)</td>
<td>.385 (9.80)</td>
<td>9/32</td>
</tr>
<tr>
<td>7C</td>
<td>.613 (15.57)</td>
<td>.500 (12.70)</td>
<td>3/8</td>
</tr>
</tbody>
</table>

.02 X 45° CHAMFER
.08 T.P.F. MORSE TAPER
Z= X + C
.37 (.25 OPTIONAL CLASS 11 OR 12)
.13

.98 X 45° CHAMFER
.08 T.P.F. MORSE TAPER
Z= X + C
.37 (.25 OPTIONAL CLASS 11 OR 12)
.13
**Swivel Head Electrodes with Water-Cooled Shanks**

**CODING EXAMPLE**

### Blind Hole

**EXAMPLE:**
- SHEA25E10075200

### Thru Hole with O-Ring

**EXAMPLE:**
- SHEAO25E10075200

---

**Centerline Swivel Head Electrodes**

- **D = OVERALL LENGTH**
- **C = SWIVEL BALL DIAMETER**
- **B = WELD FACE DIAMETER**
- **A = TAPER**
- **MATERIAL**
- **O-RING**
- **CENTERLINE SWIVEL HEAD ELECTRODES**

- **SPECIFY REQUIRED LENGTH, EX. FOR 2.00 (50.80) USE 200**
- **USE 50 FOR .50 (12.70) DIAMETER**
- **USE 75 FOR .75 (19.05) DIAMETER**
- **SPECIFY REQUIRED DIAMETER, EX. FOR 1.00 (25.40) DIAMETER**
- **USE 100**
- **USE 5C FOR #5 CAP TAPER**
- **USE 6C FOR #6 CAP TAPER**
- **USE 4E FOR 4RW TAPER**
- **USE 5E FOR 5RW TAPER**
- **USE 6E FOR 6RW TAPER**
- **USE 7E FOR 7RW TAPER**
- **USE 2 FOR CLASS 2**
- **USE 3 FOR CLASS 3**
- **USE O IF O-RING REQUIRED ON FORMED ASSEMBLY**
- **Omit O if O-RING NOT REQUIRED**
- **USE SHEA FOR FORMED ASSEMBLY**

---

**Blind Hole**

**EXAMPLE:**
- SHEA25E10075200

**Thru Hole with O-Ring**

**EXAMPLE:**
- SHEAO25E10075200

---

**FIGURE 5-10 (Material RWMA Class 2&3)**

**FIGURE 5-11 (Material RWMA Class 2&3)**

- Dimensions Shown Are: inches (mm).
THE CENTERLINE HEAVY DUTY EJECTOR HOLDER HAS BEEN DESIGNED TO PROVIDE LONGER SERVICE LIFE WITH:

- tough RWMA Class 2 alloy barrel
  - resists deformation of the tapered end
- spring-loaded water tube – properly positioned in electrode automatically
- impact-resistant stainless steel ejector in a rugged, high-strength Bronze Head – for positive ejection
- tested water flow rate of better than 2.0 gpm at 30 psi. – assures adequate cooling of electrode and holder
- leak-proof water seals

All CenterLine Holders are constructed entirely of non-magnetic, corrosion-resistant components.

### HEAVY DUTY HOLDER

<table>
<thead>
<tr>
<th>Complete Holder #</th>
<th>RW Taper Diameter</th>
<th>Barrel Diameter</th>
<th>Barrel Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAK-40608</td>
<td>4 .463 (11.76)</td>
<td>.75 (19.05)</td>
<td>8</td>
</tr>
<tr>
<td>EAK-40708</td>
<td>4 .463 (11.76)</td>
<td>.88 (22.35)</td>
<td>8</td>
</tr>
<tr>
<td>EAK-40808</td>
<td>4 .463 (11.76)</td>
<td>1.00 (25.40)</td>
<td>8</td>
</tr>
<tr>
<td>EAK-40908</td>
<td>4 .463 (11.76)</td>
<td>1.25 (31.75)</td>
<td>8</td>
</tr>
<tr>
<td>EAK-41008</td>
<td>4 .463 (11.76)</td>
<td>1.50 (38.10)</td>
<td>8</td>
</tr>
<tr>
<td>EAK-41208</td>
<td>4 .463 (11.76)</td>
<td>1.75 (44.45)</td>
<td>8</td>
</tr>
<tr>
<td>EAK-50808</td>
<td>5 .625 (15.88)</td>
<td>1.00 (25.40)</td>
<td>8</td>
</tr>
<tr>
<td>EAK-50908</td>
<td>5 .625 (15.88)</td>
<td>1.25 (31.75)</td>
<td>8</td>
</tr>
<tr>
<td>EAK-51008</td>
<td>5 .625 (15.88)</td>
<td>1.50 (38.10)</td>
<td>8</td>
</tr>
<tr>
<td>EAK-51208</td>
<td>5 .625 (15.88)</td>
<td>1.75 (44.45)</td>
<td>8</td>
</tr>
<tr>
<td>EAK-51212</td>
<td>5 .625 (15.88)</td>
<td>1.75 (44.45)</td>
<td>8</td>
</tr>
<tr>
<td>EAK-71008</td>
<td>7 .875 (22.23)</td>
<td>1.50 (38.10)</td>
<td>8</td>
</tr>
<tr>
<td>EAK-71208</td>
<td>7 .875 (22.23)</td>
<td>1.75 (44.45)</td>
<td>8</td>
</tr>
</tbody>
</table>

### REPLACEMENT PARTS

<table>
<thead>
<tr>
<th>Detail No.</th>
<th>Part No.</th>
<th>Part Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RW-2501</td>
<td>Ejector Pin</td>
</tr>
<tr>
<td>2</td>
<td>RW-2550</td>
<td>O-Ring – Ejector Pin</td>
</tr>
<tr>
<td>3</td>
<td>RW-1019</td>
<td>Hose fitting</td>
</tr>
<tr>
<td>4</td>
<td>RW-2830</td>
<td>Ejector Return Spring</td>
</tr>
<tr>
<td>5</td>
<td>RW-2801</td>
<td>Retaining Screw</td>
</tr>
<tr>
<td>6</td>
<td>RW-2802</td>
<td>Retaining Screw Washer</td>
</tr>
<tr>
<td>7</td>
<td>RW-2860</td>
<td>O-Ring – Bar 2 Req'd</td>
</tr>
<tr>
<td>8</td>
<td>RW-2840</td>
<td>Retaining Pin – Ejector Spring</td>
</tr>
<tr>
<td>9</td>
<td>RW-2830</td>
<td>Water Tube Spring</td>
</tr>
</tbody>
</table>

*SPECIFY O-RING RW-2861 FOR BARREL DIAMETERS OF 1.25 (31.75) AND 1.50 (38.10) – 2 Req'd*

- Dimensions Shown Are: inches (mm).
**HOLDERS**

**Standard Non-Ejector Holders**

- RW-1015 Brass Connection Fits 3/8 Hose

![Diagram of Standard Non-Ejector Holders]

<table>
<thead>
<tr>
<th>HOLDER #</th>
<th>A10804</th>
<th>A20804</th>
<th>A30804</th>
<th>A30805</th>
<th>A40805</th>
<th>A50805</th>
<th>A31204</th>
<th>A31205</th>
<th>A41205</th>
</tr>
</thead>
<tbody>
<tr>
<td>RW Taper</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>A – Diameter</td>
<td>.463 (11.76)</td>
<td>.463 (11.76)</td>
<td>.463 (11.76)</td>
<td>.625 (15.88)</td>
<td>.625 (15.88)</td>
<td>.625 (15.88)</td>
<td>.625 (15.88)</td>
<td>.625 (15.88)</td>
<td>.625 (15.88)</td>
</tr>
<tr>
<td>B – Diameter</td>
<td>.75 (19.05)</td>
<td>.88 (22.23)</td>
<td>1.00 (25.40)</td>
<td>1.00 (25.40)</td>
<td>1.25 (31.75)</td>
<td>1.50 (38.10)</td>
<td>1.00 (25.40)</td>
<td>1.00 (25.40)</td>
<td>1.25 (31.75)</td>
</tr>
<tr>
<td>C – Length</td>
<td>8.0 (203.20)</td>
<td>8.0 (203.20)</td>
<td>8.0 (203.20)</td>
<td>8.0 (203.20)</td>
<td>8.0 (203.20)</td>
<td>8.0 (203.20)</td>
<td>12.0 (304.80)</td>
<td>12.0 (304.80)</td>
<td>12.0 (304.80)</td>
</tr>
</tbody>
</table>

**Close-Coupled Holders**

- FOR USE WHERE WELDING SPACE IS LIMITED. STANDARD BODY LENGTH IS 3.0 (76.20).
- Dimensions Shown Are: inches (mm).

![Diagram of Close-Coupled Holders]

<table>
<thead>
<tr>
<th>HOLDER #</th>
<th>1-20304</th>
<th>1-30304</th>
<th>1-40304</th>
<th>1-40305</th>
<th>1-30305</th>
<th>1-40305</th>
</tr>
</thead>
<tbody>
<tr>
<td>A – RW Taper</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>B – Diameter</td>
<td>.88 (22.23)</td>
<td>1.00 (25.40)</td>
<td>1.25 (31.75)</td>
<td>.88 (22.23)</td>
<td>1.00 (25.40)</td>
<td>1.25 (31.75)</td>
</tr>
</tbody>
</table>
## Offset Non-Ejector Electrode Holders

### Offset Holders – Ordering Chart

<table>
<thead>
<tr>
<th>90° COMPLETE HOLDER NO.</th>
<th>B30304</th>
<th>B40304</th>
<th>B30305</th>
<th>B40305</th>
</tr>
</thead>
<tbody>
<tr>
<td>RW Electrode Taper</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>A – Diameter</td>
<td>.463 (11.76)</td>
<td>.463 (11.76)</td>
<td>.619 (15.72)</td>
<td>.619 (15.72)</td>
</tr>
<tr>
<td>B – Diameter</td>
<td>1.00 (25.40)</td>
<td>1.25 (31.75)</td>
<td>1.00 (25.40)</td>
<td>1.25 (31.75)</td>
</tr>
<tr>
<td>C – Offset</td>
<td>2.00 (50.80)</td>
<td>2.00 (50.80)</td>
<td>2.00 (50.80)</td>
<td>2.00 (50.80)</td>
</tr>
<tr>
<td>Body</td>
<td>RW-1122-2</td>
<td>RW-1122-3</td>
<td>RW-1122-5</td>
<td>RW-1122-6</td>
</tr>
<tr>
<td>RW Electrode Taper</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>A – Diameter</td>
<td>.463 (11.76)</td>
<td>.463 (11.76)</td>
<td>.619 (15.72)</td>
<td>.619 (15.72)</td>
</tr>
<tr>
<td>B – Diameter</td>
<td>1.00 (25.40)</td>
<td>1.25 (31.75)</td>
<td>1.00 (25.40)</td>
<td>1.25 (31.75)</td>
</tr>
<tr>
<td>C – Offset</td>
<td>3.00 (76.20)</td>
<td>3.00 (76.20)</td>
<td>3.00 (76.20)</td>
<td>3.00 (76.20)</td>
</tr>
<tr>
<td>Body</td>
<td>RW-1126-2</td>
<td>RW-1126-3</td>
<td>RW-1126-5</td>
<td>RW-1126-6</td>
</tr>
<tr>
<td>RW Electrode Taper</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>A – Diameter</td>
<td>.463 (11.76)</td>
<td>.463 (11.76)</td>
<td>.619 (15.72)</td>
<td>.619 (15.72)</td>
</tr>
<tr>
<td>B – Diameter</td>
<td>1.00 (25.40)</td>
<td>1.25 (31.75)</td>
<td>1.00 (25.40)</td>
<td>1.25 (31.75)</td>
</tr>
<tr>
<td>C – Offset</td>
<td>4.00 (101.60)</td>
<td>4.00 (101.60)</td>
<td>4.00 (101.60)</td>
<td>4.00 (101.60)</td>
</tr>
<tr>
<td>Body</td>
<td>RW-1127-2</td>
<td>RW-1127-3</td>
<td>RW-1127-5</td>
<td>RW-1127-6</td>
</tr>
</tbody>
</table>

Dimensions Shown Are: inches (mm).

- Ejector type also available.

**FIGURE 6-4 (Material RWMA Class 3)**
Paddle Type Holders - Type 1, 2 & 3

HOLDERS

ITEM NO. - CLP -

SHANK LENGTH 3.0 (76.20)

#RW1015

样本提示:

类型 1 - XC-2998
- 请参阅第 3-3 页有关盖子

类型 2 - CL-78-50C
- 请参阅第 3-4 页有关盖子

类型 3 - CLPC-2998
- 请参阅第 3-3 页有关盖子

图 6-5（材料 RWMA 类 2 & 3）
- 最终用于订购的图
  - 指示所需杆直径“A”- 为每 0.125 (3.18) 增量
  - 指示所需偏移尺寸“B”- 为每 0.25 (6.35) 增量
  - 为夹具和锥度规定 RWMA 类 2 或 3 要求

示例:

夹具，RWMA 类 2，类型 3，A = 1.00 (25.40) 直径，B = 4.00 (101.60) 偏移。

图 6-6（材料 RWMA 类 2）

表：

<table>
<thead>
<tr>
<th>直径 CL-1-PM-“X”</th>
<th>直径 CL-2-PM-“X”</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 4.75 (120.65)</td>
<td>7.00 (177.80)</td>
</tr>
<tr>
<td>B 2.75 (69.85)</td>
<td>4.31 (109.47)</td>
</tr>
</tbody>
</table>

C：

对于这些螺纹/锥度类型
- 替换“X”与

1/2 管螺纹 50P
5/8 管螺纹 62P
3/4 管螺纹 75P
7/8-14 直线螺纹 87S
1-12 直线螺纹 10S
4RW 锥度 4E
5RW 锥度 5E
6RW 锥度 6E
7RW 锥度 7E

* 其他螺纹/锥度可按要求提供

图 6-6

枢轴安装 - 夹具

中心线
ITEM NO. WH-101

WH-102
WH-501
WH-502

DETAILS 1/2 N.P.T. 3/4 N.P.T. 7/8-14 N.F. 1-12 N.F.

ASSEMBLY NO.*
WH-1010C WH-1020C WH-5010C WH-5020C

BARREL
WH-101-1 WH-102-1 WH-501-1 WH-502-1

CLAMP NO.

BUSHING NO.

DISC NO.

3.25 (82.55) - #101 & 501
3.50 (88.90) - #102 & 502

1.12 DIA. - #101
1.12 DIA. - #501
1.37 DIA. - #102 & #502

.75 (19.05) I.D. OF BUSHING

1/4 N.P.T. (4 PLCS.)
# 101 - 1/2 N.P.T.
# 102 - 3/4 N.P.T.
# 501 - 7/8-14 N.F.
# 502 - 1-12 N.F.

3.58 (90.88) - #101 & 501
3.93 (100.0) - #102 & 502

.62 (15.88) DIA. THRU

5/16-32 THD

1.32 (33.34)

1.12 DIA. - #101
1.25 DIA. - #501
1.37 DIA. - #102 & #502

• Dimensions Shown Are: inches (mm).

FIGURE 6-7 (Material - Copper)

101, 102, 501 & 502 SERIES HOLDERS

<table>
<thead>
<tr>
<th>DETAILS</th>
<th>1/2 N.P.T.</th>
<th>3/4 N.P.T.</th>
<th>7/8-14 N.F.</th>
<th>1-12 N.F.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASSEMBLY NO.*</td>
<td>WH-1010C</td>
<td>WH-1020C</td>
<td>WH-5010C</td>
<td>WH-5020C</td>
</tr>
<tr>
<td>BARREL</td>
<td>WH-101-1</td>
<td>WH-102-1</td>
<td>WH-501-1</td>
<td>WH-502-1</td>
</tr>
</tbody>
</table>

*A complete assembly consists of a barrel, clamp, bushing and disc.
Cylinder Mounted Holders

EXAMPLE EXPLANATION CODING

CENTERLINE BARRELS

OFFSET

X = THREAD

Y = SHANK

OFFSET

(IN .125 (3.18) INCREMENTS)

WHCL  O  87S  112  8

USE WHCL

USE 0 FOR OFFSET BARRELS

OMIT FOR STRAIGHT BARRELS

USE 50P FOR .500 PIPE THREAD

USE 62P FOR .625 PIPE THREAD

USE 75P FOR .750 PIPE THREAD

USE 87S FOR .875 STRAIGHT THREAD

USE 10S FOR 1.00 STRAIGHT THREAD

USE 112 FOR 1-1/8 DIAMETER

USE 125 FOR 1-1/4 DIAMETER

USE 137 FOR 1-3/8 DIAMETER

USE 1 FOR 1/8 OFFSET (MINIMUM)

USE 2 FOR 1/4 OFFSET

USE 3 FOR 3/8 OFFSET

USE 4 FOR 1/2 OFFSET

USE 5 FOR 5/8 OFFSET

USE 6 FOR 3/4 OFFSET

USE 7 FOR 7/8 OFFSET

USE 8 FOR 1" OFFSET (MAXIMUM)
HOLDERS

Heavy Duty Cylinder Mounted Holders

EXAMPLE EXPLANATION CODING

CENTERLINE HEAVY DUTY BARREL

OFFSET

X=THREAD

Y=SHANK

OFFSET DISTANCE

FIGURE 6-10 (Material RWMA Class 2)
HEAVY DUTY STRAIGHT BARREL
(WHCLH Series)

FIGURE 6-11 (Material RWMA Class 3)
HEAVY DUTY OFFSET BARREL
(WHCLHO Series)

WHCLH O 87S 162 8

USE WHCLH

USE 0 FOR OFFSET BARRELS
CMISS FOR STRAIGHT BARRELS

USE 50P FOR .500 PIPE THREAD
USE 62P FOR .625 PIPE THREAD
USE 75P FOR .750 PIPE THREAD
USE 87S FOR .875 STRAIGHT THREAD
USE 10S FOR 1.00 STRAIGHT THREAD
USE 12S FOR 1.25 STRAIGHT THREAD

USE 162 FOR 1-5/8 DIAMETER

USE 1 FOR 1/8 OFFSET (MINIMUM)
USE 2 FOR 1/4 OFFSET
USE 3 FOR 3/8 OFFSET
USE 4 FOR 1/2 OFFSET
USE 5 FOR 5/8 OFFSET
USE 6 FOR 3/4 OFFSET
USE 7 FOR 7/8 OFFSET
USE 8 FOR 1" OFFSET (MAXIMUM)
**EXAMPLE EXPLANATION CODING**

**CENTERLINE LIGHT DUTY BARREL**

- **OFFSET**
  - **X=THREAD**
    - USE 50P FOR .500 PIPE THREAD
    - USE 62P FOR .625 PIPE THREAD
    - USE 75P FOR .750 PIPE THREAD
    - USE 87S FOR .875 STRAIGHT THREAD
    - USE 10S FOR 1.00 STRAIGHT THREAD
  - **Y=SHANK**
    - USE 137 FOR 1-3/8 DIAMETER

**OFFSET DISTANCE**

- **USE 0 FOR OFFSET BARRELS**
- **OMIT FOR STRAIGHT BARRELS**
- **USE 1 FOR 1/8 OFFSET (MINIMUM)**
- **USE 2 FOR 1/4 OFFSET**
- **USE 3 FOR 3/8 OFFSET**
- **USE 4 FOR 1/2 OFFSET**
- **USE 5 FOR 5/8 OFFSET**
- **USE 6 FOR 3/4 OFFSET**
- **USE 7 FOR 7/8 OFFSET**
- **USE 8 FOR 1" OFFSET (MAXIMUM)**
HOLDERS

Light Duty Shunt/Cable Clamps

**SHUNT CLAMP**

- **5/16-18 S.H.C.S.**
- **Y** = SHANK DIAMETER
- **B** = LENGTH
- **1/2-13 TAP** .88 (22.25) CENTER
- **5/16-18 TAP** .88 (22.25) CENTER
- **1.00 (25.40)**
- **2.50 (63.50)** MIN. LENGTH

**CABLE CLAMP**

- **KNURLED NUT** #4130-481-00
- **Y** = SHANK DIAMETER
- **B** = MIN. LENGTH
- **5/16-18 TAP** .88 (22.25) CENTER
- **1.25 (31.75)**
- **3.62 (91.95)** MIN. LENGTH

**EXAMPLE EXPLANATION CODING**

<table>
<thead>
<tr>
<th>CENTERLINE CABLE/SHUNT CLAMPS</th>
<th>USE WHCLSA FOR SHUNT CLAMPS</th>
<th>USE WHOLCA FOR CABLE CLAMPS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Y</strong> = SHANK DIAMETER</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>B</strong> = LENGTH</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>WHCLSA 112 0250</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Heavy Duty Shunt/Cable Clamps**

**CABLE CLAMP**

- **B** = MIN. LENGTH
- **4.12**
- **1.50** 1.50
- **.69**
- **1.50 CENT.**
- **1/2-13 TAP**
- **2 HOLES**
- **1.50 1.50**

**SHUNT CLAMP**

- **5/16-18 S.H.C.S. (2)**
- **Y** = SHANK DIAMETER
- **B** = MIN. LENGTH
- **3.25**
- **1.25**
- **5/16-18 TAP 2 HOLES**
- **1.00**
- **1.50** 1.50
- **.69**
- **1.50 CENT.**

**EXAMPLE EXPLANATION CODING**

<table>
<thead>
<tr>
<th>CENTERLINE HEAVY DUTY CABLE/SHUNT CLAMPS</th>
<th>USE WHCLHSA FOR SHUNT CLAMPS</th>
<th>USE WHOLHC FOR CABLE CLAMPS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Y</strong> = SHANK DIAMETER</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>B</strong> = LENGTH</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>WHCLHCA 162 0412</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

FIGURE 6-14

FIGURE 6-15
HOLDERS

Gun Type Holders (Forging)  
(Barrel Lock Style)

ITEM NO. – CLHA20-

TYPE “A”
1.38 (34.93) Diameter Forging  
Use with Barrel Lock  
No. PB-1089-01  
(Order Separately)

ITEM NO. – CLHB25-

TYPE “B”
1.38 (34.93) Diameter Forging  
Use with Barrel Lock  
No. PB-1089-02  
(Order Separately)

• FINAL FIGURE USED IN ORDERING –
  • Indicate Desired “A” Length - In .50 (12.70) Increments

EXAMPLE: TYPE “A” WITH 7.50 (190.50) LENGTH

CLHA20 - 15  
Item No.  
“A” Length

• Dimensions Shown Are: inches (mm).
ITEM NO. – CLHC30-

TYPE “C”

1.63 (41.28) Diameter Forging
Use with Barrel Lock
No. PB-1089-04
(Order Separately)

FIGURE 6-18 (Material RWMA Class 3)

ITEM NO. – CLHD35-

TYPE “D”

1.63 (41.28) Diameter Forging
Use with Barrel Lock
No. PB-1089-04
(Order Separately)

FIGURE 6-19 (Material RWMA Class 3)

• FINAL FIGURE USED IN ORDERING –

  • Indicate Desired Holder Length “A” - In .50 (12.70) Increments

EXAMPLE: TYPE “C” WITH 14.00 (355.60) LENGTH

CLHC30 - 28

Item No. “A” Length

• Dimensions Shown Are: inches (mm).
**HOLDERS**

**Gun Type Holders (Forging)**
(Barrel Lock Style)

**ITEM NO. – CLHE40-**

**TYPE “E”**

*Use with Barrel Lock Ass’y No. PB-1089-02 (Order Separately)*

**FIGURE 6-20 (Material RWMA Class 3)**

**ITEM NO. – CLHF45-**

**TYPE “F”**

*Use with Barrel Lock Ass’y No. PB-1089-04 (Order Separately)*

**FIGURE 6-21 (Material RWMA Class 3)**

- **FINAL FIGURE USED IN ORDERING** –
  - Indicate Desired Holder Length “A” - In .50 (12.70) Increments
  - Indicate Desired Offset Dimension “B” - In .25 (6.35) Increments

**EXAMPLE: TYPE “E”, “A” = 6.00 (152.40) LENGTH, “B” = 2.50 (63.50), “S” LUG POSITION.**

**CLHE40 - 12 - 10 - S**

**Item No.**  | **Lug**
--- | ---
“A” | “B”

- Dimensions Shown Are: inches (mm).
**HOLDERS**

Gun Type Holders (Forging)  
(Barrel Lock Style)

**ITEM NO. – CLHG50-**

**TYPE “G”**

1.38 (34.93) Diameter Forging  
Use with Barrel Lock  
No. PB-1089-01  
(Order Separately)

**FIGURE 6-22 (Material RWMA Class 3)**

**ITEM NO. – CLHH55-**

**TYPE “H”**

1.38 (34.93) Diameter Forging  
Use with Barrel Lock  
No. PB-1089-02  
(Order Separately)

**FIGURE 6-23 (Material RWMA Class 3)**

- **FINAL FIGURE USED IN ORDERING** –
  - Indicate Desired Holder Length “A” - In .50 (12.70) Increments  
  - Indicate Desired Offset Dimension “B” - In .25 (6.35) Increments

**EXAMPLE:** TYPE “G”, “A” = 11.00 (279.40) LENGTH, “B” = 5.00 (127.00), “N” LUG POSITION.

**CLHG50 - 22 - 20 - N**

Item No. _______ Lug  
“A” _______ “B”

- Dimensions Shown Are: inches (mm).
Gun Type Holders
Pipe Thread Style

ITEM NO. – CLHJ602-

TYPE “J”
PIPE THD. = 1/2 N.P.T.

FIGURE 6-24 (Material RWMA Class 2&3)

ITEM NO. – CLHK652-

TYPE “K”
PIPE THD. = 5/8 N.P.T.

FIGURE 6-25 (Material RWMA Class 2&3)

- FINAL FIGURE USED IN ORDERING –
  - Indicate Desired Holder Length “A” - In .50 (12.70) Increments
  - Indicate Desired Offset Dimension “B” - In .25 (6.35) Increments
  - Specify “C” – 0-90

**HOLDERS**

*Gun Type Holders*  
*Pipe Thread Style*

**ITEM NO. – CLHL702-**

**TYPE “L”**  
*PIPE THD. = 3/4 N.P.T.*

- **HOLDER LENGTH**  
  5.5 (139.70) MIN. - 10.0 (254.00) MAX.

- **A**
- **B**
- **C**

- **5/16-32 THD.**  
- **3/4 N.P.T.**  
- **90°**

- **USE O-RING #218**
- **1.489 (37.70) DIA.**
- **1.75 (44.45) DIA.**

**FIGURE 6-26 (Material RWMA Class 2&3)**

**ITEM NO. – CLHM752-**

**TYPE “M”**  
*PIPE THD. = 1 N.P.T.*

- **HOLDER LENGTH**  
  5.5 (139.70) MIN. - 10.0 (254.00) MAX.

- **A**
- **B**
- **C**

- **5/16-32 THD.**  
- **1 N.P.T.**  
- **90°**

- **USE O-RING #218**
- **1.489 (37.70) DIA.**
- **1.75 (44.45) DIA.**

**FIGURE 6-27 (Material RWMA Class 2&3)**

**FINAL FIGURE USED IN ORDERING –**

- Indicate Desired Holder Length “A” - In .50 (12.70) Increments
- Indicate Desired Offset Dimension “B” - In .25 (6.35) Increments
- Specify – “C” = 0-90°

**EXAMPLE:** TYPE “L”, CLASS 2, “A” = 5.50 (139.70) LENGTH, “B” = 7.00 (177.80), “C” = 10°.

**CLS702 - 11 - 28 - 10**

- **Item No.**
- **Class No.**
- **“C”**
- **“B”**

*Dimensions Shown Are: inches (mm).*
HOLDERS

Gun Type Holders
Pipe Thread Style

TYPE “N”
(With 1/2 N.P.T.)

ITEM NO. – CLHN802-

TYPE “O”
(With 5/8 N.P.T.)

ITEM NO. – CLHO852-

TYPE “P”
(With 3/4 N.P.T.)

ITEM NO. – CLHP902-

TYPE “R”
(With 1 N.P.T.)

ITEM NO. – CLHR952-

FIGURE 6-28 (Material RWMA Class 2&3)

FIGURE 6-29 (Material RWMA Class 2&3)

• FINAL FIGURE USED IN ORDERING –
  • Indicate Desired Holder Length “A” - In .50 (12.70) Increments
  • Specify – “C” – 0-90˚


CLHN803 - 18 - 10

Item No.     Class No.         “A”     “C”

• Dimensions Shown Are: inches (mm).
CenterLine Spot Welding Machine Arms are engineered and manufactured to accommodate any of the standard line CenterLine Electrode Holders as well as most other special shank type holders which might be required for specific special applications.

Among the benefits to be obtained from use of our Spot Welding Arms are:

- **reduction in required set-up time** resulting from easier front attachment feature.
- **extended arm life** which occurs as a consequence of reduced bolt hole thread wear. Hole and threads are cut through steel insert which is less malleable than copper used for basic arm.

**NOTE:** CenterLine can engineer and/or manufacture special spot welding machine arms for particular applications based on customer specifications.

![Diagram of Arm, Cap, and Steel Rod Insert](image)

**FIGURE 7-1**

**ORDERING CHART**

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Description</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLRAC</td>
<td>STANDARD PREFIX - ARM &amp; CAP ASSEMBLY</td>
<td></td>
</tr>
<tr>
<td>04 THRU 16</td>
<td>“A” DIAMETER - .25 (.635) INCREMENTS</td>
<td></td>
</tr>
<tr>
<td>06 THRU 16</td>
<td>“B” DIAMETER - .12 (3.18) INCREMENTS</td>
<td></td>
</tr>
<tr>
<td>08 THRU 50</td>
<td>“C” DIMENSION - 1.00 (25.40) INCREMENTS</td>
<td></td>
</tr>
<tr>
<td>“B” OR “S”</td>
<td>BRASS OR STEEL - (CAP ONLY)</td>
<td></td>
</tr>
</tbody>
</table>

**EXAMPLE:** Arm & Cap Assembly, “A” Dia. = 3.00 (76.20), “B” Dia. = 1.25 (31.75), “C” = 36.00 (914.40).

---

**centerline**

7-1
Air-Cooled Jumper Cables

**TERMINAL DIMENSIONS**

<table>
<thead>
<tr>
<th>MCM</th>
<th>Jacket O.D.</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>600</td>
<td>1.63 (41.28)</td>
<td>1.38 (34.93)</td>
<td>.500 (12.70)</td>
</tr>
<tr>
<td>750</td>
<td>1.75 (44.45)</td>
<td>1.38 (34.93)</td>
<td>.600 (15.24)</td>
</tr>
<tr>
<td>1000</td>
<td>2.00 (50.80)</td>
<td>1.50 (38.10)</td>
<td>.700 (17.78)</td>
</tr>
<tr>
<td>1200</td>
<td>2.12 (53.98)</td>
<td>1.50 (38.10)</td>
<td>.820 (20.83)</td>
</tr>
<tr>
<td>1500</td>
<td>2.25 (57.15)</td>
<td>1.50 (38.10)</td>
<td>.990 (25.15)</td>
</tr>
</tbody>
</table>

**HOW TO ORDER CENTERLINE AIR-COOLED CABLES**

Please Supply the Following Information:

<table>
<thead>
<tr>
<th>TERMINALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE</td>
</tr>
<tr>
<td>CLAC</td>
</tr>
</tbody>
</table>

**EXAMPLE:**

CLAC - FF - 600 - 20

- WATER-COOLED JUMPER CABLES ALSO AVAILABLE UPON REQUEST
  - Dimensions Shown Are: inches (mm).
Our shunts are custom designed to customer requirements and specifications – and are readily available in any hole pattern, or size. The secondary conductor strips are of high conductivity copper – shunts are normally supplied with their ends secured by riveted copper clips.

CenterLine laminated shunts are now available with a protective covering. Please inquire when placing your order.

- To order your specials use the coding chart above

### Laminated Shunts

#### Furnish the Following Information When Ordering:

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outside Length</td>
<td>O.L.</td>
</tr>
<tr>
<td>Width</td>
<td>W</td>
</tr>
<tr>
<td>Thickness (less clip)</td>
<td>T</td>
</tr>
<tr>
<td>Hole Diameter</td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>G,F,J</td>
</tr>
<tr>
<td>Hole Pattern</td>
<td>A,B,C,D</td>
</tr>
<tr>
<td>End Style</td>
<td>Clip, solder, etc.</td>
</tr>
<tr>
<td>Dimensions (if applicable)</td>
<td>A,B,X,Y,Z</td>
</tr>
</tbody>
</table>

TO ORDER YOUR SPECIALS USE THE CODING CHART ABOVE

**Figure 8-4**

**Figure 8-5**

**Figure 8-6**

**Figure 8-7**
ITEM NO. – CLT-1000-

TYPE “A”

(Use with Telescoping Tubes
Type “B” & “C”)

FIGURE 9-1 (Material - 1/4 ID BRASS TUBE)

ITEM NO. – CLT-1200-

TYPE “B”

(Use with 4 RW Electrodes)

FIGURE 9-2 (Material - Copper)

ITEM NO. – CLT-1300-

TYPE “C”

(Use with 5, 6 & 7 RW Electrodes)

FIGURE 9-3 (Material - Copper)

ITEM NO. – CLT-1400-

TYPE “D”

(Use with 5, 6 & 7 RW Electrodes)

FIGURE 9-4 (Material - Copper & Brass)

ITEM NO. – CLT-1500-

TYPE “E”

(Use with 4 RW Electrodes)

FIGURE 9-5 (Material - Copper & Brass)
ITEM NO. – CLT-1600-
TYPE “F”
B = .210 (5.31) DIA.

ITEM NO. – CLT-1700-
TYPE “G”
B = .250 (6.35) DIA.

FIGURE 9-6 (Material - Interlocked Flexible Brass)

ITEM NO. – CLT-1800-
TYPE “H”

FIGURE 9-7 (Material - Interlocked Flexible Brass)

ITEM NO. – CLT-1900-
TYPE “I”
(Use with 5, 6 & 7 RW Electrodes)

FIGURE 9-8 (Material - Copper & Brass)

ITEM NO. – CLT-2000-
TYPE “J”
(Use with 5, 6 & 7 RW Electrodes)
FIGURE 9-9 (Material - Copper & Brass)

PART NUMBER CODING
• Indicate Desired Tube Length “A” -
In .12 (3.18) Increments
EXAMPLE: TYPE “G” WITH 1.50 (38.10) LENGTH
CLT - 1700 -12
Item No. ______ “A” Length

• Dimensions Shown Are: inches (mm).
CenterLine Forged Seam Welding Wheels are manufactured from a selection of alloys for a wide variety of manufacturing conditions and materials applications.

CenterLine (RWMA Class 1)
For seam welding of aluminum, terne plate and situations where extensive heat is developed.

CenterLine (RWMA Class 2)
Ideal for cold rolled and similar clean uncoated material seam welding applications.

CenterLine (RWMA Class 3)
Usually recommended for seam welding of stainless steels and for use where unusually high pressures prevail.

CenterLine (Zirconium & Dispersion Strengthened Copper)
Suggested for seam welding of galvanized materials and conditions where temperatures are relatively high.

NOTE:
CenterLine Seam Welding Wheels are made available either as A) machined Blanks or B) finished seam welding wheels manufactured to customer specifications.

FIGURE 10-1 (Material RWMA Class 1, 2, 3, Zirconium & Dispersion Strengthened Copper)

Raw Materials And Accessories

ALLOY ROD and BAR STOCK
• Forged and Machine Plate
• Hexagon Bar
• Rectangular
• Solid Round Rod

COPPER TUNGSTEN and REFRACTORY METALS

SEAM WELDER SHAFTS and BUSHINGS
• (See above - “Seam Welding Wheels”)

STOCK/CUSTOM FORGINGS and CASTINGS

WELDING DIES, HOLDERS and FIXTURES
• Flash, Butt and Projection
CenterLine grease equalizers are available in a variety of styles and configurations to satisfy nearly all multi-spot welding applications. Unlike spring style units, the CenterLine grease equalizers ensure that equal pressure is distributed to all spot locations.

CenterLine can also design and manufacture custom weld fixtures.

Advantages include:
- High quality, rugged design for trouble-free operation
- Simple construction for ease of maintenance
- Up to four units may be used with one mounting plate

Contact CenterLine for specific information concerning styles and availability.
Reamer
Worn tapers in electrode holders can be reworked with this high speed steel reamer.

<table>
<thead>
<tr>
<th>PART NO.</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-4E</td>
<td>4RW TAPER</td>
</tr>
<tr>
<td>R-5E</td>
<td>5RW TAPER</td>
</tr>
<tr>
<td>R-6E</td>
<td>6RW TAPER</td>
</tr>
<tr>
<td>R-7E</td>
<td>7RW TAPER</td>
</tr>
<tr>
<td>R-4C</td>
<td>.50 (12.70) CAP TAPER</td>
</tr>
<tr>
<td>R-5C</td>
<td>.62 (15.88) CAP TAPER</td>
</tr>
<tr>
<td>R-6C</td>
<td>.75 (19.05) CAP TAPER</td>
</tr>
<tr>
<td>R-7C</td>
<td>.87 (22.10) CAP TAPER</td>
</tr>
</tbody>
</table>

Gauges
CenterLine Force Gauges use standard non-calibrated pressure gauges. These gauges should be utilized as indicators of tip force fluctuations and not as precise measuring tools (Accuracy +/- 10%). Modifications quoted upon request. Gauge may not be exactly as shown.

Nylon Socket Head Insulators
These nylon socket head screw insulators are used on fixtures/machines when the copper needs to be insulated from the rest of the machine.

<table>
<thead>
<tr>
<th>PART NO.</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>230-008</td>
<td>#10 SCREW</td>
</tr>
<tr>
<td>230-009</td>
<td>#10 SCREW</td>
</tr>
<tr>
<td>HE-705-57</td>
<td>1/4 SCREW</td>
</tr>
<tr>
<td>FSD-15135</td>
<td>5/16 SCREW</td>
</tr>
<tr>
<td>FSD-15057</td>
<td>3/8 SCREW</td>
</tr>
<tr>
<td>FSD-15058</td>
<td>1/2 SCREW</td>
</tr>
</tbody>
</table>

Male Cap Extractor
To separate CenterLine tips from their adapter shanks the easy way, use the CenterLine Male Cap Extractor. Its beveled edges are radiused to match the shank diameter, increasing wedging action (and eliminating jaw adjustments). Jaw openings contact most of the shank circumference (instead of only two points), resulting in much less damage to the shank and tip.

- CLEX-45, for 4 and 5 RW taper shanks
- CLEX-56, for 5 and 6 RW taper shanks

Electrode Extractor
Use the Special CenterLine Electrode Extractor for removing “caps” from shanks and die bodies.

CLCX-250 Speed Wrench
- Dimensions Shown Are: inches (mm).
MALE CAP DATA

Dimension: 

- .482 (12.24)
- .63 (15.87)
- .75 (19.05)
- .88 (22.23)

Dimensions Shown Are: inches (mm).

FEMALE CAP DATA

Dimension: 

- .482 (12.24)
- .63 (15.87)
- .75 (19.05)
- .88 (22.23)

Dimensions Shown Are: inches (mm).
REFERENCE DATA

ELECTRODE AND ADAPTER TAPERS
(Refer to pages 4-12 to 4-14)

#0 MT - #3 RW

#1 MT - #4 RW

#2 MT - #5 RW

#6 RW

#3 MT - #7 RW

• Dimensions Shown Are: inches (mm).
# REFERENCE DATA

## RWMA Recommended Electrode Materials For Spot Welding

### SIMILAR FERROUS METALS

<table>
<thead>
<tr>
<th>ALLOY 1 **</th>
<th>Stainless Steel</th>
<th>Galvanized Steel</th>
<th>Tin Plate</th>
<th>Terne Plate</th>
<th>Cadmium Plate</th>
<th>Chrome Plate</th>
<th>Cold-Rolled Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALLOY 1 **</td>
<td>A 2,3*</td>
<td>A 1,2,20</td>
<td>B 1,2,20</td>
<td>A 1,2,20</td>
<td>A 1,2,20</td>
<td>A 2</td>
<td>A 2</td>
</tr>
</tbody>
</table>

### DISSIMILAR NONFERROUS METALS

<table>
<thead>
<tr>
<th>ALLOY 1 **</th>
<th>Aluminum &amp; Aluminum Alloys</th>
<th>Copper</th>
<th>Nickel-Siliver</th>
<th>Nickel &amp; Nickel Alloys</th>
<th>Phosphor Bronze</th>
<th>Yellow Brass</th>
<th>Red Brass</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALLOY 1 **</td>
<td>A 1,2,20</td>
<td>C 13,14</td>
<td>A 2</td>
<td>A 2</td>
<td>A 2</td>
<td>A 2</td>
<td>A 2</td>
</tr>
</tbody>
</table>

### REFRACTORY METALS

<table>
<thead>
<tr>
<th>ALLOY 1 **</th>
<th>Tungsten Molybdenum</th>
<th>Chrome Plate</th>
<th>Stainless Steel</th>
<th>Nickel &amp; Nickel Alloys</th>
</tr>
</thead>
</table>

### DISSIMILAR FERROUS METALS

<table>
<thead>
<tr>
<th>Stainless Steel</th>
<th>Nickel &amp; Nickel Alloy</th>
<th>Cold-Rolled Steel</th>
<th>Tin Plate</th>
<th>Terne Plate</th>
<th>Galvanized Steel</th>
<th>Cadmium Plate</th>
<th>Chrome Plate</th>
</tr>
</thead>
<tbody>
<tr>
<td>B 2</td>
<td>A 2</td>
<td>2,3*</td>
<td>2,3*</td>
<td>2,3*</td>
<td>2,3*</td>
<td>2,3*</td>
<td>2,3*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chrome Plate</th>
<th>Nickel &amp; Nickel Alloy</th>
<th>Cold-Rolled Steel</th>
<th>Tin Plate</th>
<th>Terne Plate</th>
<th>Galvanized Steel</th>
<th>Cadmium Plate</th>
<th>Chrome Plate</th>
</tr>
</thead>
<tbody>
<tr>
<td>B 2</td>
<td>B 2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cadmium Plate</th>
<th>Nickel &amp; Nickel Alloy</th>
<th>Cold-Rolled Steel</th>
<th>Tin Plate</th>
<th>Terne Plate</th>
<th>Galvanized Steel</th>
<th>Cadmium Plate</th>
<th>Chrome Plate</th>
</tr>
</thead>
<tbody>
<tr>
<td>B 2</td>
<td>B 2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Galvanized Steel</th>
<th>Nickel &amp; Nickel Alloy</th>
<th>Cold-Rolled Steel</th>
<th>Tin Plate</th>
<th>Terne Plate</th>
<th>Galvanized Steel</th>
<th>Cadmium Plate</th>
<th>Chrome Plate</th>
</tr>
</thead>
<tbody>
<tr>
<td>C 2</td>
<td>B 2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Terne Plate</th>
<th>Nickel &amp; Nickel Alloy</th>
<th>Cold-Rolled Steel</th>
<th>Tin Plate</th>
<th>Terne Plate</th>
<th>Galvanized Steel</th>
<th>Cadmium Plate</th>
<th>Chrome Plate</th>
</tr>
</thead>
<tbody>
<tr>
<td>C 2</td>
<td>B 2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cold-Rolled Plate</th>
<th>Nickel &amp; Nickel Alloy</th>
<th>Cold-Rolled Steel</th>
<th>Tin Plate</th>
<th>Terne Plate</th>
<th>Galvanized Steel</th>
<th>Cadmium Plate</th>
<th>Chrome Plate</th>
</tr>
</thead>
<tbody>
<tr>
<td>C 2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

### DISSIMILAR NONFERROUS METALS

<table>
<thead>
<tr>
<th>Nickel &amp; Nickel Alloy</th>
<th>Phosphor Bronze</th>
<th>Silicon Bronze</th>
<th>Nickel-Silver</th>
<th>Cupro Nickel</th>
<th>Yellow Brass</th>
<th>Red Brass</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper</td>
<td>C 2</td>
<td>C 1,2,20</td>
<td>C 1,2,20</td>
<td>C 1,2,20</td>
<td>C 1,2,20</td>
<td>C 1</td>
</tr>
</tbody>
</table>

| Red Brass            | C 2            | C 1,2,20       | C 1,2,20      | C 1,2,20     | C 1,2,20     | C 1       |


| Silicon Bronze       | C 2,10         | C 1,2,20       | C 1,2,20      | C 1,2,20     | C 1,2,20     | C 1       |

| Phosphor Bronze      | C 2            | 2              | 2             | 2            | 2            | 2         |

* Electrode materials are second choices
** Alloy 1=Alloy 2 (refer to block interpretation)
## GROUP “A” – COPPER BASE ALLOYS –

<table>
<thead>
<tr>
<th>CLASS</th>
<th>RWMA NO.</th>
<th>GENERAL USE</th>
<th>DESCRIPTION</th>
<th>AVAILABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>RWMA CLASS 1</td>
<td></td>
<td></td>
<td>A specially heat treated zirconium copper alloy that meets the minimum electrical conductivity and hardness specification of Class 1 Alloy.</td>
<td>X X</td>
</tr>
<tr>
<td>ZIRCONIUM</td>
<td>1.15000</td>
<td>Electrodes for welding aluminum alloys, magnesium alloys, coated materials, brass and bronze. Can be used for both spot and seam welding.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CADMIUM</td>
<td>1.16200</td>
<td>A high conductivity cadmium copper alloy, not heat treatable, but can be work hardened.</td>
<td></td>
<td>X X</td>
</tr>
<tr>
<td>RWMA CLASS 2</td>
<td></td>
<td></td>
<td>A specially heat treated chromium zirconium copper alloy that meets the minimum electrical and hardness specification of Class 2 Alloys.</td>
<td>X X X</td>
</tr>
<tr>
<td>CHROMIUM-ZIRCONIUM</td>
<td>2.18150</td>
<td>These materials are stronger than Class 1 materials but have slightly lower conductivity. They are used for the spot and seam welding of cold and hot rolled steel, stainless steel and low conductivity brass &amp; bronze. They are also used as flash welding dies, and as electrodes for the welding of steel &amp; other coated materials.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RWMA CLASS 3</td>
<td></td>
<td></td>
<td>Heat treatable copper alloys with a combination of high tensile strength and good electrical and thermal conductivity.</td>
<td>X X X X X X</td>
</tr>
<tr>
<td>COBALT-BERYLLIUM COPPER</td>
<td>3.17500</td>
<td>Their high hardness makes them ideal for electrodes for the spot and seam welding of high resistance materials such as stainless steel, nichrome and monel metal. As a casting, they are used for flash, butt and projection welding electrodes &amp; fixtures. They can also be used for seam welder bearing and other current carrying structural parts.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NICKEL-BERYLLIUM COPPER</td>
<td>3.17510</td>
<td></td>
<td></td>
<td>X X X X X X</td>
</tr>
<tr>
<td>BERYLLIUM-FREE COPPER</td>
<td>3.18000</td>
<td></td>
<td></td>
<td>X X X</td>
</tr>
<tr>
<td>RWMA CLASS 4</td>
<td></td>
<td></td>
<td>A heat treatable copper alloy having the unusual combination of very high strength and lower electrical conductivity than Class 3. Can be annealed, machined &amp; reheat treated to regain its properties.</td>
<td>X X X X X X</td>
</tr>
<tr>
<td>BERYLLIUM</td>
<td>4.17200</td>
<td>Electrode material for special flash, flash butt and projection welding applications where pressures are extremely high and wear is severe but where heat is not excessive. Used in the form of inserts &amp; facings.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RWMA CLASS 5</td>
<td></td>
<td></td>
<td>Copper base alloy usually furnished in the form of castings. It is not heat treatable.</td>
<td>X</td>
</tr>
<tr>
<td>ALUMINUM</td>
<td>5.95300</td>
<td>Typical uses are flash welding electrodes, secondary circuit welder arms, knees, platens and other current carrying fixtures where high strength, wear resistance and non-magnetic properties are required.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### REFERENCE DATA

#### GROUP “B” – REFRACTORY METAL COMPOSITION –

<table>
<thead>
<tr>
<th>CLASS</th>
<th>RWMA NO.</th>
<th>GENERAL USE</th>
<th>DESCRIPTION</th>
<th>AVAILABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>RWMA CLASS 10 COPPER-TUNGSTEN</td>
<td>10.74450</td>
<td>Flash and butt welding electrodes where higher electrical and thermal conductivity is necessary and where a degree of malleability is desired. They can also be used for spot welding low conductivity steels -- stainless.</td>
<td>A powder metallurgical combination of 45% copper &amp; 55% of the refractory metal tungsten. Not a true alloy. This combination produces dense, hard metals of superior wear resistance and strength at elevated temperatures.</td>
<td>X X</td>
</tr>
<tr>
<td>RWMA CLASS 11 COPPER-TUNGSTEN</td>
<td>11.74400</td>
<td>Projection welding electrodes, flash &amp; butt welding electrodes, light upsetting electroforging &amp; seam welder bushings. Harder than Class 10 &amp; used where moderate pressure required.</td>
<td>A powder metallurgical combination of 25% copper and 75% of the refractory metal tungsten. Not a true alloy. This combination produces dense, hard metals with good thermal &amp; electrical conductivity.</td>
<td>X X</td>
</tr>
<tr>
<td>RWMA CLASS 12 COPPER-TUNGSTEN</td>
<td>12.74350</td>
<td>Heavy duty projection welding electrodes, electro-forming &amp; electroforging electrodes, electrode facing for upsetting of studs and rivets, cross wire welding of large diameter wire and rod.</td>
<td>A powder metallurgical combination of 20% copper and 80% of the refractory metal tungsten. Not a true alloy. This combination produces dense, hard metals with good thermal and electrical conductivity.</td>
<td>X X</td>
</tr>
<tr>
<td>RWMA CLASS 13 TUNGSTEN</td>
<td>13.74300</td>
<td>Cross wire welding of copper &amp; brass electrobrazing and some electro upsetting. Welding of braided copper wire to other materials.</td>
<td>Tungsten is extremely hard and has low ductility. It cannot be machined but can be ground to required contours. It does not alloy with non-ferrous materials.</td>
<td>X X X</td>
</tr>
<tr>
<td>RWMA CLASS 14 MOLYBDENUM</td>
<td>14.42300</td>
<td>Cross wire welding of copper &amp; brass electrobrazing and some electro upsetting. Welding of braided copper wire to other materials.</td>
<td>Molybdenum is not as hard as Class 13 and can be drilled and machined to special contours.</td>
<td>X X X</td>
</tr>
</tbody>
</table>

### GROUP “C” – SPECIALTY MATERIAL –

<table>
<thead>
<tr>
<th>CLASS</th>
<th>RWMA NO.</th>
<th>GENERAL USE</th>
<th>DESCRIPTION</th>
<th>AVAILABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>RWMA CLASS 20 DISPERSION STRENGTHENED COPPER</td>
<td>20.15760</td>
<td>Welding of metallic coated metal such as galvanized steel, term plate, etc.</td>
<td>A powder metallurgy material consisting of copper and aluminum oxide with high temperature hardness and physical properties different than the copper alloys.</td>
<td>X X</td>
</tr>
</tbody>
</table>

#### AVAILABILITY CODING EXPLANATION

- 1 = CASTING
- 2 = FORGING
- 3 = ROD & BAR
- 4 = PLATE
- 5 = TUBE
- 6 = INSERTS

*GENERAL SUGGESTED APPLICATIONS, NOT TO BE INTERPRETED AS THE OPTIMUM FOR ANY SPECIFIC APPLICATION*
OVEREXPOSURE EFFECTS

<table>
<thead>
<tr>
<th>TYPE/LOCATION OF OVEREXPOSURE</th>
<th>RWMA CLASS 1</th>
<th>RWMA CLASS 2</th>
<th>RWMA CLASS 3</th>
<th>ZIRCONIUM COPPER</th>
<th>TUNGSTEN</th>
<th>GLUCOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin: Irritation with possible discoloration of skin or hair.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Skin: Irritation with possible discoloration of skin (Copper).</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On broken skin, can cause granulomatous lesions (hard lesions with a central non-healing core) (Beryllium). Cobalt can cause an allergic sensitivity even with very low exposures. Often expressed as eruptions in creases of elbow, knee, ankles and neck.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inhalation: Upper respiratory tract irritation, metallic taste in mouth, nausea, metal fume fever (sensation of chills and stuffiness of the head and weakness). Possible lesions on nasal passages.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Inhalation: Upper respiratory tract irritation, metallic taste in mouth, nausea, metal fume fever. Possible lesions on nasal passages (Copper). Cough, substernal pain, moderate shortness of breath, some weight loss (Beryllium). Chronic Beryllium disease can exhibit these symptoms plus weakness and fatigue. Severity can be from non-disabling to severely disabling. High Cobalt inhalation levels can cause asthma-like symptoms to interstitial pneumonia with fibrosis in severe cases.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eyes: Metal particles penetrating the eyes may cause irritation discoloration and damage.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Eyes: Copper particles penetrating the eye may cause irritation discoloration and damage. Beryllium dust and fumes may cause irritation and conjunctivitis.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cadmium – reported to increase incidence of prostate cancer.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beryllium &amp; Nickel – classed as suspect of carcinogenic potential for man.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chromium – dust and fumes can cause skin and pulmonary sensitization and is corrosive. Overexposure is unlikely to occur.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

REACTIVITY

<table>
<thead>
<tr>
<th>Hazardous Polymerization: Will not occur.</th>
<th>RWMA CLASS 1</th>
<th>RWMA CLASS 2</th>
<th>RWMA CLASS 3</th>
<th>ZIRCONIUM COPPER</th>
<th>TUNGSTEN</th>
<th>GLUCOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stability: Stable</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incompatibility: Dust or fume contact / acetylene gas may cause formation of copper acetylenes which are sensitive to shock.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hazardous Decomposition Products: Melting may generate harmful fumes.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

EMERGENCY & FIRST AID PROCEDURES

Skin: Wash contaminated skin using soap or mild detergent and water. If irritation persists after washing, get medical attention. Eyes: Wash eyes immediately with large amounts of water, lifting lower and upper lids occasionally. Get medical attention immediately.

T. J. SNOW CO., INC.
Resistance Welding Equipment & Supplies
Service • Sales • Consulting • Seminars
LIMITED WARRANTY

CenterLine (Windsor) Limited, Electrodes Division, hereby provides to purchaser a limited warranty that its products and parts are manufactured free from defects in material and workmanship subject to the following DISCLAIMERS of WARRANTIES, limitations of liability, and EXCLUSIVE REMEDY provisions set forth below. Said warranty shall only be available to the original purchaser of the products or parts.

DISCLAIMERS OF WARRANTIES AND LIMITATIONS OR LIABILITY AND EXCLUSIVE REMEDY

A. The limited warranty set forth above is in lieu of any and all other expressed warranties.

B. Manufacturer disclaims any and all implied warranties and disclaims any and all warranties of merchantability and warranties of fitness for a particular purpose.

C. The liability of manufacturer for a breach or violation of any warranty is limited to repair or replacement (at manufacturer’s option) of the defective product or parts.

D. All other liability of manufacturer with respect to, arising from, or in connection with the purchase of the products or parts or in connection with this agreement or from manufacture, installation, maintenance, repair or use of any products or parts, whether in contract or in tort or otherwise is limited to the amounts paid (purchase price) by the purchaser to manufacturer for such parts or products.

E. Manufacturer shall not be liable or responsible for direct damages or for indirect damages or for incidental damages or for consequential damages or for the loss of the use of any asset or for the loss or revenue or for the loss of profit, anything in this agreement or in any other document to the contrary notwithstanding. The remedies set forth in this document, are the sole and exclusive remedies available against manufacturer. All damages (including attorney fees and litigation costs) exceeding the purchase price of the products or parts are hereby expressly excluded and expressly disclaimed by the manufacturer.

F. Written notice of any defects in parts or products must be provided to manufacturer within one (1) year of the date of purchase by registered mail or certified mail, return receipt requested and any product or part believed to be defective must be returned to manufacturer’s plant at purchaser’s cost within said one (1) year. Any legal action based on any claim against manufacturer for breach of warranty must be commenced within one (1) year after date of purchase; otherwise, said claim shall be barred, void and unenforceable.

G. Manufacturer shall not be liable or responsible for any damages arising from injury in shipment, faulty installation, adjustments or repairs, exposure to excessive pressure, temperature or harmful chemicals or improper application or misuse or abuse of said products or parts and/or negligence of others.

DISCLAIMER OF LIABILITY

The information in these Material Safety Data Sheets in this section was obtained from sources which we believe are reliable. However, the information is provided without any warranty, express or implied, regarding its correctness. The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage, or expense arising out of or in any way connected with the handling, storage, use, or disposal of the product.
OTHER PRODUCTS

CenterLine manufactures a variety of products to satisfy resistance welding and metal working needs. Contact CenterLine for additional information on other products.

RESISTANCE WELDING EXPERTISE

CenterLine has a broad range of proven resistance welding gun solutions.

The CenterLine product range includes:

- basic solutions to satisfy your general needs
- custom solutions to address your unique requirements
- innovative solutions to meet your future needs.

Our knowledge and experience are reflected in a family of resistance welding gun solutions that are well suited for tough industrial environments. A culture of continuous improvement has helped us improve our product line by simplifying installation, improving durability, and requiring minimal maintenance.

We have diverse engineering and manufacturing capabilities to turn your unique requirements or ideas into a solution that will give you a competitive advantage.

Standard CenterLine™ solutions all offer low-impact operation. Our Staac™ air cylinder, OHMA® air/oil cylinder, or servo-electric actuator, will help ensure you can:

- maximize up-time by decreasing wear
- reduce operating cost by maximizing consumable life
- minimize noise
- decrease shock and vibration
- minimize electrode skidding
- control dimensional variation
- improve weld appearance

T. J. SNOW CO., INC.
Resistance Welding Equipment & Supplies
Service • Sales • Consulting • Seminars
OHMA® Welding Cylinders
The OHMA intensifier cylinder produces consistent welding forces with low impact. It is ideal for high force applications and space restrictive locations. This cylinder operates with a low impact advance stroke resulting in prolonged electrode life, reduced part deformation and decreased overall shock to the equipment.

AMSI Welding Cylinders
American Machining Specialties Incorporated (AMSI) coupled with CenterLine, offers a comprehensive line of new air cylinders:
• Dual Piston Cylinders  • Triple Piston Cylinders
• Pre-Lube Cylinders   • Retract Cylinders
• Proximity Switch Cylinders  • Hydraulic Cylinders
The line of standard cylinders provide direct replacements for a large variety of weld cylinder applications. In addition to the standard line we also offer in house design to fit our customer’s specific requirements as well as replacement seal kits and parts for competitive brands.

OHMA® Piercing Cylinders
The OHMA piercing cylinder offers a robust design and remains one of the most practical and trouble-free systems available today. By using shop air pressure and hydraulic fluid, the OHMA cylinder produces work forces ranging from one ton to hundreds of tons. Rod, stroke and mounting style options make the OHMA cylinder suitable for virtually all metalworking applications.

OHMA® Press Packages
The OHMA press family is a collection of presses ranging from 4 to 70 tons. The presses are designed to satisfy production needs, prototype work or serves as an all purpose press. The design offers total flexibility with a soft touch, non-shock approach to the part and a 1/2” high force work stroke. These presses are ideal for piercing, pierce nut installation, crimping, coining, marking, forming, stamping, etc.