



centerline®

connecting needs with capabilities

Resistance Welding Product Guide Ver. 8.0





## CenterLine Electrodes Division

connecting needs with capabilities

CenterLine's Electrodes and Allied Products Division manufactures and supplies a complete range of welding consumable products satisfying North American and European standards. These include: 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 accessory products. All products are available in an extensive range of copper alloys and are manufactured to the highest quality standards. An extensive finished goods inventory ensures standard products are available when needed.

Through its extensive experience, strong engineering support and wide range of machining capabilities, the Electrodes Division is a proven commodity supplier to numerous OEM and Tier suppliers. It provides an extensive range of services and capabilities to ensure your automated production welding needs are completely satisfied; these include:

**PRODUCTION CAPACITY** - The Electrodes Division operates in a modern, highly efficient, well-equipped facility, managed and operated to meet delivery and quality expectations on a daily basis.

**MANUFACTURING EXCELLENCE** - CenterLine continues to invest in machinery, tooling, and people in order to provide one of the most advanced consumable electrode production facilities in the industry. 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.

**INVENTORY SUPPORT** - Effective inventory management guarantees part supply and satisfies the emergency needs of our customers.

**DESIGN ASSISTANCE** - With our wealth of application experience, CenterLine can design and manufacture custom components that are specifically suited to unique applications.

**PRODUCT DIVERSIFICATION** - In addition to offering an abundance of resistance welding consumable products, the Electrodes Division also supplies 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.







**1** STUD & WELD NUT  
ELECTRODES



**2** ELECTRODE CAPS



**3** STANDARD ADAPTERS

**4** RESISTANCE WELDING  
ELECTRODES



**5** HOLDERS

**6** SPOT WELDING  
MACHINE ARMS & CAPS

**7** SHUNTS & CABLES

**8** WATER TUBES

**9** SEAM WELDING WHEELS

**10** WELD GUN ASSEMBLY

**11** ACCESSORIES

**12** REFERENCE DATA

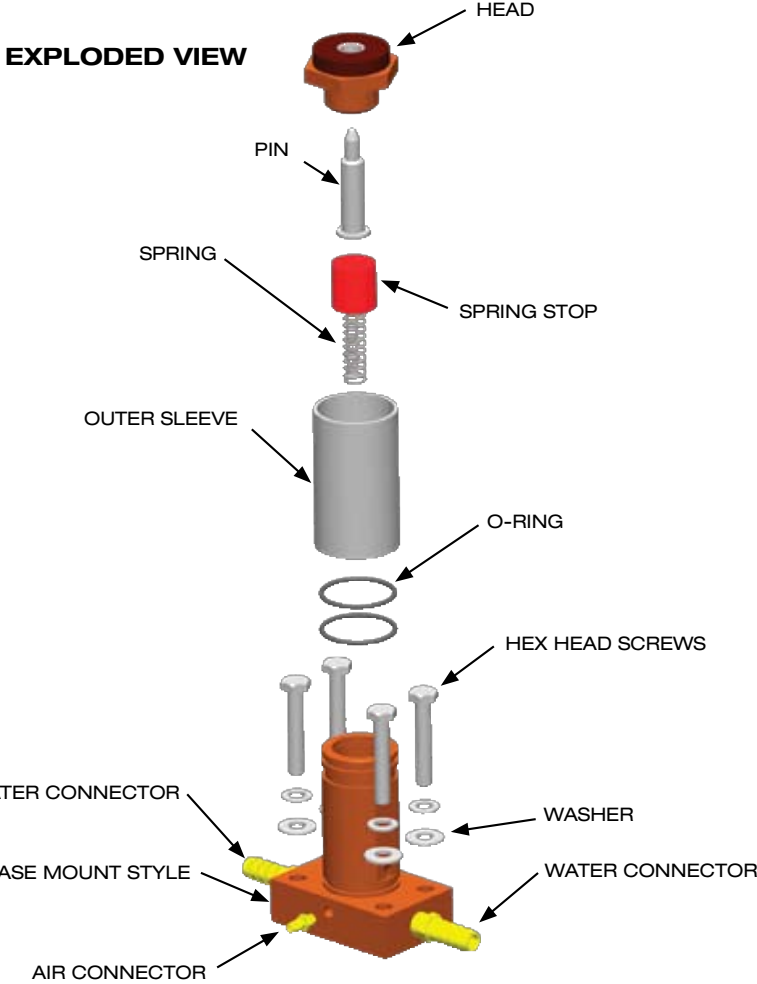
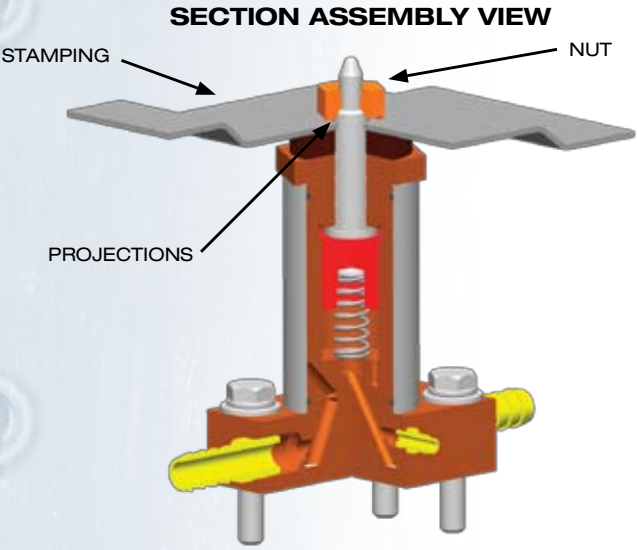
**13** CORPORATE INFO



# STUD & WELD NUT ELECTRODES

**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.



**Spare Parts List (Not including Pin or Head)**



U2	SPRINGSTOP-U2
X2	SPRINGSTOP-X2
U3	SPRINGSTOP-U3
X3	SPRINGSTOP-X3
U4	SPRINGSTOP-U4
X4	SPRINGSTOP-X4



U2	SPRING037013050
U3 & U4	SPRING037025075
X2	SPRING037032100
X3 & X4	SPRING037034125

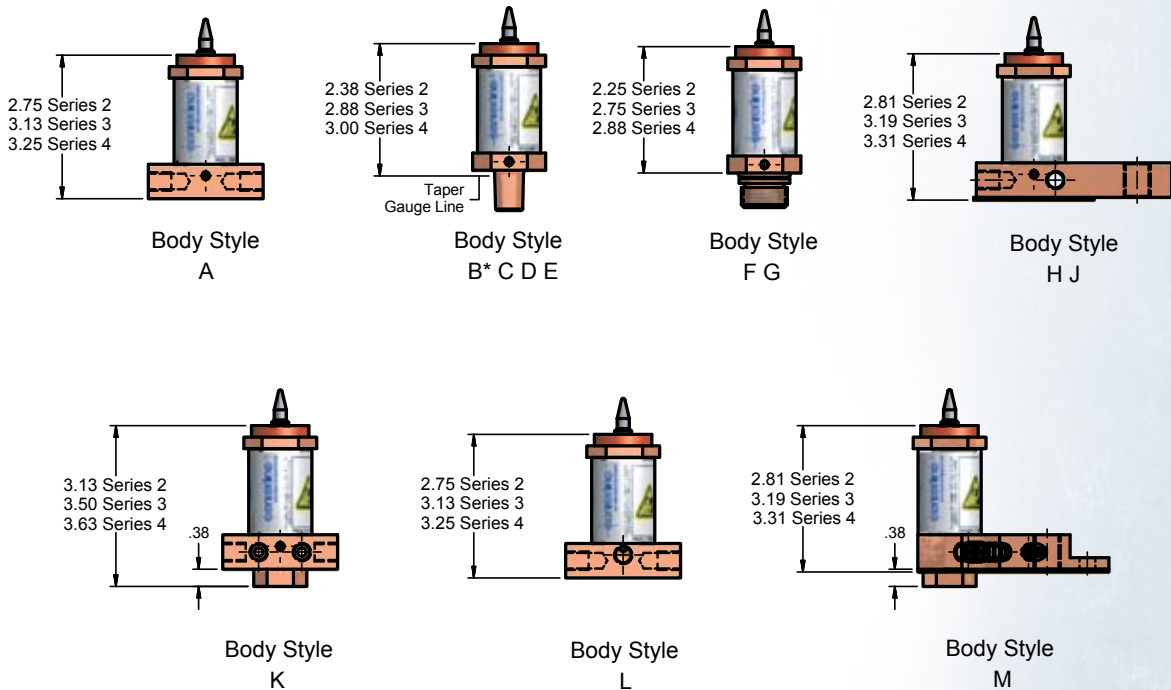


## Stud & Weld Nut Model Number Breakdown

### CODING EXAMPLE

<p>LENGTH</p> <p>BODY STYLE</p> <p>SERIES</p> <p>COMPONENTS</p>	<p>USE <b>U</b> FOR STANDARD LENGTH (SHOWN BELOW)</p> <p>USE <b>X</b> FOR EXTENDED LENGTH (.50 (12.70) LONGER THAN STANDARD LENGTH)</p> <p>USE <b>A</b> FOR BASE MOUNT</p> <p>USE <b>B</b> FOR 4 RW TAPER</p> <p>USE <b>C</b> FOR 5 RW TAPER</p> <p>USE <b>D</b> FOR 6 RW TAPER</p> <p>USE <b>E</b> FOR 7 RW TAPER</p> <p>USE <b>F</b> FOR 7/8-14 THREAD</p> <p>USE <b>G</b> FOR 1-12 THREAD</p> <p>USE <b>H</b> FOR BASE MOUNT WITH CABLE LUG (17/32" clearance hole for 1/2 screw)</p> <p>USE <b>J</b> FOR BASE MOUNT WITH CABLE LUG (Tapped hole for 1/2-13 screw)</p> <p>USE <b>K</b> FOR BASE MOUNT WITH CONTACT (CL-200-37)</p> <p>USE <b>L</b> FOR BASE MOUNT WITH LARGER AIR PORT (1/8 NPT)</p> <p>USE <b>M</b> FOR MODIFIED BASE MOUNT (Allows close mounting of multiple units)</p> <p>USE <b>2</b> FOR SERIES 2 (.88" WELD FACE)</p> <p>USE <b>3</b> FOR SERIES 3 (1.25" WELD FACE)</p> <p>USE <b>4</b> FOR SERIES 4 (1.50" WELD FACE)</p> <p>USE <b>R2</b> FOR RETRACTABLE PIN SERIES 2 (.88" WELD FACE)</p> <p>USE <b>R3</b> FOR RETRACTABLE PIN SERIES 3 (1.25" WELD FACE)</p> <p>USE <b>R4</b> FOR RETRACTABLE PIN SERIES 4 (1.50" WELD FACE)</p> <p><b>Note:</b> Leave blank if generating a complete nut or stud welding unit because information is contained in the pin or head number.</p> <p>USE <b>NHP</b> FOR UNIT WITH NO HEAD OR PIN</p> <p>USE GENERATED PIN # FOR COMPLETE NUT WELDING UNIT</p> <p>USE GENERATED HEAD # FOR COMPLETE STUD WELDING UNIT</p>
<p>U</p> <p>C</p> <p>3</p> <p>NHP</p>	<p>GH3050T125417</p> <p>P2A3482700525</p>
<p>X</p> <p>U</p>	<p>A</p> <p>G</p>
<p>Standard Length with 5 RW Body Style Retractable Series 3 with no Head or Pin.</p> <p>Extended Length, Base Mount Style, head #. This describes a complete stud welding unit.</p> <p>Standard Length, 1-12 Threaded Body Style, pin #. This describes a complete nut welding unit.</p>	

### STANDARD LENGTH OF SERIES BODY STYLES



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



# STUD & WELD NUT ELECTRODES

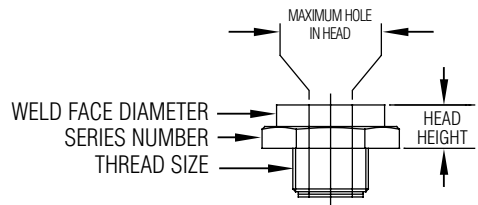
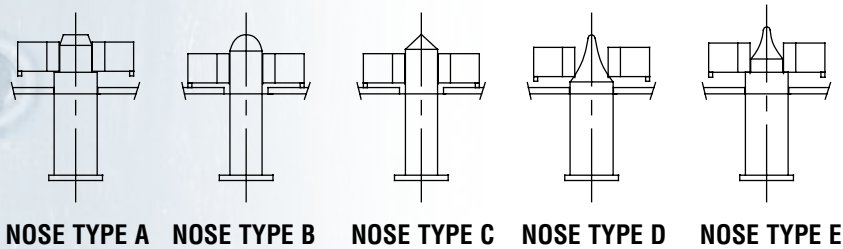
## Manual Load Weld Nut Pins

Pin Type	Description
GP	Stainless Steel Pin, Supported by spring and/or air
CP	Coated, D2 Steel Pin, Supported by spring and/or air
RP	Retractable, Stainless Steel Pin, Movement controlled by Air Pressure only, Special Application please contact CenterLine
KP	Coated Retractable, D2 Steel Pin, Movement controlled by Air Pressure only, Special Application please contact CenterLine

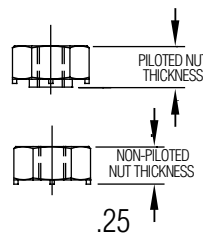
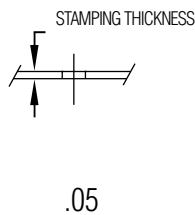
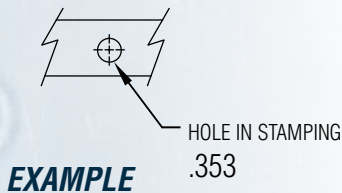
Series	Thread Size	Weld Face Diameter	Hex Size	Maximum Hole in Head*	Head Height
2	5/8-18	7/8 Standard	1	0.427 (10.85) ID	0.500
3	7/8-14	1-1/4 Standard	1-3/8	0.642 (16.31) ID	0.500
4	1-1/8-12	1-1/2 Standard	1-5/8	0.852 (21.64) ID	0.625

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

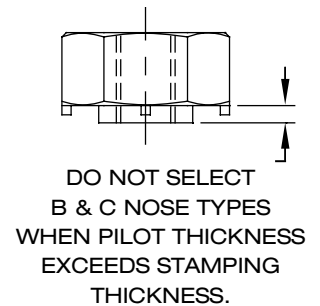
Nose Type	Description
A	Preferred when locating nut and stamping, no stamping contact during weld, no hole in upper electrode
B	Preferred when locating nut only, no stamping contact, no hole in upper electrode
C	Preferred when locating nut only, no stamping contact, no hole in upper electrode
D	Locates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



### APPLICATION SIZES



### CAUTION



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

Example	GP	2	A	348	270	05	25
Breakdown	Pin Type	Series Number	Nose Type	Hole in Stamping -.005" (3 Dec.) - see note below	Hole in Nut -.005" (3 Dec.) - see note below	Stamping Thickness (2 Dec.)	Nut Thickness (2 Dec.)
NOTE: For B & C style pins, the "Hole in Stamping" value is the "Hole in Nut" value (i.e. GP2B2702700525)							
Part Number							

Contact CenterLine to obtain a pin number for a Smart Electrode unit.

# STUD & WELD NUT ELECTRODES



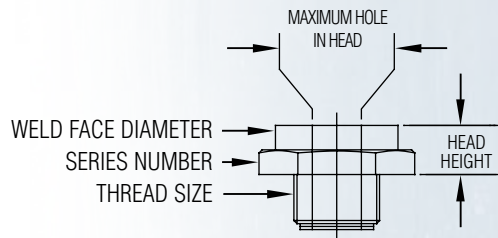
## Auto Load Weld Nut Pins

Pin Type	Description
GA	Stainless Steel Pin, Supported by spring and/or air
CA	Coated, D2 Steel Pin, Supported by spring and/or air
RA	Retractable, Stainless Steel Pin, Movement controlled by Air Pressure only, Special Application contact CenterLine
KA	Coated Retractable, D2 Steel Pin, Movement controlled by Air Pressure only, Special Application contact CenterLine

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

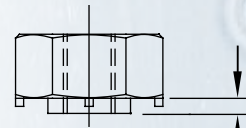
\*Special weld nut electrodes are available for larger IDs and areas with clearance restrictions.

Nose Type	
N	P
NOSE TYPE N	NOSE TYPE P
STRAIGHT	STRAIGHT
For auto loading nuts where the stamping is being located.	For auto loading nuts where the stamping is not being located. Refer to caution note.



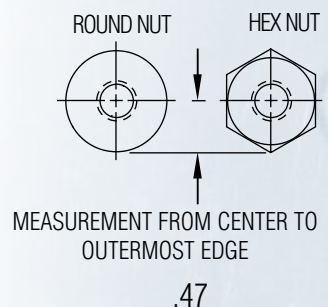
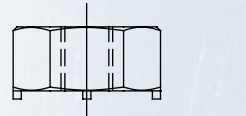
**CAUTION**  
P Nose Types Only

**PILOTED NUT**

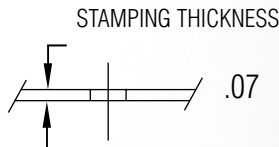
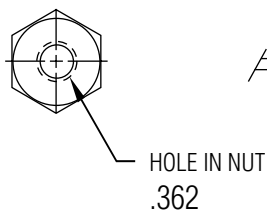
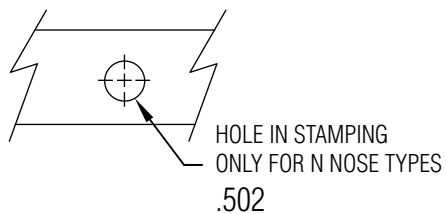


Caution: If pilot thickness exceeds stamping thickness, see special application sheet

**NON-PILOTED NUT**



### APPLICATION SIZES



**EXAMPLE**

Generate Your Own Number (Total 14 Characters)

Example	GA	3	N	497	357	07	47
Breakdown	Pin Type	Series Number	Nose Type	Hole in Stamping -.005" (3 Dec.) - see note below	Hole in Nut -.005" (3 Dec.) - see note below	Stamping Thickness (2 Dec.)	Measurement from Center to Outermost Edge (2 Dec.)
NOTE: For P style pins, the "Hole in Stamping" value is the "Hole in Nut" value (i.e. GA3P3573570747)							
Part Number							

Contact CenterLine to obtain a pin number for a Smart Electrode unit.

# STUD & WELD NUT ELECTRODES

Special Application Auto Load Weld Nut Pins

PinType	Description
GA	Stainless Steel Pin, Supported by spring and/or air
CA	Coated, D2 Steel Pin, Supported by spring and/or air
RA	Retractable, Stainless Steel Pin, Movement controlled by Air Pressure only, Special Application please contact CenterLine
KA	Coated Retractable, D2 Steel Pin, Movement controlled by Air Pressure only, Special Application please contact CenterLine

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

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

**Nose Type**

**M**

NOSE TYPE M

**STRAIGHT**

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

**PILOTED NUT**

Use **M** nose type if pilot thickness exceeds stamping thickness, and pin is not used to locate stamping.

**CAUTION**  
For M Nose Type pins ADD .005" to the pilot diameter.

## APPLICATION SIZES

**EXAMPLE**

PILOT DIAMETER .502

HOLE IN NUT .362

STAMPING THICKNESS .07

ROUND NUT

HEX NUT

MEASUREMENT FROM CENTER TO OUTERMOST EDGE .47

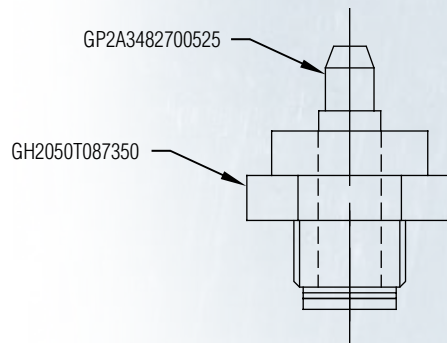
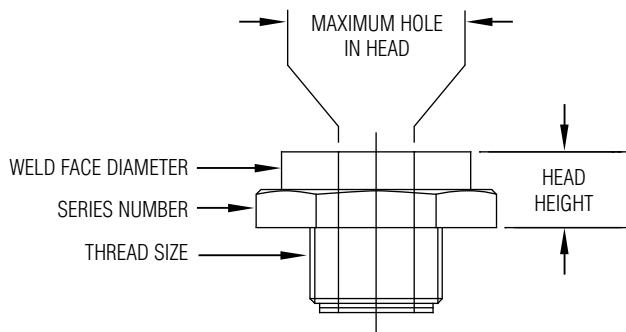
Generate Your Own Number (Total 14 Characters)

Example	GA	3	M	507	357	07	47
Breakdown	Pin Type	Series Number	Nose Type	Pilot Diameter + .005" (3 Dec.)	Hole in Nut -.005" (3 Dec.)	Stamping Thickness (2 Dec.)	Measurement from Center to Outermost Edge (2 Dec.)
Part Number							

Do not generate your own pin number for a Smart Electrode unit; contact CenterLine.



## Nut Welding Heads

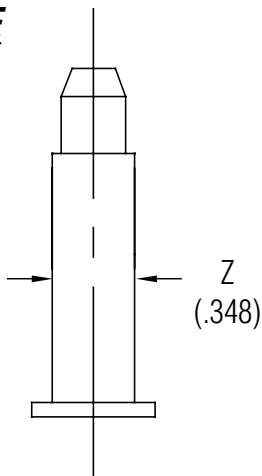


Series	Thread Size	Weld Face Diameter	Hex Size	Maximum Hole in Head*	Head Height
2	5/8-18	7/8 Standard	1	0.427 (10.85) ID	0.500
3	7/8-14	1-1/4 Standard	1-3/8	0.642 (16.31) ID	0.500
4	1-1/8-12	1-1/2 Standard	1-5/8	0.852 (21.64) ID	0.625

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

## PART NUMBER INSTRUCTIONS

### EXAMPLE



Pin # GP**2A348**2700525

Series Number \_\_\_\_\_ Major Diameter of Pin (Z dimension)

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

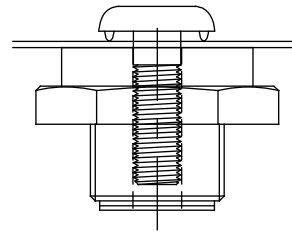
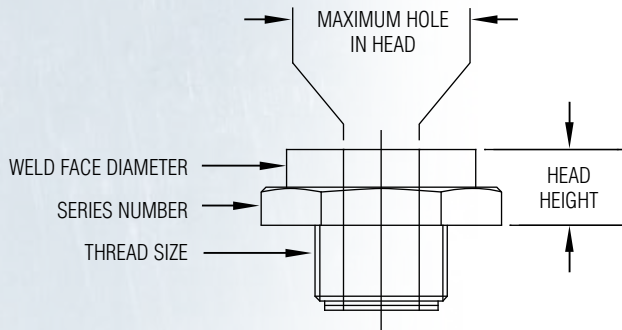
**Example** Series 2 - GH2050T087**350**

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

Series	Part Number Prefix	Z + .002" Specify to 3 decimal places.
2	GH2050T087	
3	GH3050T125	
4	GH4062T150	

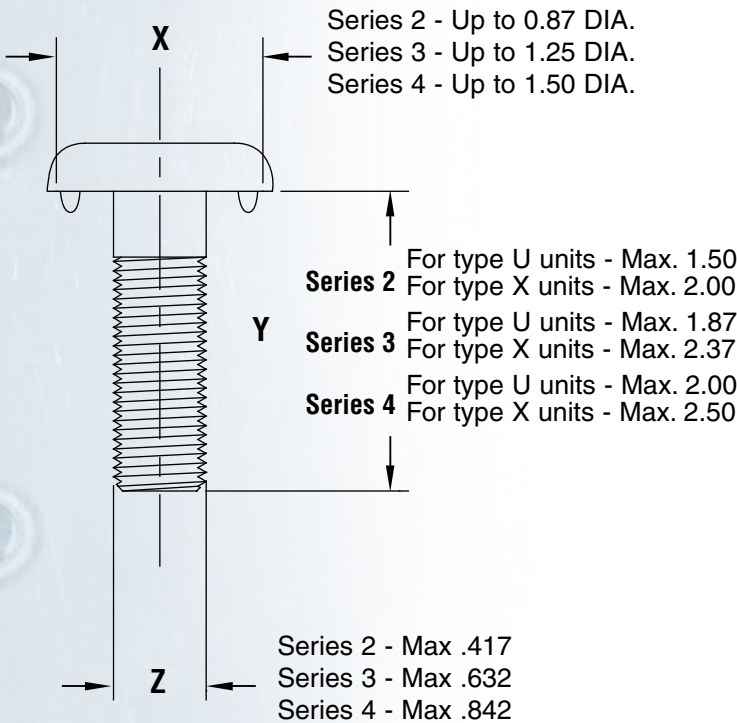
# STUD & WELD NUT ELECTRODES

## Stud Welding Heads



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

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



### 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

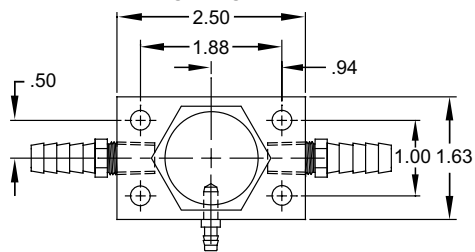
#### Generate Your Own Number (Total 13 Characters)

Series	Part Number Prefix	Z + .010" Specify to 3 decimal places.
2	GH2050T087	
3	GH3050T125	
4	GH4062T150	

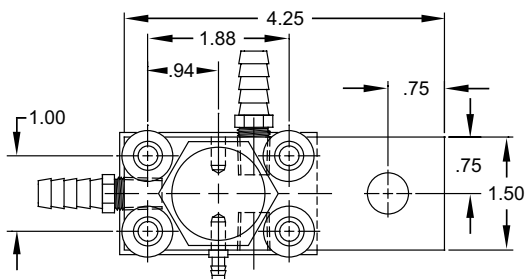


**Mounting dimensions  
for base mount body styles**

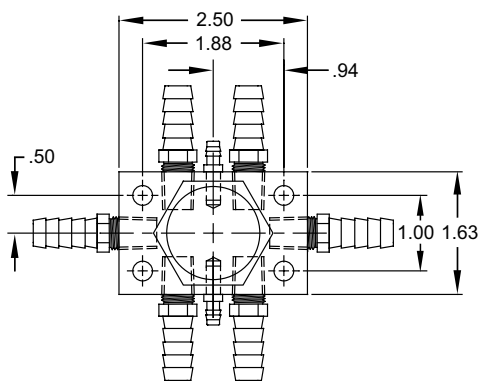
**Body Style A**



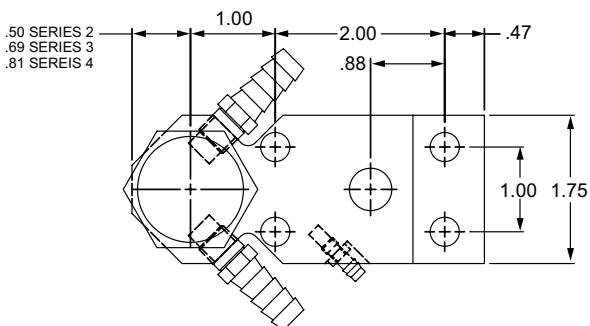
**Body Style H&J**



**Body Style K**



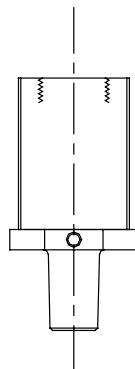
**Body Style M**



**Part number  
example**

**COMPLETE BODY REPLACEMENT UNIT**

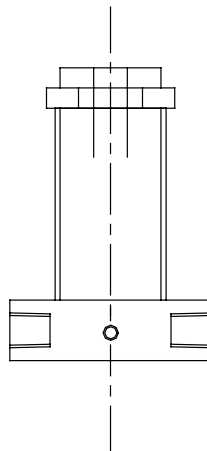
**UCR3NHP**



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

**COMPLETE STUD WELDING UNIT**

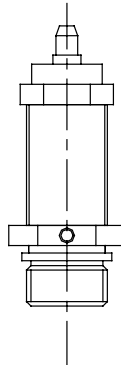
**XAGH3050T125440**



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

**COMPLETE NUT WELDING UNIT**

**UGGP2A3482700525**

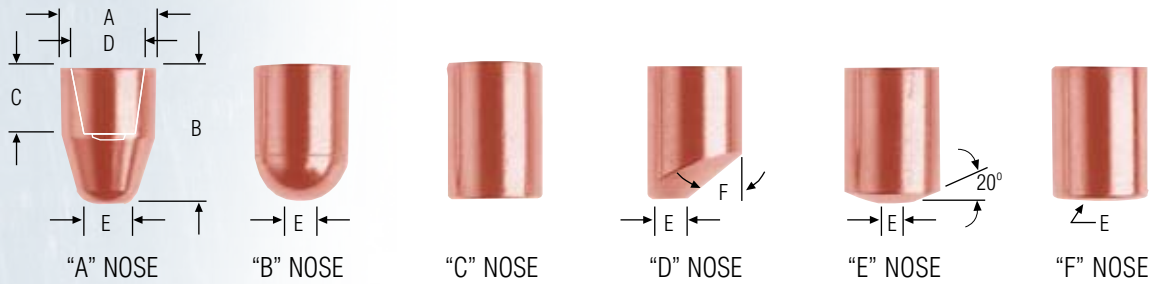


- GP2A3482700525**  
Pin # created from manual load weld nut page.
- G** - 1" - 12 Thread
- U** - Standard Length

**NOTE:** Base units come with 1/4-20 screws for mounting & barb fittings.

# ELECTRODE CAPS

Replaceable Female Spot Welding Caps



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

- Dimensions Shown Are: inches (mm).
- See pages 12-1 & 12-2 for reference data.

Item No.		DIMENSIONS					
CLASS 2		A Major Diameter	B Overall Length Standard/Short	C Taper Length	D Taper Diameter	E Welding Face Diameter	F Offset Angle
Standard	Short Caps					Standard/Short	Standard/Short
CLFA-24	CLFA-24S	.500 (12.70)	.84 (21.34) / .59 (14.99)	.32 (8.13)	.394 (10.01)	.19 (4.76)/.25(6.35)	
CLFB-24	CLFB-24S	.500 (12.70)	.84 (21.34) / .59 (14.99)	.32 (8.13)	.394 (10.01)	.12(3.17)	
CLFC-24	CLFC-24S	.500 (12.70)	.84 (21.34) / .59 (14.99)	.32 (8.13)	.394 (10.01)	-----	
CLFD-24	CLFD-24S	.500 (12.70)	.84 (21.34) / .59 (14.99)	.32 (8.13)	.394 (10.01)	.19 (4.76)	40° / 35°
CLFE-24	CLFE-24S	.500 (12.70)	.84 (21.34) / .59 (14.99)	.32 (8.13)	.394 (10.01)	.19 (4.76)	
CLFF-24	CLFF-24S	.500 (12.70)	.84 (21.34) / .59 (14.99)	.32 (8.13)	.394 (10.01)	2.00 (50.80) sphere. rad.	
CLFA-25	CLFA-25S	.625 (15.88)	.88 (22.23) / .63 (16.00)	.38 (9.53)	.495 (12.57)	.25 (6.35)	
CLFB-25	CLFB-25S	.625 (15.88)	.88 (22.23) / .63 (16.00)	.38 (9.53)	.495 (12.57)	.19 (4.76)	
CLFC-25	CLFC-25S	.625 (15.88)	.88 (22.23) / .63 (16.00)	.38 (9.53)	.495 (12.57)	-----	
CLFD-25	CLFD-25S	.625 (15.88)	.88 (22.23) / .63 (16.00)	.38 (9.53)	.495 (12.57)	.25 (6.35)	40° / 30°
CLFE-25	CLFE-25S	.625 (15.88)	.88 (22.23) / .63 (16.00)	.38 (9.53)	.495 (12.57)	.25 (6.35)	
CLFF-25	CLFF-25S	.625 (15.88)	.88 (22.23) / .63 (16.00)	.38 (9.53)	.495 (12.57)	2.00 (50.80) sphere. rad.	
CLFA-26	CLFA-26S	.750 (19.05)	1 (25.40) / .75 (19.05)	.47 (11.94)	.625 (15.88)	.31 (7.94)	
CLFB-26	CLFB-26S	.750 (19.05)	1 (25.40) / .75 (19.05)	.47 (11.94)	.625 (15.88)	.19 (4.76)	
CLFC-26	CLFC-26S	.750 (19.05)	1 (25.40) / .75 (19.05)	.47 (11.94)	.625 (15.88)	-----	
CLFD-26	CLFD-26S	.750 (19.05)	1 (25.40) / .75 (19.05)	.47 (11.94)	.625 (15.88)	.31 (7.94)	45° / 30°
CLFE-26	CLFE-26S	.750 (19.05)	1 (25.40) / .75 (19.05)	.47 (11.94)	.625 (15.88)	.31 (7.94)	
CLFF-26	CLFF-26S	.750 (19.05)	1 (25.40) / .75 (19.05)	.47 (11.94)	.625 (15.88)	2.00 (50.80) sphere. rad.	

• **ADDITIONAL LENGTHS ARE AVAILABLE UPON REQUEST.**

**FOR ALL OTHER ITEMS:**

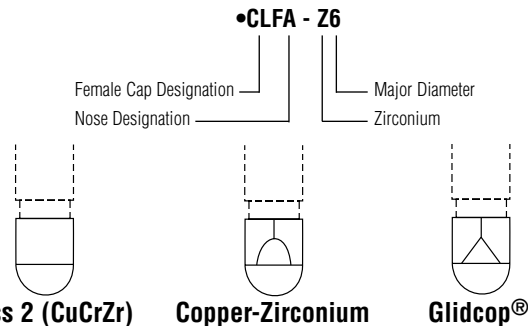
- Check Key To Item Numbers For Availability
- Use Example For Ordering Available Items

**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

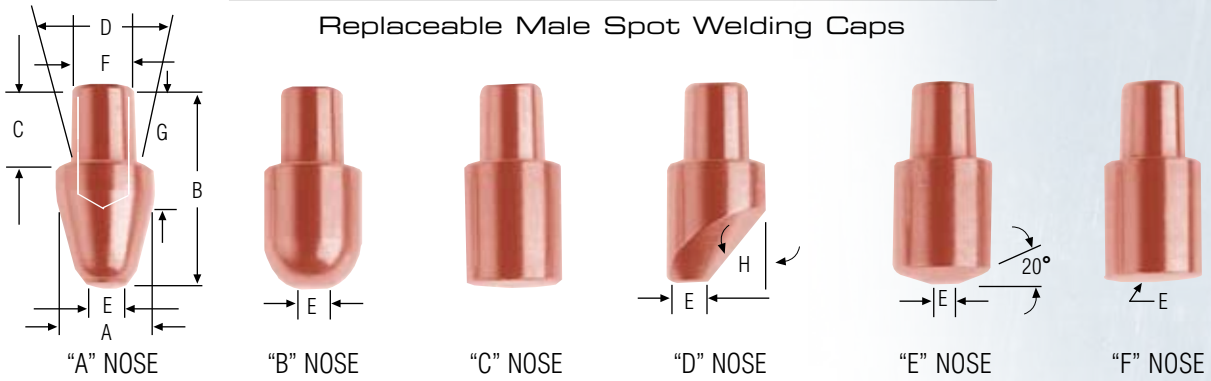


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# ELECTRODE CAPS

## Replaceable Male Spot Welding Caps



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

• Dimensions Shown Are: inches (mm). • See pages 12-1 & 12-2 for reference data.

Item No.	DIMENSIONS							
	A	B	C	D	E	F	G	H
CLASS 2 Standard	Major Diameter	Overall Length	Taper Length	Taper Diameter	Welding Face Diameter	Water Hole Diameter	Water Hole Depth	Offset Angle
WA-24	.482 (12.24)	1.12 (28.45)	.38 (9.53)	.375 (9.53)	.19 (4.76)	.28 (7.14)	.62 (15.88)	
WB-24	.482 (12.24)	1.12 (28.45)	.38 (9.53)	.375 (9.53)	.19 (4.76)	.28 (7.14)	.62 (15.88)	
WC-24	.482 (12.24)	1.12 (28.45)	.38 (9.53)	.375 (9.53)	-----	.28 (7.14)	.62 (15.88)	
WD-24	.482 (12.24)	1.12 (28.45)	.38 (9.53)	.375 (9.53)	.19 (4.76)	.28 (7.14)	.62 (15.88)	40°
WE-24	.482 (12.24)	1.12 (28.45)	.38 (9.53)	.375 (9.53)	.19 (4.76)	.28 (7.14)	.62 (15.88)	
WF-24-2	.482 (12.24)	1.12 (28.45)	.38 (9.53)	.375 (9.53)	2.00 (50.80) sphere. rad.	.28 (7.14)	.62 (15.88)	
WA-25	.625 (15.88)	1.25 (41.15)	.50 (12.70)	.415 (10.54)	.25 (6.35)	.31 (7.94)	.875 (22.23)	
WB-25	.625 (15.88)	1.25 (41.15)	.50 (12.70)	.415 (10.54)	.19 (4.76)	.31 (7.94)	.875 (22.23)	
WC-25	.625 (15.88)	1.25 (41.15)	.50 (12.70)	.415 (10.54)	-----	.31 (7.94)	.875 (22.23)	
WD-25	.625 (15.88)	1.25 (41.15)	.50 (12.70)	.415 (10.54)	.25 (6.35)	.31 (7.94)	.875 (22.23)	40°
WE-25	.625 (15.88)	1.25 (41.15)	.50 (12.70)	.415 (10.54)	.25 (6.35)	.31 (7.94)	.875 (22.23)	
WF-25-2	.625 (15.88)	1.25 (41.15)	.50 (12.70)	.415 (10.54)	2.00 (50.80) sphere. rad.	.31 (7.94)	.875 (22.23)	
WA-26	.750 (19.05)	1.62 (41.15)	.63 (15.88)	.500 (12.70)	.31 (7.94)	.38 (9.53)	1 (25.40)	
WB-26	.750 (19.05)	1.62 (41.15)	.63 (15.88)	.500 (12.70)	.19 (4.76)	.38 (9.53)	1 (25.40)	
WC-26	.750 (19.05)	1.62 (41.15)	.63 (15.88)	.500 (12.70)	-----	.38 (9.53)	1 (25.40)	
WD-26	.750 (19.05)	1.62 (41.15)	.63 (15.88)	.500 (12.70)	.31 (7.94)	.38 (9.53)	1 (25.40)	45°
WE-26	.750 (19.05)	1.62 (41.15)	.63 (15.88)	.500 (12.70)	.31 (7.94)	.38 (9.53)	1 (25.40)	
WF-26-4	.750 (19.05)	1.62 (41.15)	.63 (15.88)	.500 (12.70)	4.00 (101.60) sphere. rad.	.38 (9.53)	1 (25.40)	
WA-27	.875 (22.23)	1.62 (41.15)	.63 (15.88)	.613 (15.57)	.31 (7.94)	.50 (12.70)	1 (25.40)	
WB-27	.875 (22.23)	1.62 (41.15)	.63 (15.88)	.613 (15.57)	.25 (6.35)	.50 (12.70)	1 (25.40)	
WC-27	.875 (22.23)	1.62 (41.15)	.63 (15.88)	.613 (15.57)	-----	.50 (12.70)	1 (25.40)	
WD-27	.875 (22.23)	1.62 (41.15)	.63 (15.88)	.613 (15.57)	.31 (7.94)	.50 (12.70)	1 (25.40)	45°
WE-27	.875 (22.23)	1.62 (41.15)	.63 (15.88)	.613 (15.57)	.31 (7.94)	.50 (12.70)	1 (25.40)	
WF-27-6	.875 (22.23)	1.62 (41.15)	.63 (15.88)	.613 (15.57)	6.00 (152.40) sphere. rad.	.50 (12.70)	1 (25.40)	

• **ADDITIONAL LENGTHS ARE AVAILABLE UPON REQUEST.**

**FOR ALL OTHER ITEMS:**

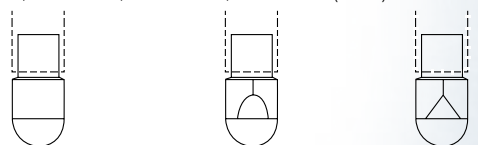
- Check Key To Item Numbers For Availability
- Use Example For Ordering Available Items

**KEY TO ITEM NUMBERS**

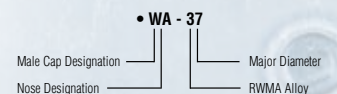
- W** - Cap Designation
- A,B,C,D,E,F** - Nose Designation
- 2,3** - RWMA Alloy Class
- Z** - Zirconium
- G** - Dispersion Strengthened Copper
- 4 THRU 7** - Major Diameter In .125 (3.18) Increments

**EXAMPLE:**

MALE CAP, A NOSE, CLASS 3, A = .875 (22.23) DIAMETER



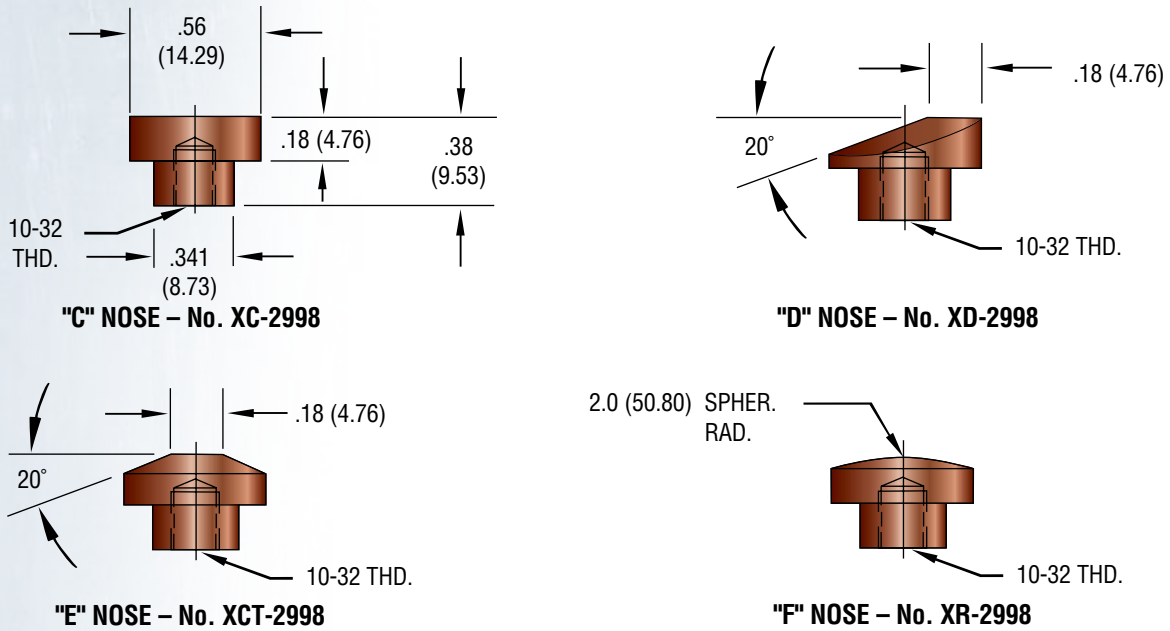
**Class 2 (CuCrZr) Copper-Zirconium**      **Glidcop®**  
 Glidcop® is a registered trademark of SCM Metal Products Inc.



# ELECTRODE CAPS

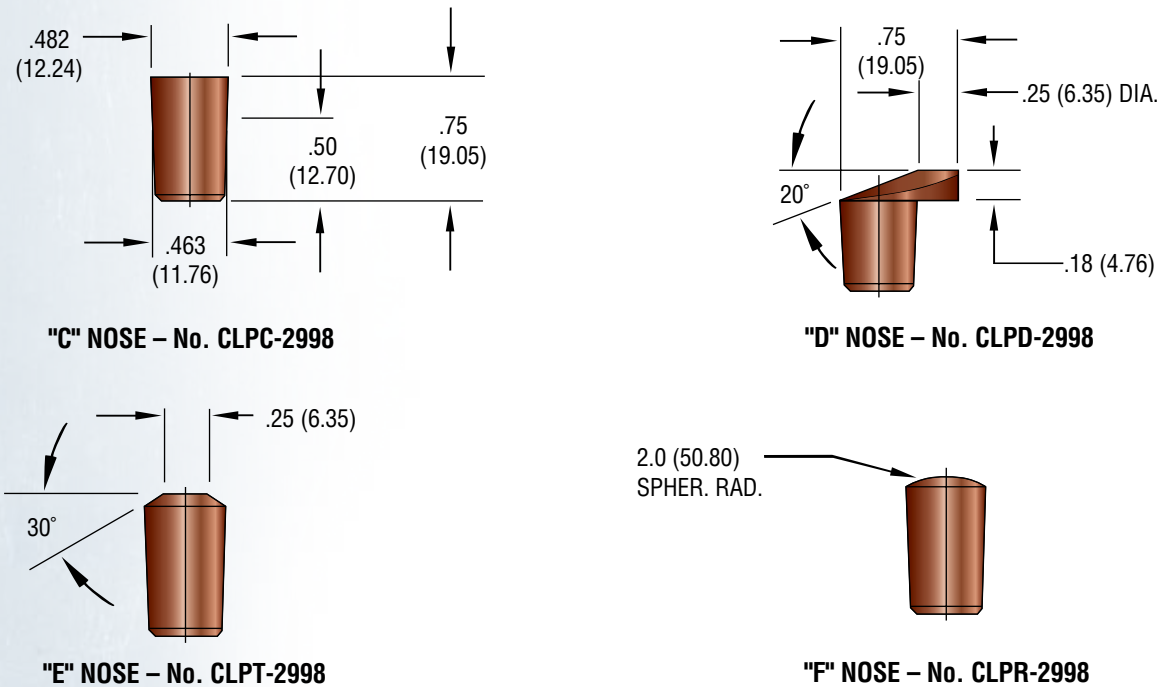
Replaceable Button Caps

## For Paddle Holder Type 1 - See Page 5-3



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

## For Paddle Holder Type 3 - See Page 5-3



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

• Dimensions Shown Are: inches (mm).



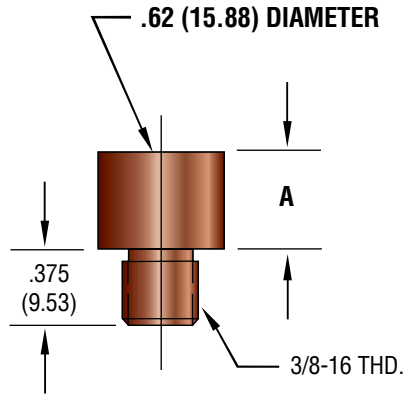
# ELECTRODE CAPS

Button Caps

**For Paddle Holder Type 2 – See Page 5-3**

**EXAMPLE – CLR2-78-AY**

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

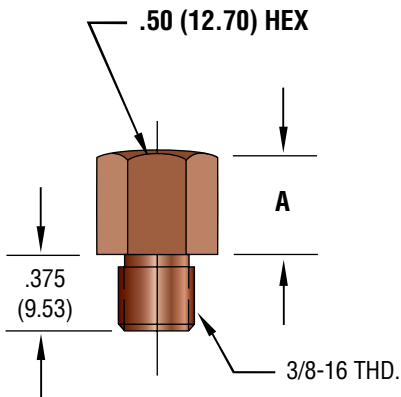


Item No.	"A" = Height
CLR2-78-31C	.312 (7.92)
CLR2-78-37C	.375 (9.53)
CLR2-78-43C	.437 (11.10)
CLR2-78-50C	.500 (12.70)
CLR2-78-62C	.625 (15.88)
CLR2-78-75C	.750 (19.05)
ETC.	See Example

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

**EXAMPLE – CLH3-78-AY**

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



**"Y" = NOSE DESIGNATION**

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

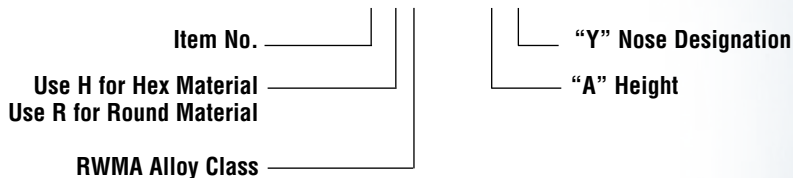
**\* 0.25(6.35) Weld Face Diameter**

• Dimensions Shown Are: inches (mm).

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

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

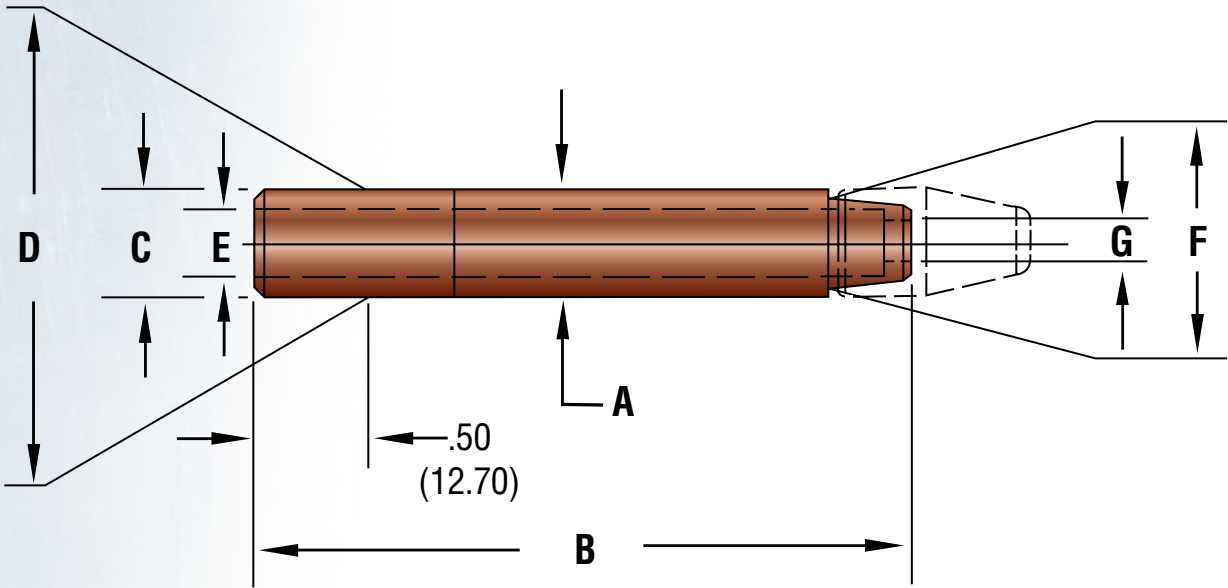
• **CLH3-78-50C**



**NOTE: Other thread sizes and shapes are available.**

# STANDARD ADAPTERS

Straight Male Adapter Shanks For Female Caps



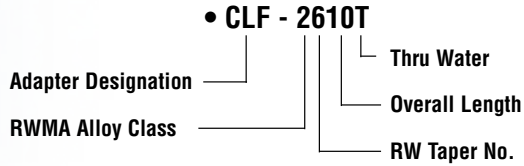
**FIGURE 3-1 (Material RWMA Class 2 & 3)**

- Dimensions Shown Are: inches (mm).
- See pg. 3-2 for part number chart and pg. 2-1 For Caps.

**KEY TO ITEM NUMBERS**

- CLF -** Adapter Designation
- 2 or 3 -** RWMA Alloy Class
- 4 Thru 7 -** RW Taper Number
- 05 Thru 16 -** Overall Length in .25 (6.35) Increments
- T -** Thru Water Hole  
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**





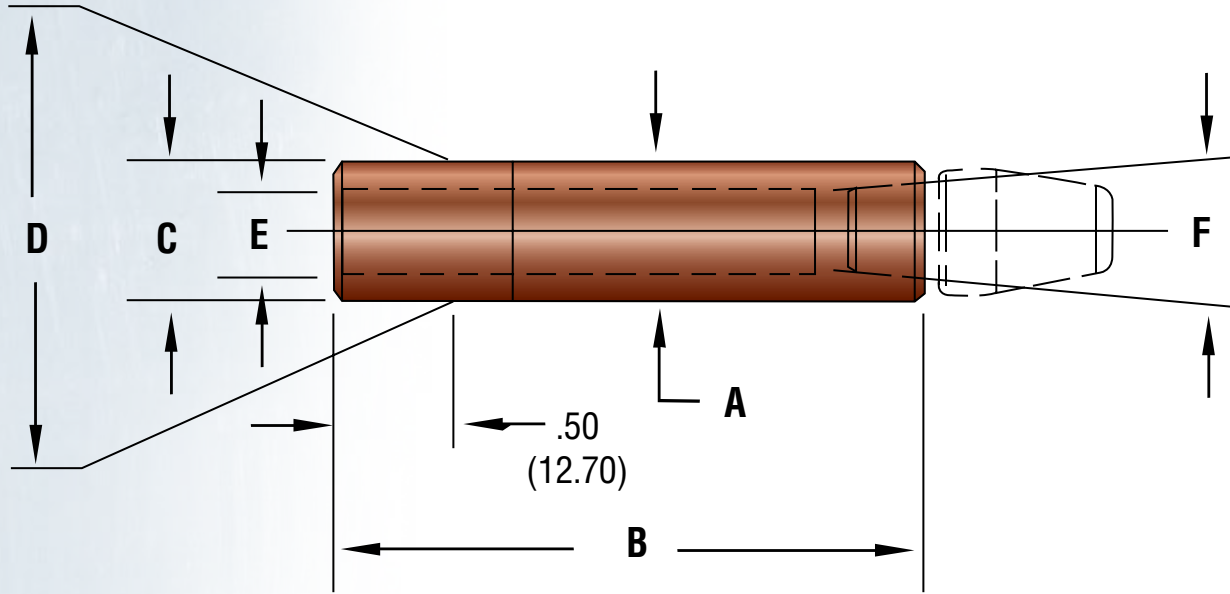
# STANDARD ADAPTERS

Straight Male Adapter Shanks For Female Caps

Item No.	DIMENSIONS						
	A	B	C	D	E	F	G
	CLASS 2 Major Diameter	Shank Overall Length	Minor Taper Diameter	Gauging Taper Diameter	Water Hole Diameter	Cap End Taper Diameter	Taper Water Hole Diameter
CLF-2405T	.482 (12.24)	1.25 (31.75)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.402 (10.21)	.25 (6.35)
CLF-2406T	.482 (12.24)	1.50 (38.10)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.402 (10.21)	.25 (6.35)
CLF-2407T	.482 (12.24)	1.75 (44.45)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.402 (10.21)	.25 (6.35)
CLF-2408T	.482 (12.24)	2.00 (50.80)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.402 (10.21)	.25 (6.35)
CLF-2409T	.482 (12.24)	2.25 (57.15)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.402 (10.21)	.25 (6.35)
CLF-2410T	.482 (12.24)	2.50 (63.50)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.402 (10.21)	.25 (6.35)
CLF-2411T	.482 (12.24)	2.75 (69.85)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.402 (10.21)	.25 (6.35)
CLF-2412T	.482 (12.24)	3.00 (76.20)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.402 (10.21)	.25 (6.35)
CLF-2413T	.482 (12.24)	3.25 (82.55)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.402 (10.21)	.25 (6.35)
CLF-2414T	.482 (12.24)	3.50 (88.90)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.402 (10.21)	.25 (6.35)
CLF-2415T	.482 (12.24)	3.75 (95.25)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.402 (10.21)	.25 (6.35)
CLF-2416T	.482 (12.24)	4.00 (101.60)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.402 (10.21)	.25 (6.35)
CLF-2506T	.625 (15.88)	1.43 (36.32)	.588 (14.94)	.613 (15.57)	.34 (8.73)	.502 (12.75)	.265 (6.73)
CLF-2507T	.625 (15.88)	1.68 (42.67)	.588 (14.94)	.613 (15.57)	.34 (8.73)	.502 (12.75)	.265 (6.73)
CLF-2508T	.625 (15.88)	1.93 (49.02)	.588 (14.94)	.613 (15.57)	.34 (8.73)	.502 (12.75)	.265 (6.73)
CLF-2509T	.625 (15.88)	2.18 (55.37)	.588 (14.94)	.613 (15.57)	.34 (8.73)	.502 (12.75)	.265 (6.73)
CLF-2510T	.625 (15.88)	2.43 (61.72)	.588 (14.94)	.613 (15.57)	.34 (8.73)	.502 (12.75)	.265 (6.73)
CLF-2511T	.625 (15.88)	2.68 (68.02)	.588 (14.94)	.613 (15.57)	.34 (8.73)	.502 (12.75)	.265 (6.73)
CLF-2512T	.625 (15.88)	2.93 (74.42)	.588 (14.94)	.613 (15.57)	.34 (8.73)	.502 (12.75)	.265 (6.73)
CLF-2513T	.625 (15.88)	3.18 (80.77)	.588 (14.94)	.613 (15.57)	.34 (8.73)	.502 (12.75)	.265 (6.73)
CLF-2514T	.625 (15.88)	3.43 (87.12)	.588 (14.94)	.613 (15.57)	.34 (8.73)	.502 (12.75)	.265 (6.73)
CLF-2515T	.625 (15.88)	3.68 (93.47)	.588 (14.94)	.613 (15.57)	.34 (8.73)	.502 (12.75)	.265 (6.73)
CLF-2516T	.625 (15.88)	3.93 (99.82)	.588 (14.94)	.613 (15.57)	.34 (8.73)	.502 (12.75)	.265 (6.73)
CLF-2608T	.750 (19.05)	2.00 (50.80)	.706 (17.93)	.731 (18.57)	.38 (9.53)	.633 (16.08)	.343 (8.71)
CLF-2610T	.750 (19.05)	2.50 (63.50)	.706 (17.93)	.731 (18.57)	.38 (9.53)	.633 (16.08)	.343 (8.71)
CLF-2612T	.750 (19.05)	3.00 (76.20)	.706 (17.93)	.731 (18.57)	.38 (9.53)	.633 (16.08)	.343 (8.71)
CLF-2614T	.750 (19.05)	3.50 (88.90)	.706 (17.93)	.731 (18.57)	.38 (9.53)	.633 (16.08)	.343 (8.71)
CLF-2616T	.750 (19.05)	4.00 (101.60)	.706 (17.93)	.731 (18.57)	.38 (9.53)	.633 (16.08)	.343 (8.71)
CLF-2708T	.875 (22.23)	2.00 (50.80)	.819 (20.80)	.844 (21.44)	.38 (9.53)	.633 (16.08)	.343 (8.71)
CLF-2710T	.875 (22.23)	2.50 (63.50)	.819 (20.80)	.844 (21.44)	.38 (9.53)	.633 (16.08)	.343 (8.71)
CLF-2712T	.875 (22.23)	3.00 (76.20)	.819 (20.80)	.844 (21.44)	.38 (9.53)	.633 (16.08)	.343 (8.71)
CLF-2714T	.875 (22.23)	3.50 (88.90)	.819 (20.80)	.844 (21.44)	.38 (9.53)	.633 (16.08)	.343 (8.71)
CLF-2716T	.875 (22.23)	4.00 (101.60)	.819 (20.80)	.844 (21.44)	.38 (9.53)	.633 (16.08)	.343 (8.71)

# STANDARD ADAPTERS

Straight Female Adapter Shanks For Male Caps



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

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

**FOR ALL OTHER ITEMS:**

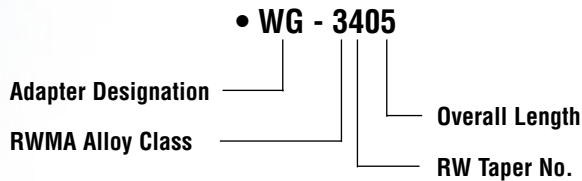
- Check Key To Item Numbers For Availability
- Use Example For Ordering Available Items

**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.**



# STANDARD ADAPTERS



Straight Female Adapter Shanks For Male Caps

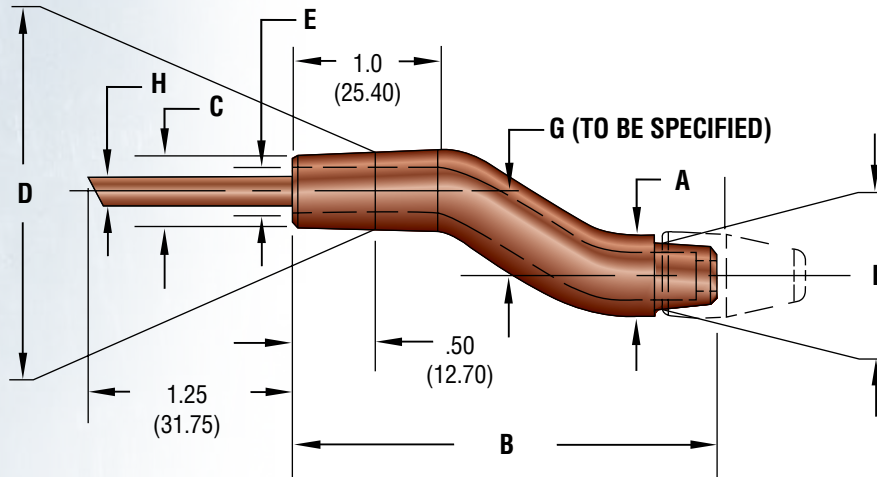
ITEM NO.	DIMENSIONS					
	CLASS 2	A Major Diameter	B Shank Overall Length	C Minor Taper Diameter	D Gauging Taper Diameter	E Water Hole Diameter
WG-2405	.482 (12.24)	1.25 (31.75)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.375 (9.53)
WG-2406	.482 (12.24)	1.50 (38.10)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.375 (9.53)
WG-2407	.482 (12.24)	1.75 (44.45)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.375 (9.53)
WG-2408	.482 (12.24)	2.00 (50.80)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.375 (9.53)
WG-2409	.482 (12.24)	2.25 (57.15)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.375 (9.53)
WG-2410	.482 (12.24)	2.50 (63.50)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.375 (9.53)
WG-2411	.482 (12.24)	2.75 (69.85)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.375 (9.53)
WG-2412	.482 (12.24)	3.00 (76.20)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.375 (9.53)
WG-2413	.482 (12.24)	3.25 (82.55)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.375 (9.53)
WG-2414	.482 (12.24)	3.50 (88.90)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.375 (9.53)
WG-2415	.482 (12.24)	3.75 (95.25)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.375 (9.53)
WG-2416	.482 (12.24)	4.00 (101.60)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.375 (9.53)
WG-2505	.625 (15.88)	1.25 (31.75)	.588 (14.94)	.613 (15.57)	.38 (9.53)	.415 (10.54)
WG-2506	.625 (15.88)	1.50 (38.10)	.588 (14.94)	.613 (15.57)	.38 (9.53)	.415 (10.54)
WG-2507	.625 (15.88)	1.75 (44.45)	.588 (14.94)	.613 (15.57)	.38 (9.53)	.415 (10.54)
WG-2508	.625 (15.88)	2.00 (50.80)	.588 (14.94)	.613 (15.57)	.38 (9.53)	.415 (10.54)
WG-2509	.625 (15.88)	2.25 (57.15)	.588 (14.94)	.613 (15.57)	.38 (9.53)	.415 (10.54)
WG-2510	.625 (15.88)	2.50 (63.50)	.588 (14.94)	.613 (15.57)	.38 (9.53)	.415 (10.54)
WG-2511	.625 (15.88)	2.75 (69.85)	.588 (14.94)	.613 (15.57)	.38 (9.53)	.415 (10.54)
WG-2512	.625 (15.88)	3.00 (76.20)	.588 (14.94)	.613 (15.57)	.38 (9.53)	.415 (10.54)
WG-2513	.625 (15.88)	3.25 (82.55)	.588 (14.94)	.613 (15.57)	.38 (9.53)	.415 (10.54)
WG-2514	.625 (15.88)	3.50 (88.90)	.588 (14.94)	.613 (15.57)	.38 (9.53)	.415 (10.54)
WG-2515	.625 (15.88)	3.75 (95.25)	.588 (14.94)	.613 (15.57)	.38 (9.53)	.415 (10.54)
WG-2516	.625 (15.88)	4.00 (101.60)	.588 (14.94)	.613 (15.57)	.38 (9.53)	.415 (10.54)
WG-2608	.750 (19.05)	2.00 (50.80)	.706 (17.93)	.731 (18.57)	.44 (11.11)	.501 (12.73)
WG-2610	.750 (19.05)	2.50 (63.50)	.706 (17.93)	.731 (18.57)	.44 (11.11)	.501 (12.73)
WG-2612	.750 (19.05)	3.00 (76.20)	.706 (17.93)	.731 (18.57)	.44 (11.11)	.501 (12.73)
WG-2614	.750 (19.05)	3.50 (88.90)	.706 (17.93)	.731 (18.57)	.44 (11.11)	.501 (12.73)
WG-2616	.750 (19.05)	4.00 (101.60)	.706 (17.93)	.731 (18.57)	.44 (11.11)	.501 (12.73)
WG-2708	.875 (22.23)	2.00 (50.80)	.819 (20.80)	.844 (21.44)	.50 (12.70)	.613 (15.57)
WG-2710	.875 (22.23)	2.50 (63.50)	.819 (20.80)	.844 (21.44)	.50 (12.70)	.613 (15.57)
WG-2712	.875 (22.23)	3.00 (76.20)	.819 (20.80)	.844 (21.44)	.50 (12.70)	.613 (15.57)
WG-2714	.875 (22.23)	3.50 (88.90)	.819 (20.80)	.844 (21.44)	.50 (12.70)	.613 (15.57)
WG-2716	.875 (22.23)	4.00 (101.60)	.819 (20.80)	.844 (21.44)	.50 (12.70)	.613 (15.57)

• ADDITIONAL LENGTHS ARE AVAILABLE UPON REQUEST.



# STANDARD ADAPTERS

Offset Male Adapter Shanks For Female Caps



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

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

ITEM NO.	DIMENSIONS							
CLASS 2	A Major Diameter	B Shank Overall Length	C Minor Taper Diameter	D Gauging Taper Diameter	E Water Hole Diameter	F Cap End Taper Diameter	G Offset	H Water Tube Diameter
CLF-2410-04T	.482 (12.24)	2.50 (63.50)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.402 (10.21)	.25 (6.35)	.19 (4.76)
CLF-2411-04T	.482 (12.24)	2.75 (69.85)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.402 (10.21)	.25 (6.35)	.19 (4.76)
CLF-2412-04T	.482 (12.24)	3.00 (76.20)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.402 (10.21)	.25 (6.35)	.19 (4.76)
CLF-2413-04T	.482 (12.24)	3.25 (82.55)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.402 (10.21)	.25 (6.35)	.19 (4.76)
CLF-2410-08T	.482 (12.24)	2.50 (63.50)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.402 (10.21)	.50 (12.70)	.19 (4.76)
CLF-2411-08T	.482 (12.24)	2.75 (69.85)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.402 (10.21)	.50 (12.70)	.19 (4.76)
CLF-2412-08T	.482 (12.24)	3.00 (76.20)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.402 (10.21)	.50 (12.70)	.19 (4.76)
CLF-2413-08T	.482 (12.24)	3.25 (82.55)	.588 (14.94)	.463 (11.76)	.28 (7.14)	.402 (10.21)	.50 (12.70)	.19 (4.76)
CLF-2510-04T	.625 (15.88)	2.50 (63.50)	.588 (14.94)	.613 (15.57)	.34 (8.73)	.502 (12.75)	.25 (6.35)	.25 (6.35)
CLF-2511-04T	.625 (15.88)	2.75 (69.85)	.588 (14.94)	.613 (15.57)	.34 (8.73)	.502 (12.75)	.25 (6.35)	.25 (6.35)
CLF-2512-04T	.625 (15.88)	3.00 (76.20)	.588 (14.94)	.613 (15.57)	.34 (8.73)	.502 (12.75)	.25 (6.35)	.25 (6.35)
CLF-2513-04T	.625 (15.88)	3.25 (82.55)	.588 (14.94)	.613 (15.57)	.34 (8.73)	.502 (12.75)	.25 (6.35)	.25 (6.35)
CLF-2510-08T	.625 (15.88)	2.50 (63.50)	.588 (14.94)	.613 (15.57)	.34 (8.73)	.502 (12.75)	.50 (12.70)	.25 (6.35)
CLF-2511-08T	.625 (15.88)	2.75 (69.85)	.588 (14.94)	.613 (15.57)	.34 (8.73)	.502 (12.75)	.50 (12.70)	.25 (6.35)
CLF-2512-08T	.625 (15.88)	3.00 (76.20)	.588 (14.94)	.613 (15.57)	.34 (8.73)	.502 (12.75)	.50 (12.70)	.25 (6.35)
CLF-2513-08T	.625 (15.88)	3.25 (82.55)	.588 (14.94)	.613 (15.57)	.34 (8.73)	.502 (12.75)	.50 (12.70)	.25 (6.35)

**FOR ALL OTHER ITEMS:**

- Check Key To Item Numbers For Availability
- Use Example For Ordering Available Items

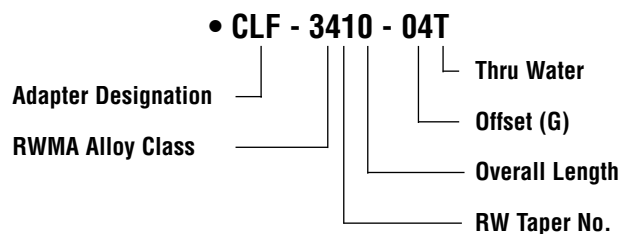
**• ADDITIONAL LENGTHS ARE AVAILABLE UPON REQUEST.**

**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 1/16 (1.59) Increments
- T -** Thru Water Hole  
Delete "T" If Blind Hole Is Required

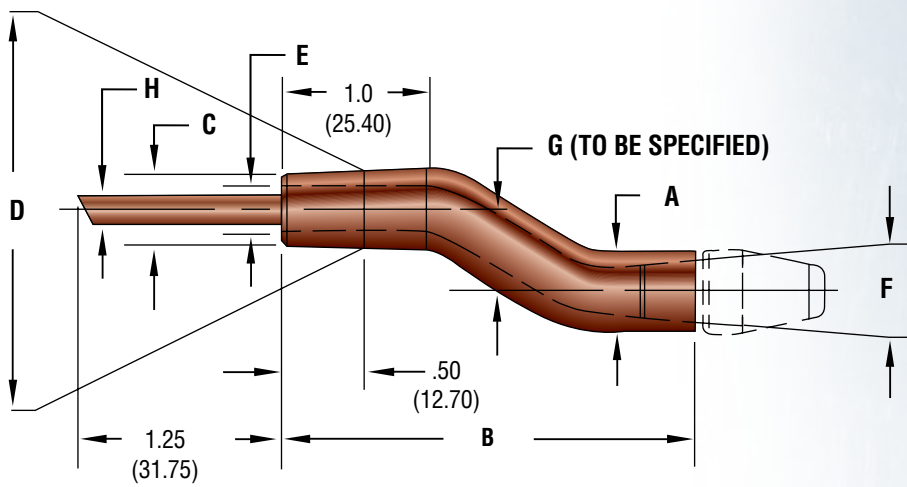
**EXAMPLE:**

**MALE ADAPTER, CLASS 3,  
RW 4 TAPER, 2.50 (63.50) O.A.L., .25 (6.35) OFFSET, THRU WATER HOLE**



# STANDARD ADAPTERS

Offset Female Adapter Shanks for Male Caps



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

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

ITEM NO.	DIMENSIONS							
CLASS 2	A Major Diameter	B Shank Overall Length	C Minor Taper Diameter	D Gauging Taper Diameter	E Water Hole Diameter	F Cap End Taper Diameter	G Offset	H Water Tube Diameter
WG-2410-04	.482 (12.24)	2.50 (63.50)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.375 (9.53)	.25 (6.35)	.19 (4.76)
WG-2411-04	.482 (12.24)	2.75 (69.85)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.375 (9.53)	.25 (6.35)	.19 (4.76)
WG-2412-04	.482 (12.24)	3.00 (76.20)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.375 (9.53)	.25 (6.35)	.19 (4.76)
WG-2413-04	.482 (12.24)	3.25 (82.55)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.375 (9.53)	.25 (6.35)	.19 (4.76)
WG-2410-08	.482 (12.24)	2.50 (63.50)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.375 (9.53)	.50 (12.70)	.19 (4.76)
WG-2411-08	.482 (12.24)	2.75 (69.85)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.375 (9.53)	.50 (12.70)	.19 (4.76)
WG-2412-08	.482 (12.24)	3.00 (76.20)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.375 (9.53)	.50 (12.70)	.19 (4.76)
WG-2413-08	.482 (12.24)	3.25 (82.55)	.438 (11.13)	.463 (11.76)	.28 (7.14)	.375 (9.53)	.50 (12.70)	.19 (4.76)
WG-2510-04	.625 (15.88)	2.50 (63.50)	.588 (14.94)	.613 (15.57)	.38 (9.65)	.415 (10.54)	.25 (6.35)	.25 (6.35)
WG-2511-04	.625 (15.88)	2.75 (69.85)	.588 (14.94)	.613 (15.57)	.38 (9.65)	.415 (10.54)	.25 (6.35)	.25 (6.35)
WG-2512-04	.625 (15.88)	3.00 (76.20)	.588 (14.94)	.613 (15.57)	.38 (9.65)	.415 (10.54)	.25 (6.35)	.25 (6.35)
WG-2513-04	.625 (15.88)	3.25 (82.55)	.588 (14.94)	.613 (15.57)	.38 (9.65)	.415 (10.54)	.25 (6.35)	.25 (6.35)
WG-2510-08	.625 (15.88)	2.50 (63.50)	.588 (14.94)	.613 (15.57)	.38 (9.65)	.415 (10.54)	.50 (12.70)	.25 (6.35)
WG-2511-08	.625 (15.88)	2.75 (69.85)	.588 (14.94)	.613 (15.57)	.38 (9.65)	.415 (10.54)	.50 (12.70)	.25 (6.35)
WG-2512-08	.625 (15.88)	3.00 (76.20)	.588 (14.94)	.613 (15.57)	.38 (9.65)	.415 (10.54)	.50 (12.70)	.25 (6.35)
WG-2513-08	.625 (15.88)	3.25 (82.55)	.588 (14.94)	.613 (15.57)	.38 (9.65)	.415 (10.54)	.50 (12.70)	.25 (6.35)

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

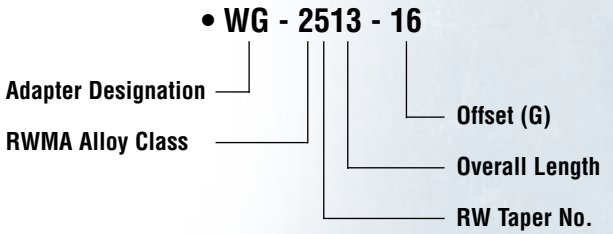
• **ADDITIONAL LENGTHS ARE AVAILABLE UPON REQUEST.**

**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 1/16 (1.59) Increments

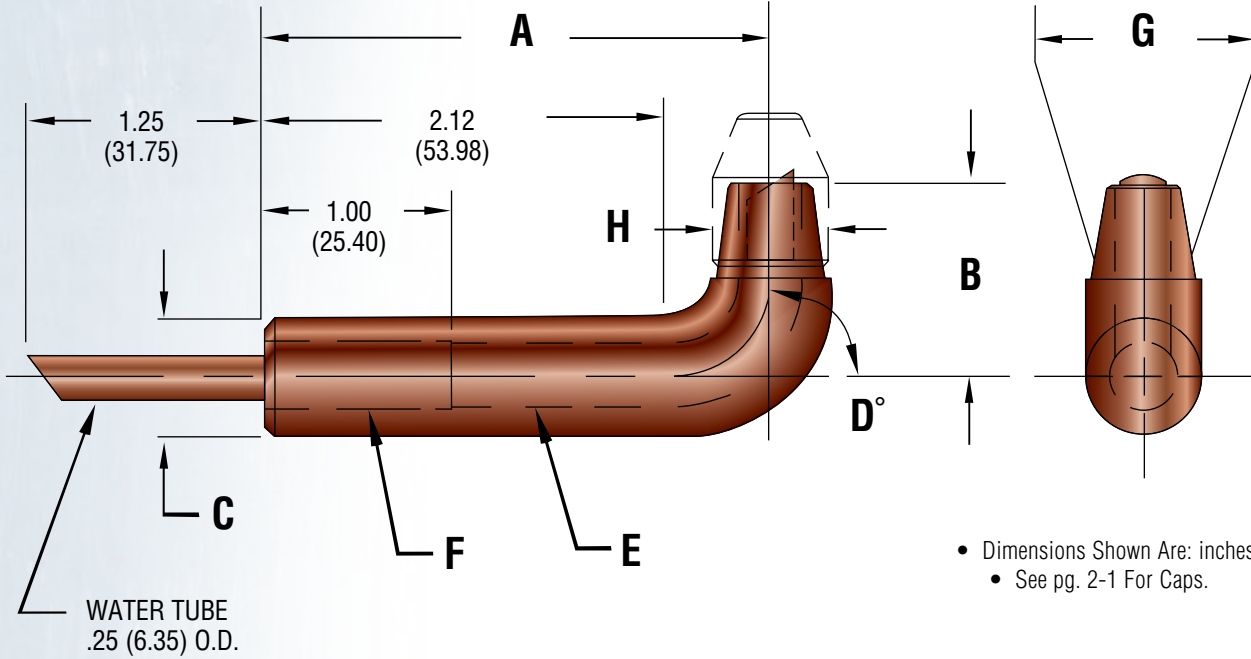
**EXAMPLE:**

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



# STANDARD ADAPTERS

Single Bend Male Adapter Shanks For Female Caps



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

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

### DIMENSION CHARTS

C – DIAMETER DIAMETER CODE	.625 (15.88)	.750 (19.05)	.88 (22.35)
	5	6	7
A – OVERALL LENGTH	AS CODED		
B – OFFSET	AS CODED		
D – ANGLE	AS CODED		

H – CAP SIZE	.500 (12.70)	.625 (15.88)	.750 (19.05)
E – HOLE DIAMETER	.28 (7.11)	.31 (7.87)	.34 (8.64)
F – HOLE DIAMETER	.38 (9.65)	.38 (9.65)	.38 (9.65)
G – TAPER DIAMETER	.402 (10.21)	.502 (12.75)	.633 (16.08)

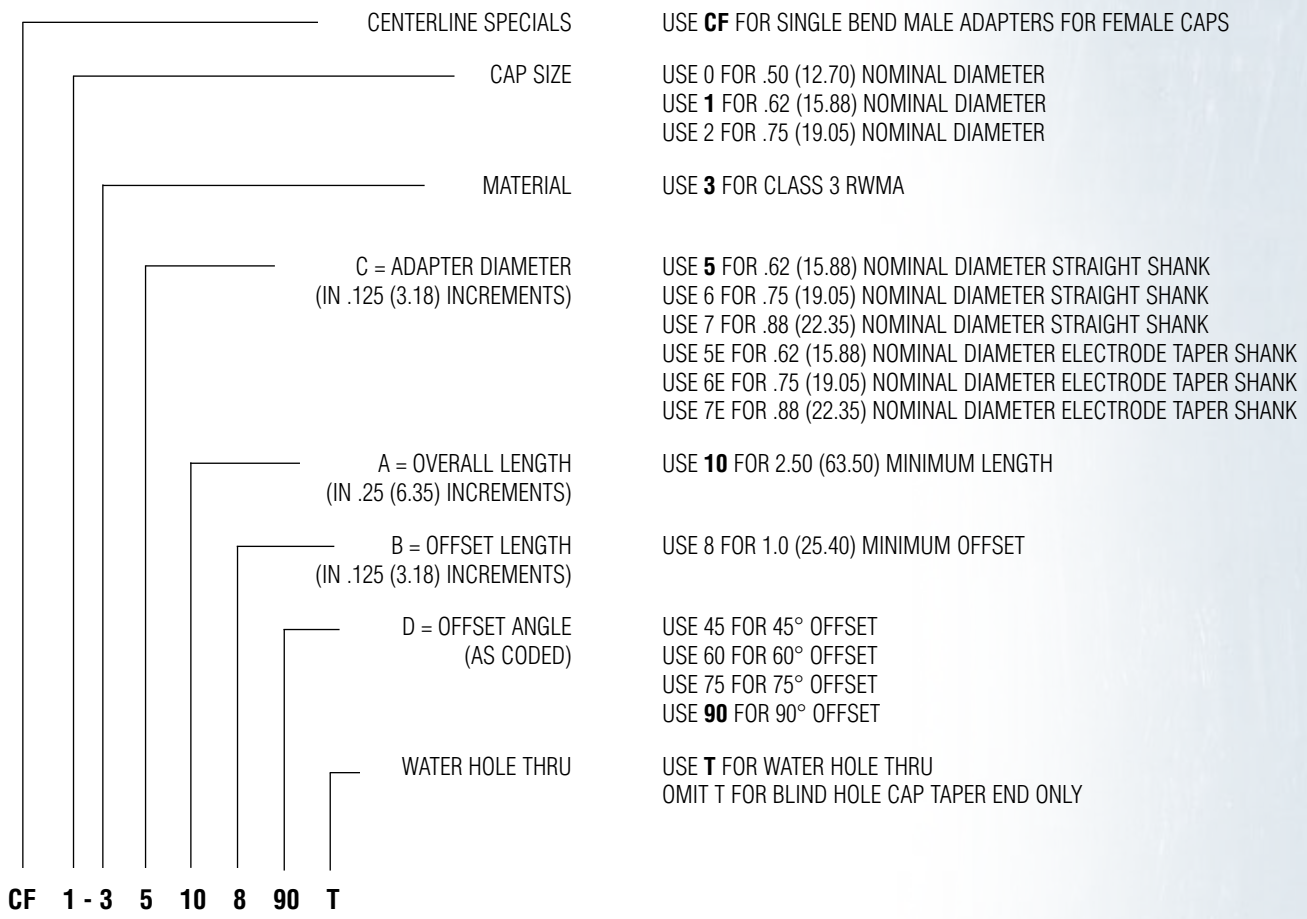
• TO ORDER YOUR SPECIALS USE CODING CHART - SEE PG. 3-8



# STANDARD ADAPTERS

Single Bend Male Adapter Shanks For Female Caps

### EXAMPLE EXPLANATION CODING



### 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

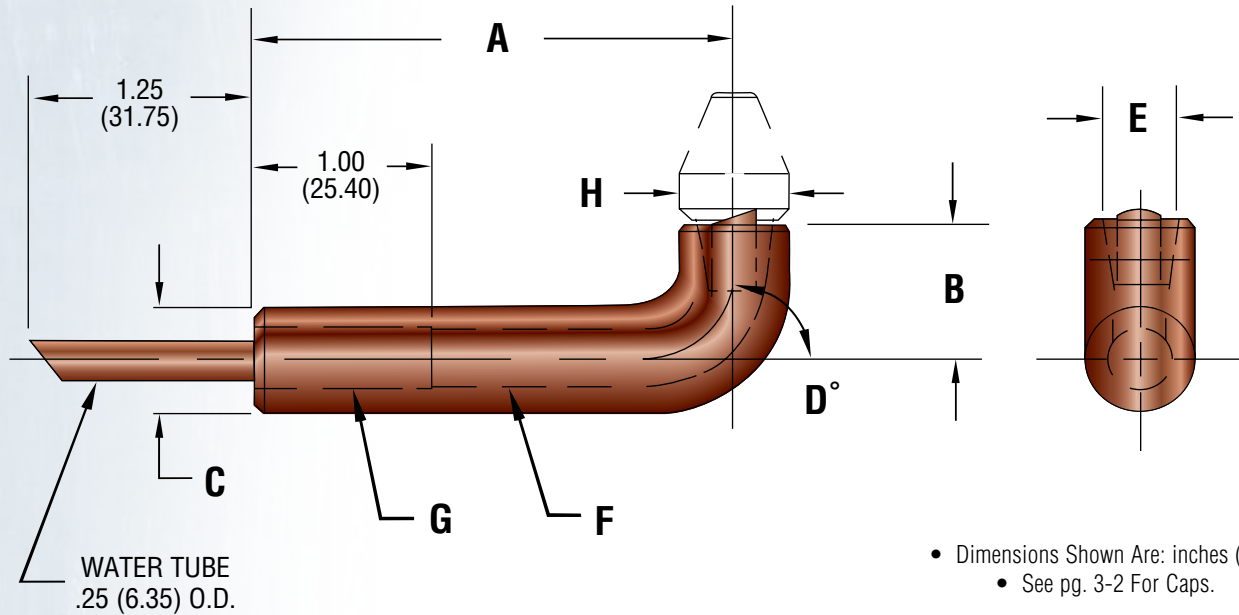
**EXAMPLE:**

**• CF1-3510890T**

• Dimensions Shown Are: inches (mm)

# STANDARD ADAPTERS

Single Bend Female Adapter Shanks For Male Caps



**FIGURE 3-7 (Material RWMA Class 3)**

### DIMENSION CHARTS

C – DIAMETER DIAMETER CODE	.625 (15.88)	.750 (19.05)	.875 (22.23)	1.00 (25.40)
	5	6	7	8
A – OVERALL LENGTH	AS CODED			
B – OFFSET	AS CODED			
D – DIAMETER	AS CODED			

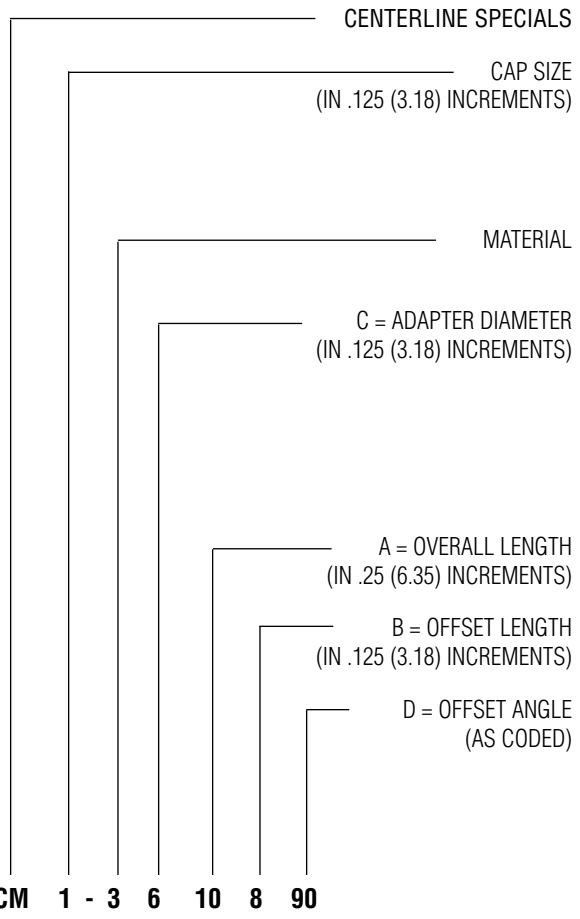
H – CAP SIZE	.500 (12.70)	.625 (15.88)	.750 (19.05)	.875 (22.23)
E – TAPER DIAMETER	.374 (9.50)	.414 (10.52)	.500 (12.70)	.613 (15.57)
F – HOLE DIAMETER	.28 (7.11)	.34 (8.64)	.44 (11.18)	.50 (12.70)
G – HOLE DIAMETER	.38 (9.65)	.38 (9.65)	.44 (11.18)	.50 (12.70)

• TO ORDER YOUR SPECIALS USE CODING CHART - SEE PG. 3-10

# STANDARD ADAPTERS

Single Bend Female Adapter Shanks For Male Caps

### EXAMPLE EXPLANATION CODING



- USE **CM** FOR SINGLE BEND FEMALE ADAPTER FOR MALE CAPS
- 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
- USE **3** FOR CLASS 3 RWMA
- 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
- USE **10** FOR 2.50 (63.50) MINIMUM LENGTH
- USE **8** FOR 1.0 (25.40) MINIMUM OFFSET
- 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)

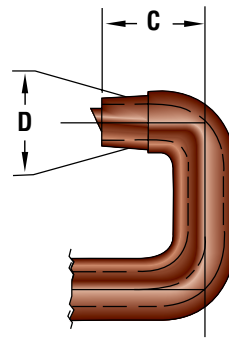
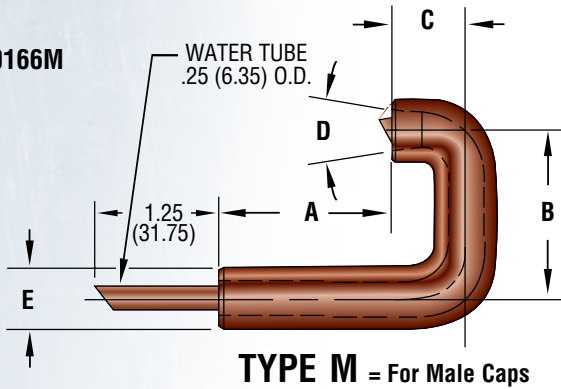


# STANDARD ADAPTERS

## J Shape Cap Adapters

**EXAMPLE:**

- CL JA5-35-10166M



**Minimum "C" Dim.**

- Type M = .75 (19.05)
- Type F = 1.00 (25.40)

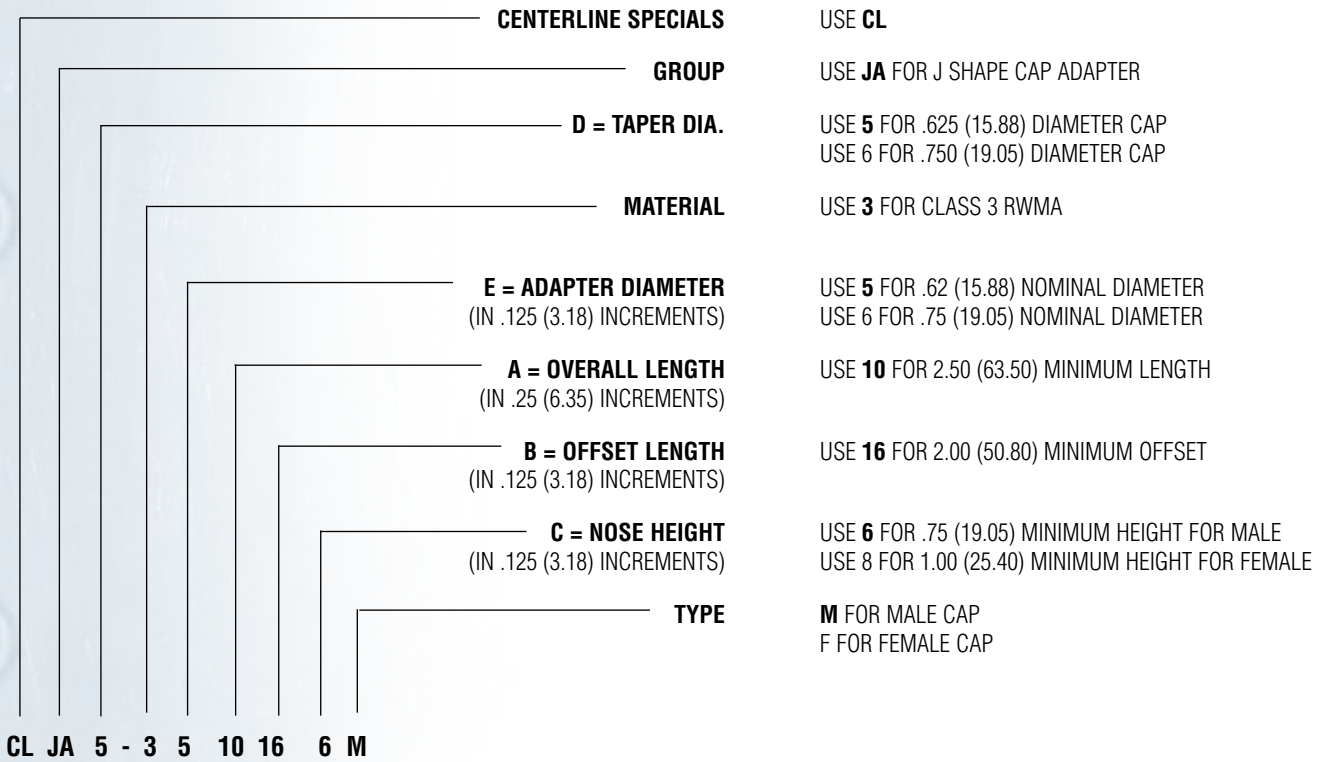
**TYPE M = For Male Caps**

**TYPE F = For Female Caps**

**FIGURE 3-8 (Material RWMA Class 3)**

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

**EXAMPLE EXPLANATION CODING**

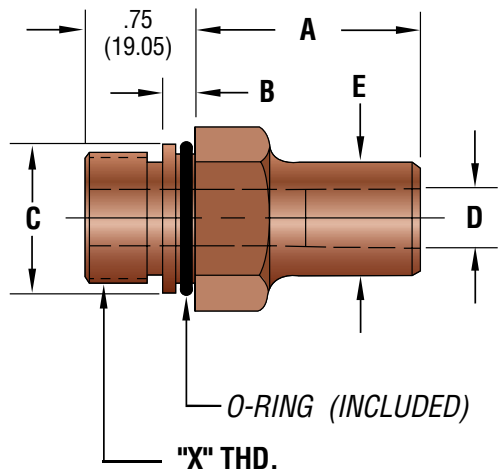


**SAMPLE  
TYPICAL J SHAPE CAP ADAPTER CODING**

- 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

# STANDARD ADAPTERS

CenterLine Hex Adapters  
Straight Thread



TAPER NO.	D	Minimum A		
		7/8-14	1-12	1-1/4-12
#4RW	0.463 (11.76)	0.25	0.25	0.25
#5RW	0.625 (15.88)	0.25	0.25	0.25
#6RW	0.750 (19.05)	1.13	0.25	0.25
#7RW	0.875 (22.35)	1.38	1.25	0.25

**FIGURE 3-9**

• Dimensions Shown Are: inches (mm).

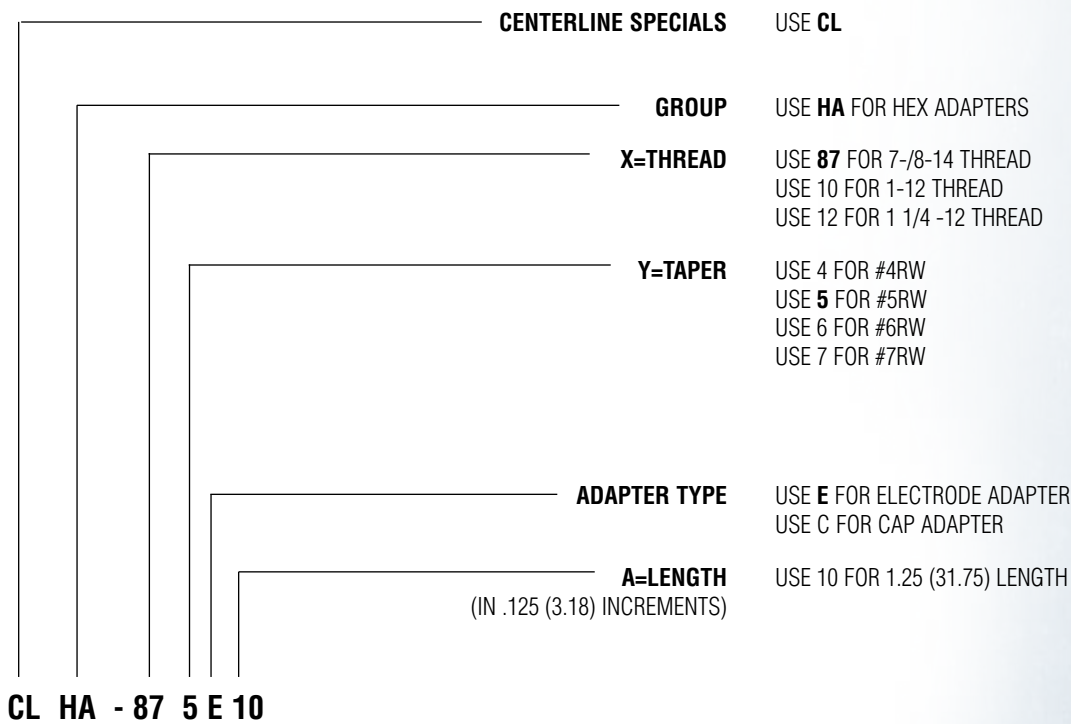
THREAD	"X"	B	C	HEX	O-RING	E
7/8-14	87	0.25 (6.35)	1 (25.40)	1-1/4	SLORD-117	1.22
1-12	10	0.25 (6.35)	1.13 (28.58)	1-1/4	SLORD-119	1.22
1-1/4-12	12	0.25 (6.35)	1.38 (34.93)	1-1/2	SLORD-123	1.47

**EXAMPLE:**

• **CLHA - 875E10**

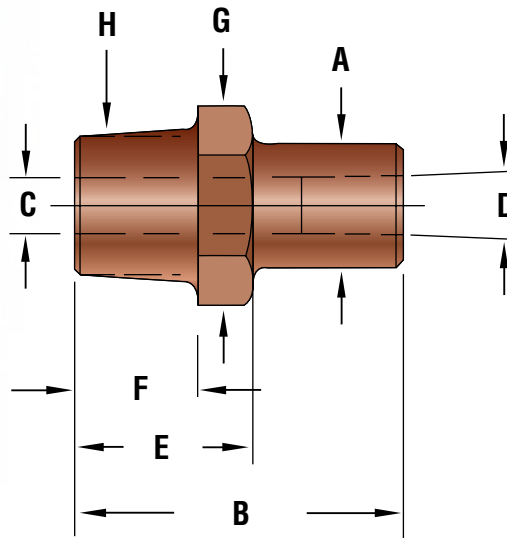
**HEX ADAPTER, 7/8-14 THD., #5 RW TAPER, ELECTRODE ADAPTER, LENGTH = 1.25 (31.75).**

**EXAMPLE EXPLANATION CODING**



# STANDARD ADAPTERS

Cap and Electrode Hex Adapters  
Pipe Thread



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

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

### ELECTRODE ADAPTER CHART

ELECTRODE CODE	4	5	4	5	5	6	7
A- DIAMETER	0.88 (22.35)	0.94 (23.88)	0.88 (22.35)	0.94 (23.88)	0.94 (23.88)	1.09 (27.69)	1.24 (31.50)
B- LENGTH	AS CODED						
LENGTH (Minimum)	0.88 (22.35)	0.88 (22.35)	1.00 (25.40)	1.00 (25.40)	1.12 (28.45)	1.12 (28.45)	1.38 (35.05)
C- HOLE DIAMETER	0.42 (10.67)	0.44 (11.18)	0.42 (10.67)	0.44 (11.18)	0.44 (11.18)	0.50 (12.70)	0.56 (14.22)
D- TAPER DIAMETER	0.463 (11.76)	0.625 (15.88)	0.463 (15.88)	0.625 (15.88)	0.625 (15.88)	0.750 (19.05)	0.875 (22.22)
E- HEX LENGTH	0.88 (22.35)	0.88 (22.35)	1.00 (25.40)	1.00 (25.40)	1.38 (35.05)	1.38 (35.05)	1.38 (35.05)
F- THREAD LENGTH	0.62 (15.75)	0.62 (15.75)	0.75 (19.05)	0.75 (19.05)	0.88 (22.35)	0.88 (22.35)	0.88 (22.35)
G- HEX	1.00 (25.40)	1.00 (25.40)	1.00 (25.40)	1.00 (25.40)	1.25 (31.75)	1.25 (31.75)	1.25 (31.75)
H- THREAD (N.P.T.)	1/2	1/2	5/8	5/8	3/4	3/4	3/4

### CAP ADAPTER CHART

ELECTRODE CODE	4	5	4	5	5	6	6-1	7
A- DIAMETER	0.50 (12.70)	0.62 (15.75)	0.50 (12.70)	0.62 (15.75)	0.62 (15.75)	0.75 (19.05)	0.75 (19.05)	0.88 (22.35)
B- LENGTH	AS CODED							
LENGTH (Minimum)	0.88 (22.35)	0.88 (22.35)	1.00 (25.40)	1.00 (25.40)	1.12 (28.45)	1.12 (28.45)	1.12 (28.45)	1.12 (28.45)
C- HOLE DIAMETER	0.28 (7.11)	0.38 (9.65)	0.28 (7.11)	0.38 (9.65)	0.38 (9.65)	0.44 (11.18)	0.44 (11.18)	0.56 (14.22)
D- TAPER DIAMETER	0.313 (7.95)	0.414 (10.52)	0.313 (7.95)	0.414 (10.52)	0.414 (10.52)	0.500 (12.70)	0.562 (14.27)	0.700 (17.78)
E- HEX LENGTH	0.88 (22.35)	0.88 (22.35)	1.00 (25.40)	1.00 (25.40)	1.38 (35.05)	1.38 (35.05)	1.38 (35.05)	1.38 (35.05)
F- THREAD LENGTH	0.62 (15.75)	0.62 (15.75)	0.75 (19.05)	0.75 (19.05)	0.88 (22.35)	0.88 (22.35)	0.88 (22.35)	0.88 (22.35)
G- HEX	1.00 (25.40)	1.00 (25.40)	1.00 (25.40)	1.00 (25.40)	1.25 (31.75)	1.25 (31.75)	1.25 (31.75)	1.25 (31.75)
H- THREAD (N.P.T.)	1/2	1/2	5/8	5/8	3/4	3/4	3/4	3/4

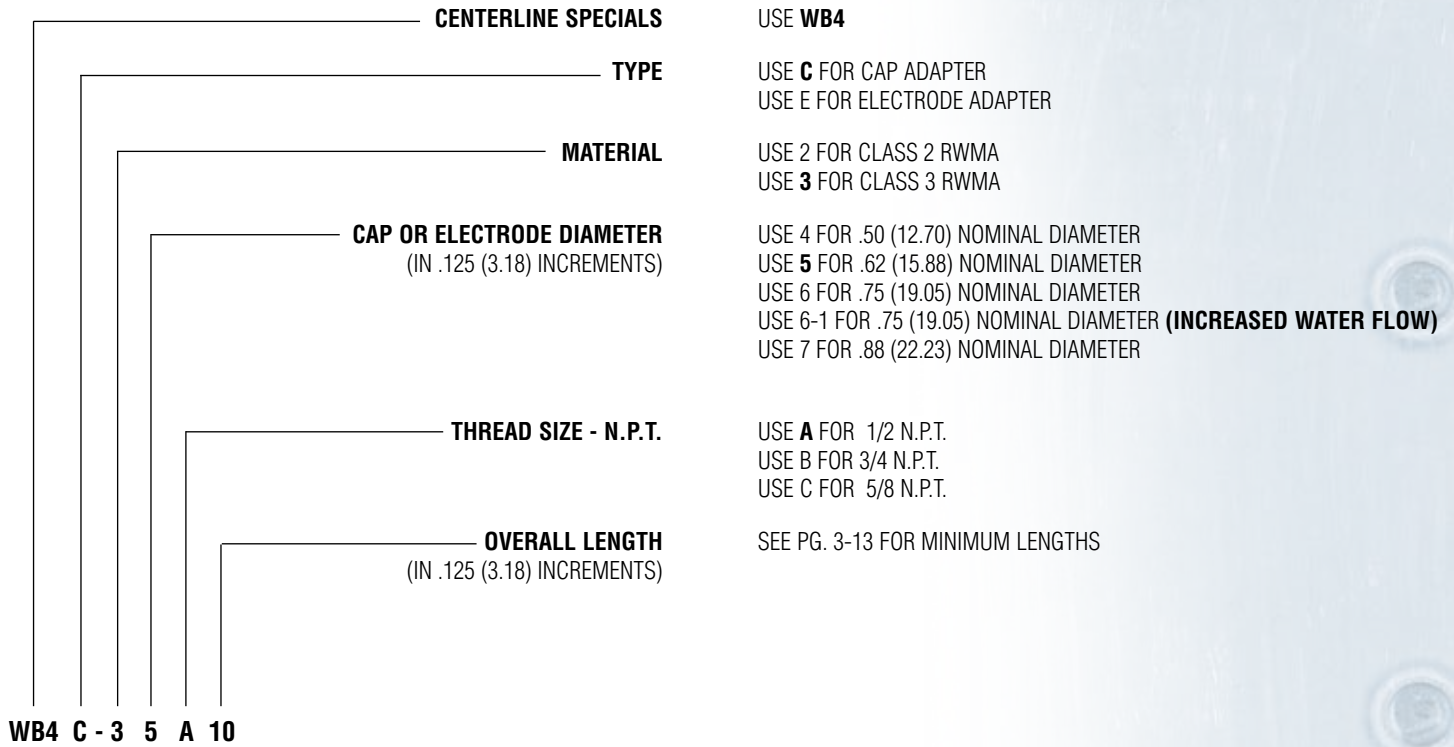
**• TO ORDER YOUR SPECIALS USE CODING CHART - SEE PG. 3-14**



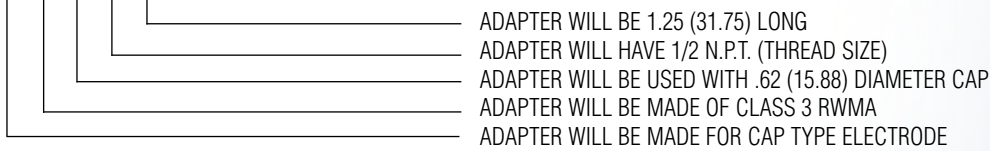
# STANDARD ADAPTERS

Cap and Electrode Hex Adapters  
Pipe Thread

### EXAMPLE EXPLANATION CODING



### SAMPLE TYPICAL THREADED ADAPTER CODING

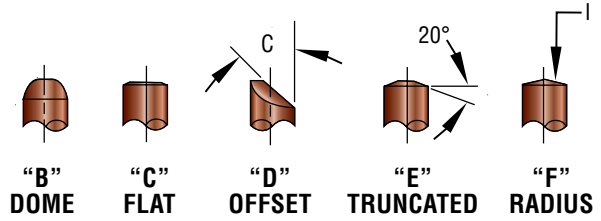
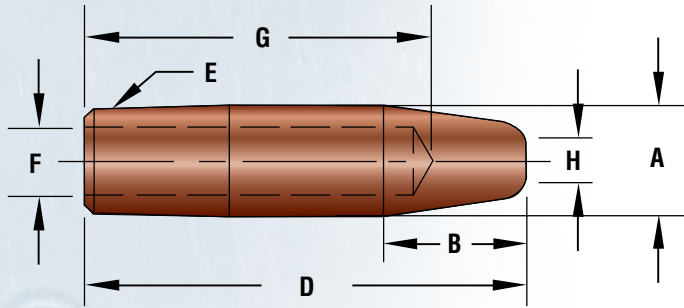


**EXAMPLE:**

- **WB4C-35A10**

• Dimensions Shown Are: inches (mm)

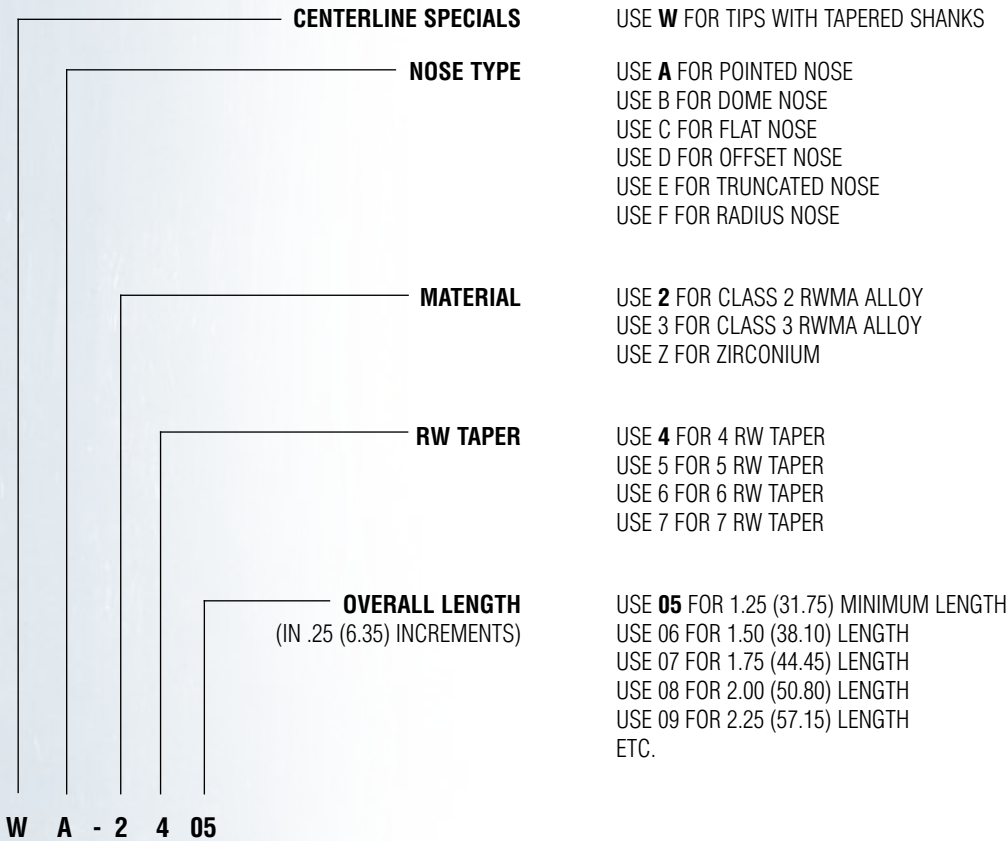
## Tips With Tapered Shanks Nose Types A, B, C, D, E & F



• Dimensions Shown Are: inches (mm).

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

### EXAMPLE EXPLANATION CODING



### SAMPLE TYPICAL TIP WITH TAPERED SHANK CODING

TIP OVERALL LENGTH WILL BE 1.25 (31.75)  
TIP WILL HAVE #4 RWMA TAPER  
TIP WILL BE MADE OF CLASS 2 RWMA  
TIP WILL HAVE TYPE A NOSE

**EXAMPLE:**

• **WA-2405**

• Dimensions Shown Are: inches (mm).

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

### KEY TO ITEM NUMBERS

- W** - Standard Prefix
- \*** - Nose Designation (see pg. 4-1 for nose types)
- 2, 3 or Z** - RWMA Alloy Class
- 4 thru 7** - RW Taper
- 05 thru 16** - Overall Length – in .25 (6.35) Increments

• Dimensions Shown Are: inches (mm).

ITEM NO. CLASS 2	DIMENSIONS								
	A Major Diameter	B Nose Length	C Angle Offset	D Overall Length	E RW Taper	F Water Hole Diameter	G Water Hole Depth	H Weld Face Diameter	I Nose Sphere Radius
W*-2405	.482 (12.24)	.38 (9.53)	30°	1.25 (31.75)	4	.28 (7.14)	.75 (19.05)	.19 (4.76)	2
W*-2406	.482 (12.24)	.63 (15.88)	30°	1.50 (38.10)	4	.28 (7.14)	1.00 (25.40)	.19 (4.76)	2
W*-2407	.482 (12.24)	.75 (19.05)	30°	1.75 (44.45)	4	.28 (7.14)	1.25 (31.75)	.19 (4.76)	2
W*-2408	.482 (12.24)	.75 (19.05)	30°	2.00 (50.80)	4	.28 (7.14)	1.50 (38.10)	.19 (4.76)	2
W*-2409	.482 (12.24)	.75 (19.05)	30°	2.25 (57.15)	4	.28 (7.14)	1.75 (44.45)	.19 (4.76)	2
W*-2410	.482 (12.24)	.75 (19.05)	30°	2.50 (63.50)	4	.28 (7.14)	2.00 (50.80)	.19 (4.76)	2
W*-2411	.482 (12.24)	.75 (19.05)	30°	2.75 (69.85)	4	.28 (7.14)	2.25 (57.15)	.19 (4.76)	2
W*-2412	.482 (12.24)	.75 (19.05)	30°	3.00 (76.20)	4	.28 (7.14)	2.50 (63.50)	.19 (4.76)	2
W*-2413	.482 (12.24)	.75 (19.05)	30°	3.25 (82.55)	4	.28 (7.14)	2.75 (69.85)	.19 (4.76)	2
W*-2414	.482 (12.24)	.75 (19.05)	30°	3.50 (88.90)	4	.28 (7.14)	3.00 (76.20)	.19 (4.76)	2
W*-2415	.482 (12.24)	.75 (19.05)	30°	3.75 (92.25)	4	.28 (7.14)	3.25 (82.55)	.19 (4.76)	2
W*-2416	.482 (12.24)	.75 (19.05)	30°	4.00 (101.60)	4	.28 (7.14)	3.50 (88.90)	.19 (4.76)	2
W*-2505	.625 (15.88)	.75 (19.05)	40°	1.25 (31.75)	5	.38 (9.53)	.50 (12.70)	.25 (6.35)	2
W*-2506	.625 (15.88)	.75 (19.05)	40°	1.50 (38.10)	5	.38 (9.53)	.75 (19.05)	.25 (6.35)	2
W*-2507	.625 (15.88)	.75 (19.05)	30°	1.75 (44.45)	5	.38 (9.53)	1.00 (25.40)	.25 (6.35)	2
W*-2508	.625 (15.88)	1.13 (28.58)	30°	2.00 (50.80)	5	.38 (9.53)	1.25 (31.75)	.25 (6.35)	2
W*-2509	.625 (15.88)	1.13 (28.58)	30°	2.25 (57.15)	5	.38 (9.53)	1.50 (38.10)	.25 (6.35)	2
W*-2510	.625 (15.88)	1.13 (28.58)	30°	2.50 (63.50)	5	.38 (9.53)	1.75 (44.45)	.25 (6.35)	2
W*-2511	.625 (15.88)	1.13 (28.58)	30°	2.75 (69.85)	5	.38 (9.53)	2.00 (50.80)	.25 (6.35)	2
W*-2512	.625 (15.88)	1.13 (28.58)	30°	3.00 (76.20)	5	.38 (9.53)	2.25 (57.15)	.25 (6.35)	2
W*-2513	.625 (15.88)	1.13 (28.58)	30°	3.25 (82.55)	5	.38 (9.53)	2.50 (63.50)	.25 (6.35)	2
W*-2514	.625 (15.88)	1.13 (28.58)	30°	3.50 (88.90)	5	.38 (9.53)	2.75 (69.85)	.25 (6.35)	2
W*-2515	.625 (15.88)	1.13 (28.58)	30°	3.75 (95.25)	5	.38 (9.53)	3.00 (76.20)	.25 (6.35)	2
W*-2516	.625 (15.88)	1.13 (28.58)	30°	4.00 (101.60)	5	.38 (9.53)	3.25 (82.55)	.25 (6.35)	2
W*-2608	.750 (19.05)	1.00 (25.40)	30°	2.00 (50.80)	6	.44 (11.11)	1.25 (31.75)	.28 (7.14)	4
W*-2610	.750 (19.05)	1.00 (25.40)	30°	2.50 (63.50)	6	.44 (11.11)	1.75 (44.45)	.28 (7.14)	4
W*-2612	.750 (19.05)	1.00 (25.40)	30°	3.00 (76.20)	6	.44 (11.11)	2.25 (57.15)	.28 (7.14)	4
W*-2614	.750 (19.05)	1.00 (25.40)	30°	3.50 (88.90)	6	.44 (11.11)	2.75 (69.85)	.28 (7.14)	4
W*-2616	.750 (19.05)	1.00 (25.40)	30°	4.00 (101.60)	6	.44 (11.11)	3.25 (82.55)	.28 (7.14)	4
W*-2708	.875 (22.23)	.75 (19.05)	40°	2.00 (50.80)	7	.50 (12.70)	1.25 (31.75)	.31 (7.94)	6
W*-2710	.875 (22.23)	1.13 (28.58)	30°	2.50 (63.50)	7	.50 (12.70)	1.75 (44.45)	.31 (7.94)	6
W*-2712	.875 (22.23)	1.13 (28.58)	30°	3.00 (76.20)	7	.50 (12.70)	2.25 (57.15)	.31 (7.94)	6
W*-2714	.875 (22.23)	1.13 (28.58)	30°	3.50 (88.90)	7	.50 (12.70)	2.75 (69.85)	.31 (7.94)	6
W*-2716	.875 (22.23)	1.13 (28.58)	30°	4.00 (101.60)	7	.50 (12.70)	3.25 (82.55)	.31 (7.94)	6

REPLACE \* WITH NOSE TYPE A, B, C, D, E OR F.



## Double Bend Offset Electrodes

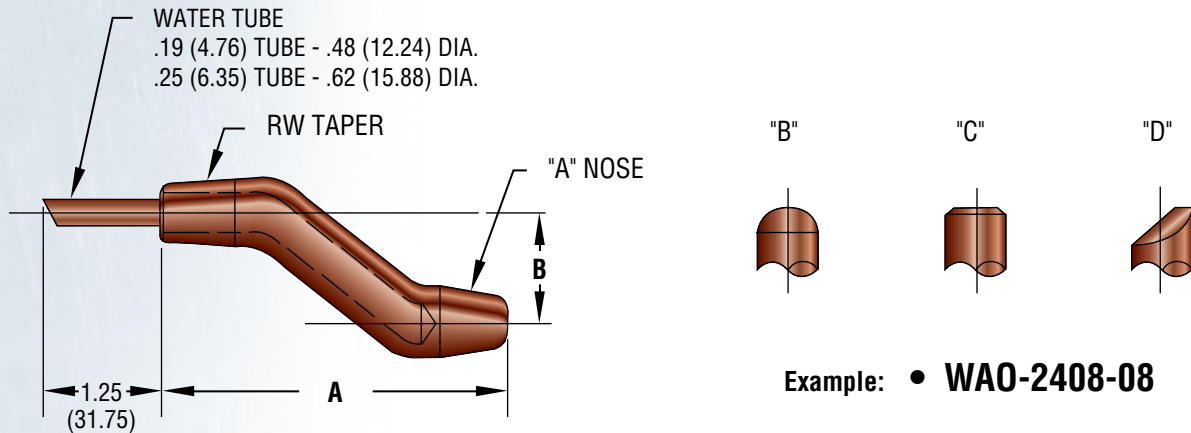
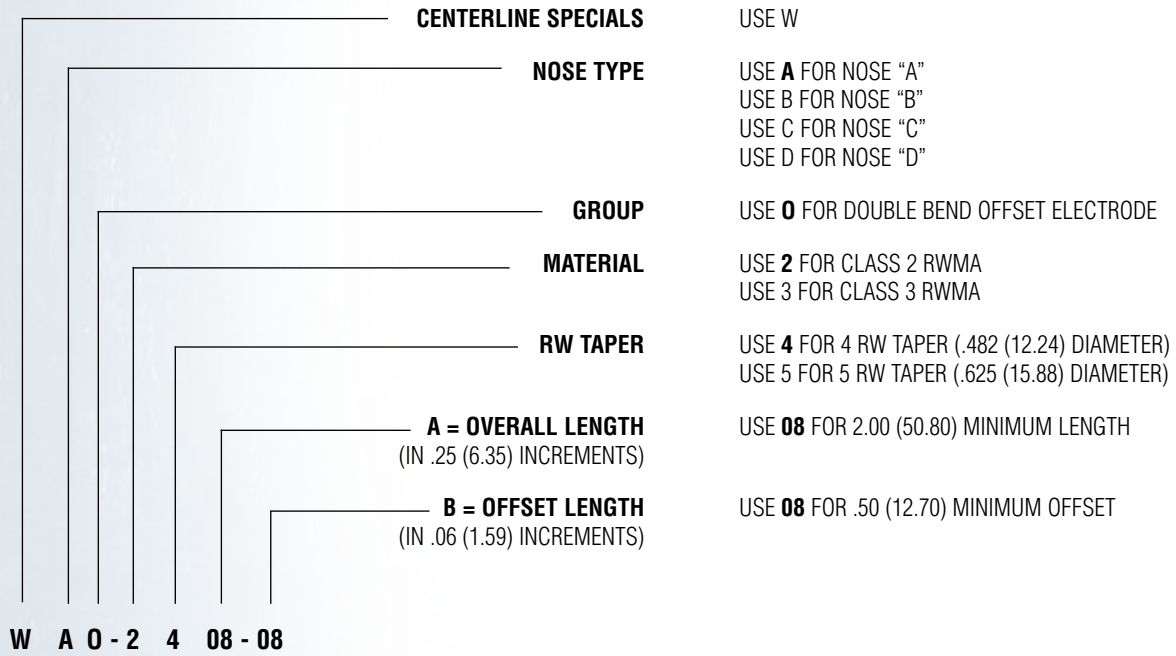
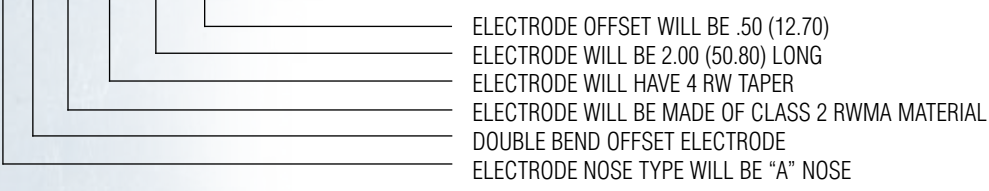


FIGURE 4-2 (Material RWMA Class 2 & 3)

### EXAMPLE EXPLANATION CODING

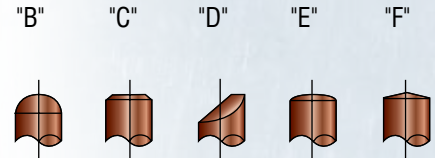
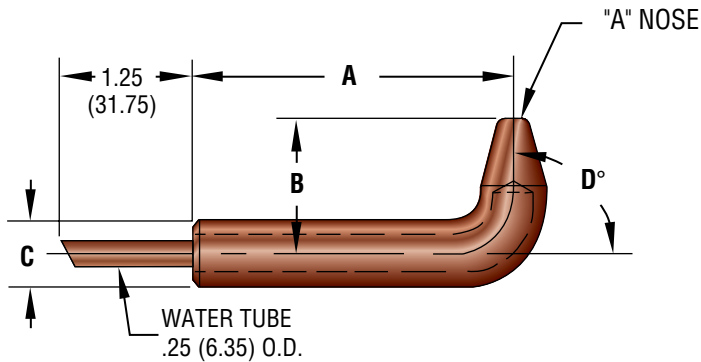


### SAMPLE TYPICAL DOUBLE BEND OFFSET CODING



• Dimensions Shown Are: inches (mm).

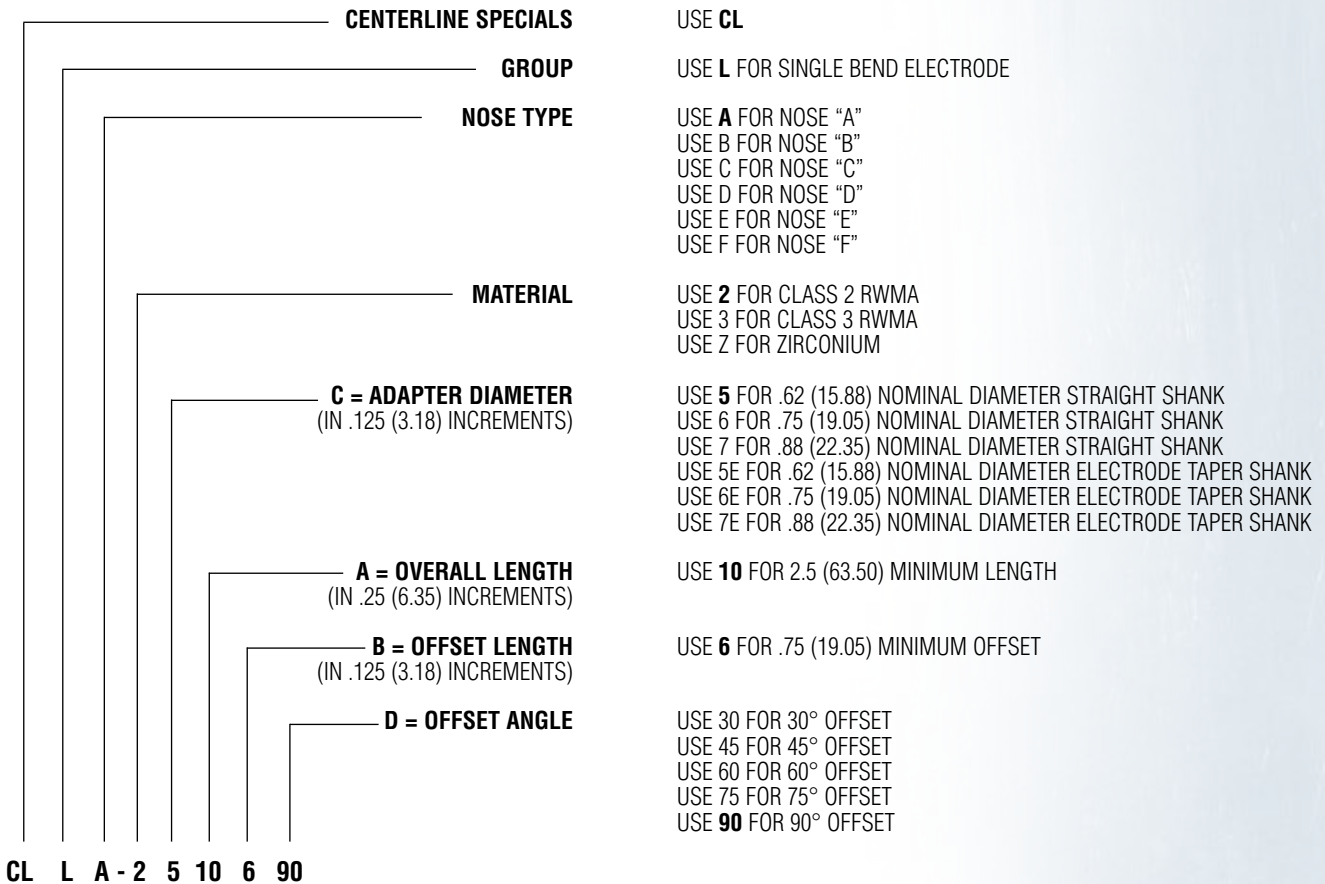
Single Bend Electrodes



Example: • **CLLA-2510690**

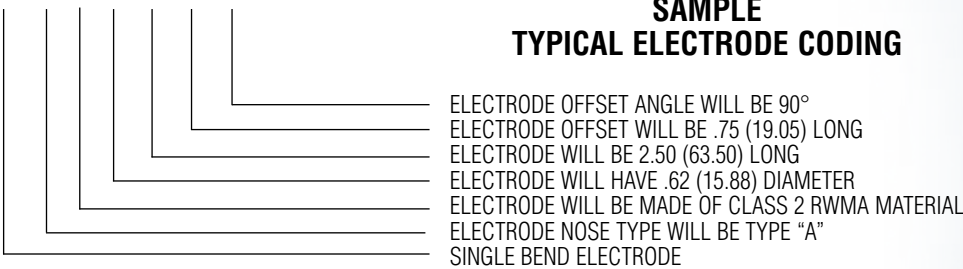
**FIGURE 4-3 (Material RWMA Class 2, 3 & Zirconium)**

**EXAMPLE EXPLANATION CODING**



**CL L A - 2 5 10 6 90**

**SAMPLE TYPICAL ELECTRODE CODING**

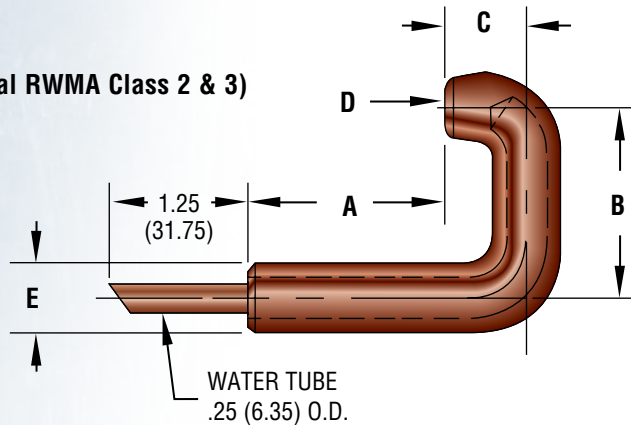


ELECTRODE OFFSET ANGLE WILL BE 90°  
ELECTRODE OFFSET WILL BE .75 (19.05) LONG  
ELECTRODE WILL BE 2.50 (63.50) LONG  
ELECTRODE WILL HAVE .62 (15.88) DIAMETER  
ELECTRODE WILL BE MADE OF CLASS 2 RWMA MATERIAL  
ELECTRODE NOSE TYPE WILL BE TYPE "A"  
SINGLE BEND ELECTRODE

• Dimensions Shown Are: inches (mm).

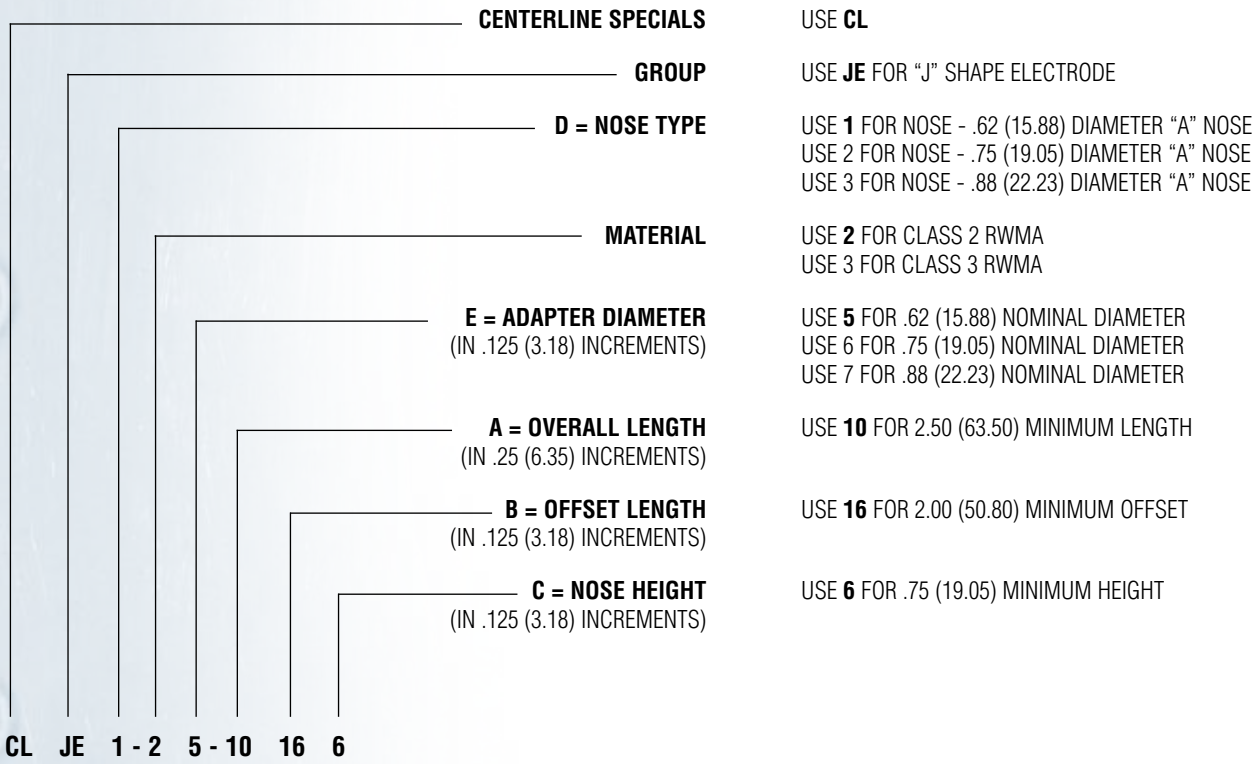
J Shape Electrodes

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



Example: • **CLJE1-25-10166**

**EXAMPLE EXPLANATION CODING**



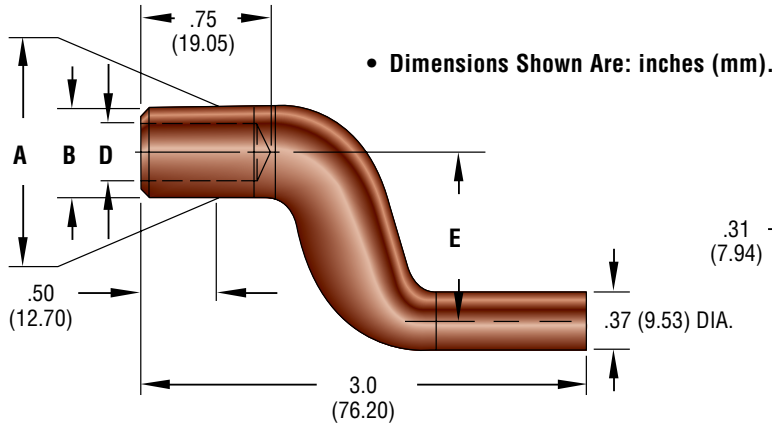
CL JE 1 - 2 5 - 10 16 6

**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  
 ELECTRODE NOSE TYPE WILL BE .62 (15.88) DIAMETER  
 J SHAPE ELECTRODE

• Dimensions Shown Are: inches (mm).

### Irregular-Offset Electrodes With Taper Shanks



• WEF-SERIES FIGURE 4-5 (Material RWMA Class 2)

ITEM NO.	DIMENSIONS				
CLASS 2	A Major Diameter	B Minor Taper Diameter	C RW Taper	D Water Hole Diameter	E Offset Diameter
WEF-2412	.463 (11.76)	.438 (11.13)	4	.281 (7.14)	1.125 (28.58)
WEF-2512	.613 (15.57)	.588 (14.94)	5	.375 (9.53)	1.125 (28.58)

### Spade Electrodes

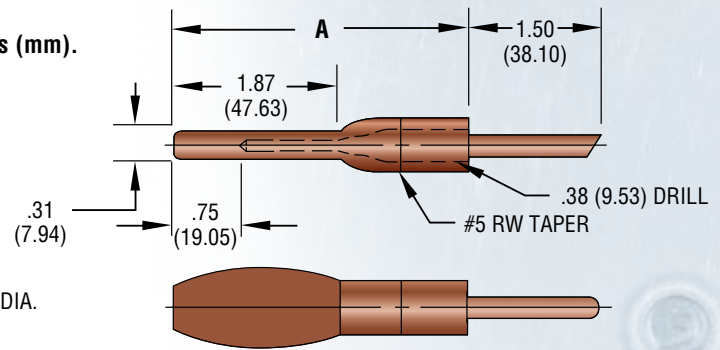


FIGURE 4-6 (Material RWMA Class 2)

ITEM NO.	"A" O.A.L.
WEM100-1	3.31 (84.14)
WEM100-2	3.56 (90.49)
WEM100-3	3.81 (96.84)
WEM100-4	4.06 (103.19)

• Dimensions Shown Are: inches (mm).

### 1.25 (31.75) Irregular-Offset Electrodes With Taper Shanks

• WFA-SERIES

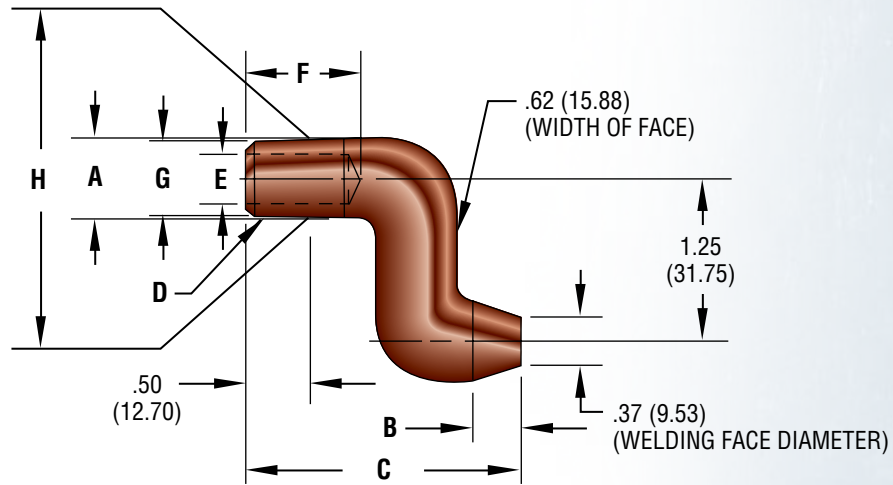


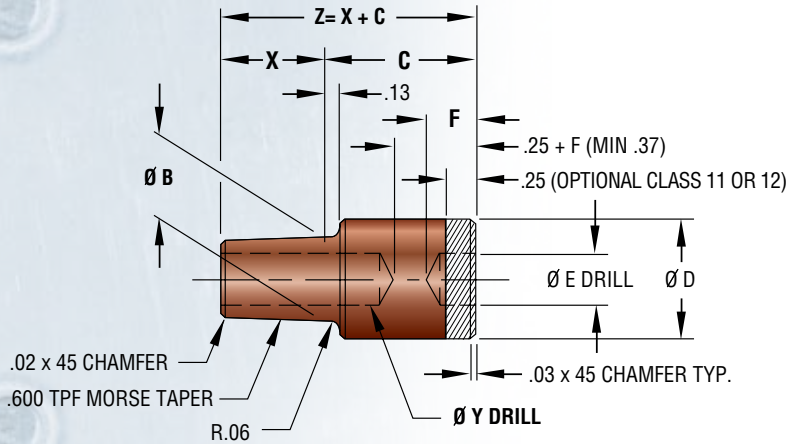
FIGURE 4-7 (Material RWMA Class 2)

• Dimensions Shown Are: inches (mm).

ITEM NO.	DIMENSIONS							
CLASS 2	A Major Diameter	B Nose Length	C Overall Length	D RW Taper	E Water Hole Diameter	F Water Hole Depth	G Minor Taper Diameter	H Taper Diameter
WFA-2408	.50 (12.70)	.38 (9.53)	2.00 (50.80)	4	.281 (7.14)	.88 (22.23)	.438 (11.13)	.463 (11.76)
WFA-2409	.50 (12.70)	.75 (19.05)	2.38 (60.33)	4	.281 (7.14)	.88 (22.23)	.438 (11.13)	.463 (11.76)
WFA-2508	.62 (15.88)	.38 (9.53)	2.12 (53.98)	5	.375 (9.53)	.75 (19.05)	.588 (14.94)	.613 (15.58)
WFA-2509	.62 (15.88)	.75 (19.05)	2.50 (63.50)	5	.375 (9.53)	.75 (19.05)	.588 (14.94)	.613 (15.58)



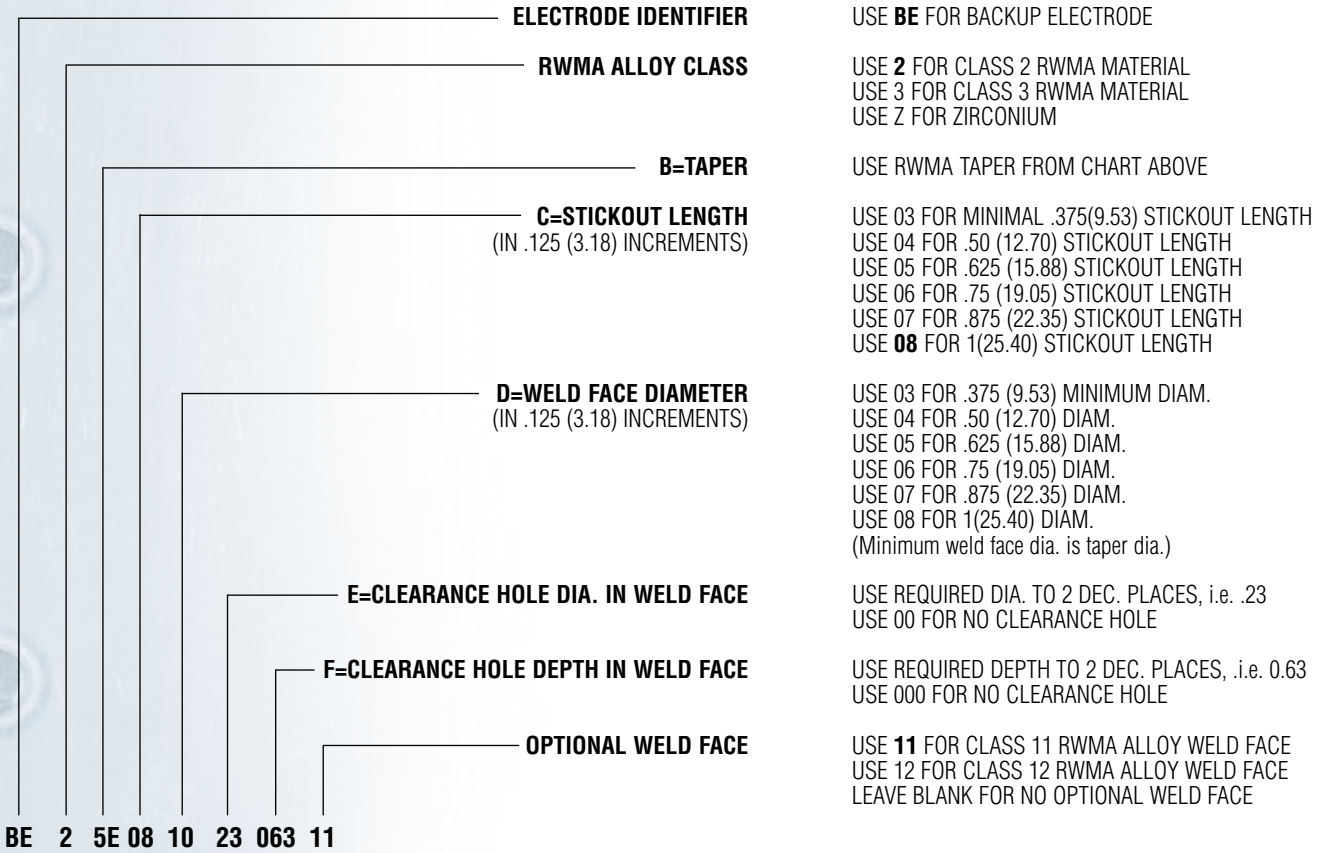
## Backup Electrodes



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

FIGURE 4-8 (Material RWMA Class 2&3)

### EXAMPLE EXPLANATION CODING

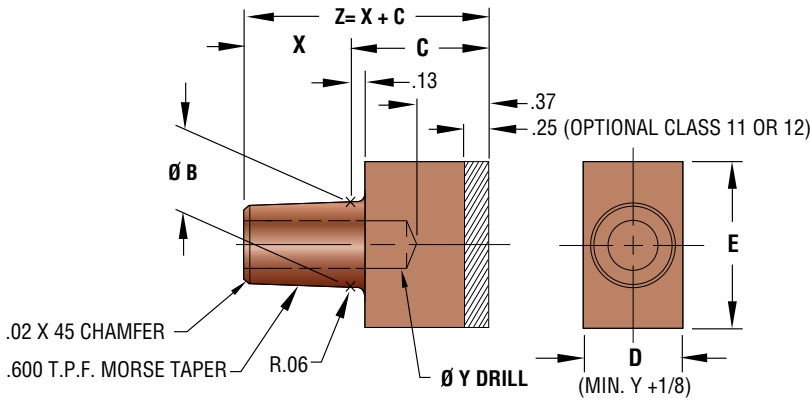


BE 2 5E 08 10 23 063 11

### 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 .23  
 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

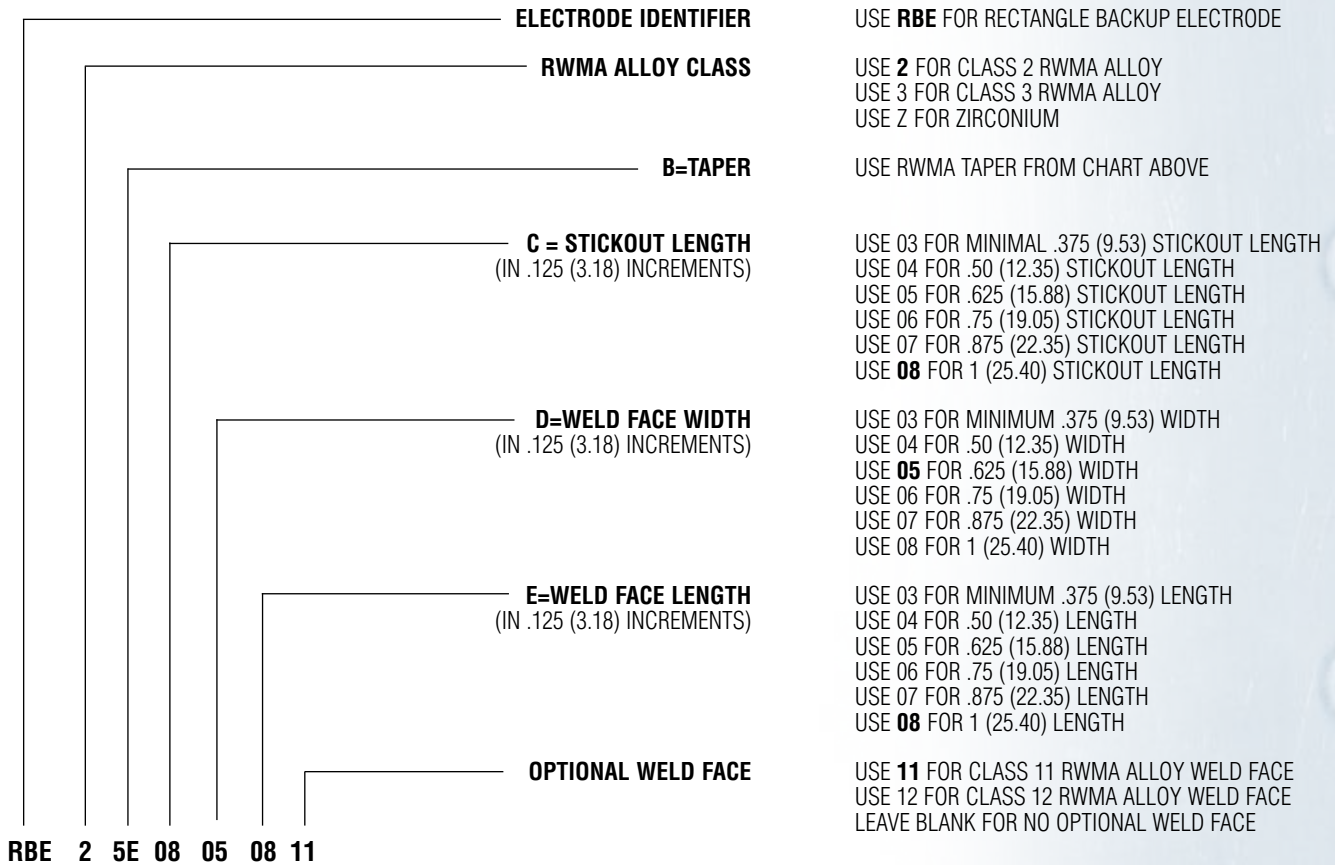
## Block Type Electrodes



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

FIGURE 4-9 (Material RWMA Class 2&3)

### EXAMPLE EXPLANATION CODING

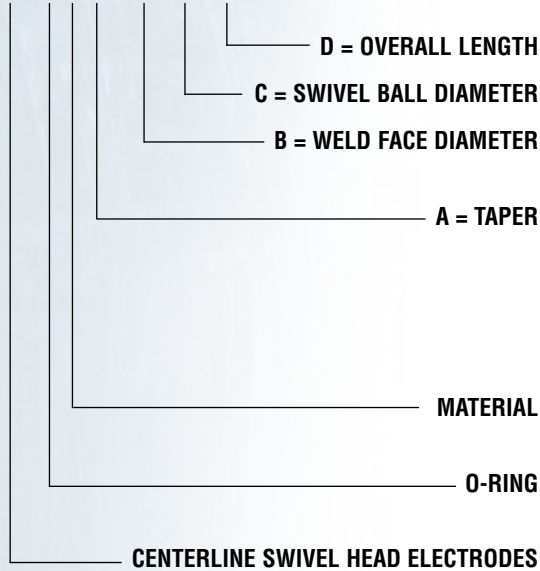


### SAMPLE TYPICAL CAP ADAPTER CODING

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

### CODING EXAMPLE

**SHEA 0 2 5E XXX ZZ YYY**



SPECIFY REQUIRED LENGTH, EX. FOR 2.00 (50.80) USE 200

SWIVEL BALL DIAMETER APPLICATION DEPENDANT

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 **0** IF O-RING REQUIRED ON FORMED ASSEMBLY

OMIT 0 IF O-RING NOT REQUIRED

USE **SHEA** FOR FORMED ASSEMBLY

### Blind Hole

EXAMPLE:

- SHEA25E10075200

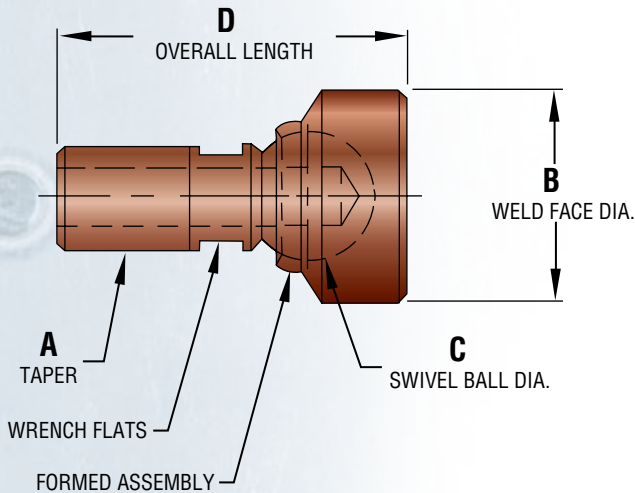


FIGURE 4-10 (Material RWMA Class 2&3)

### Thru Hole with O-Ring

EXAMPLE:

- SHEA025E10075200

O-RING

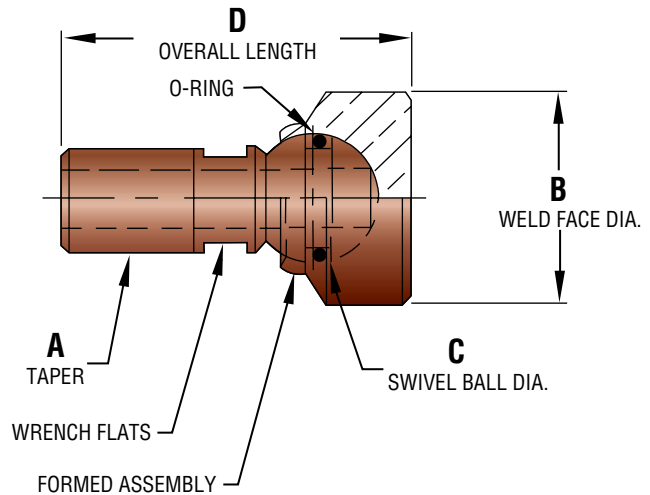


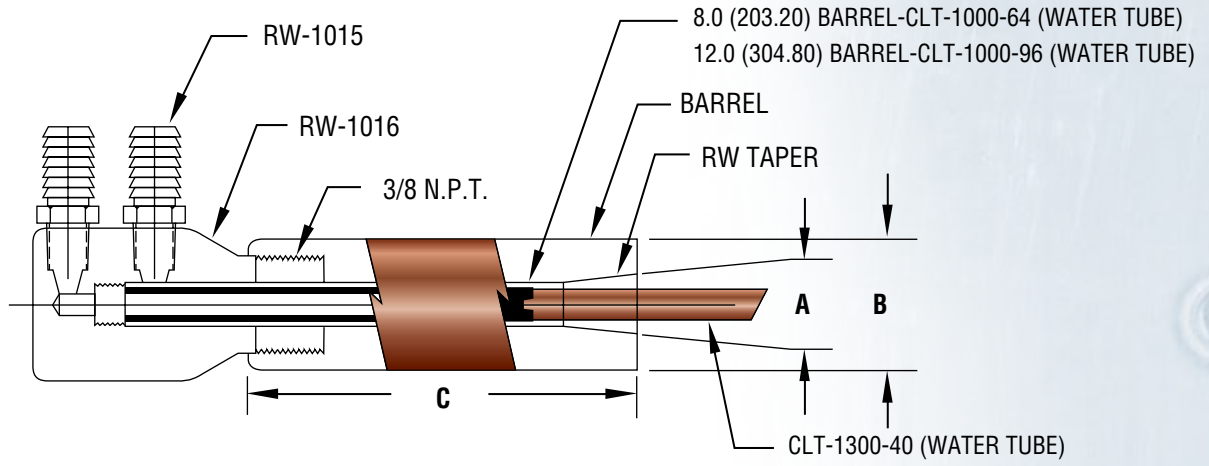
FIGURE 4-11 (Material RWMA Class 2&3)

- Dimensions Shown Are: inches (mm).

# HOLDERS

## Standard Non-Ejector Holders

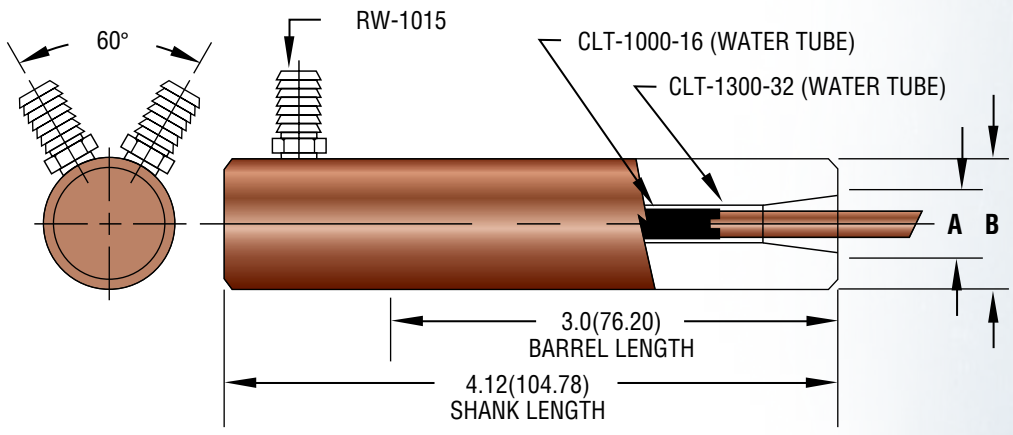
- RW-1015 Brass Connection Fits 3/8 Hose



**FIGURE 5-1 (Material RWMA Class 2)**

HOLDER #	A10804	A20804	A30804	A30805	A40805	A50805	A31204	A31205	A41205
RW Taper	4	4	4	5	5	5	4	5	5
A – Diameter	.463 (11.76)	.463 (11.76)	.463 (11.76)	.625 (15.88)	.625 (15.88)	.625 (15.88)	.463 (11.76)	.625 (15.88)	.625 (15.88)
B – Diameter	.75 (19.05)	.88 (22.23)	1.00 (25.40)	1.00 (25.40)	1.25 (31.75)	1.50 (38.10)	1.00 (25.40)	1.00 (25.40)	1.25 (31.75)
C – Length	8.0 (203.20)	8.0 (203.20)	8.0 (203.20)	8.0 (203.20)	8.0 (203.20)	8.0 (203.20)	12.0 (304.80)	12.0 (304.80)	12.0 (304.80)
BARREL	RW-1121-2	RW-1121-3	RW-1121-4	RW-1121-6	RW-1121-7	RW-1121-8	RW-1121-9	RW-1121-10	RW-1121-11

### Close-Coupled Holders



**FIGURE 5-2 (Material RWMA Class 2)**

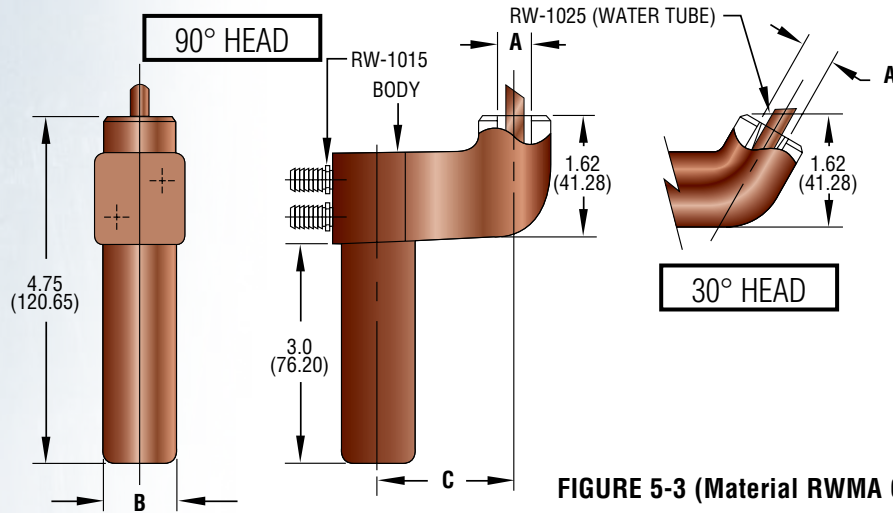
HOLDER #	1-20304	1-30304	1-40304	1-20305	1-30305	1-40305
A – RW Taper	4	4	4	5	5	5
B – Diameter	.88 (22.23)	1.00 (25.40)	1.25 (31.75)	.88 (22.23)	1.00 (25.40)	1.25 (31.75)

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



# HOLDERS

## Offset Non-Ejector Electrode Holders



**FIGURE 5-3 (Material RWMA Class 3)**

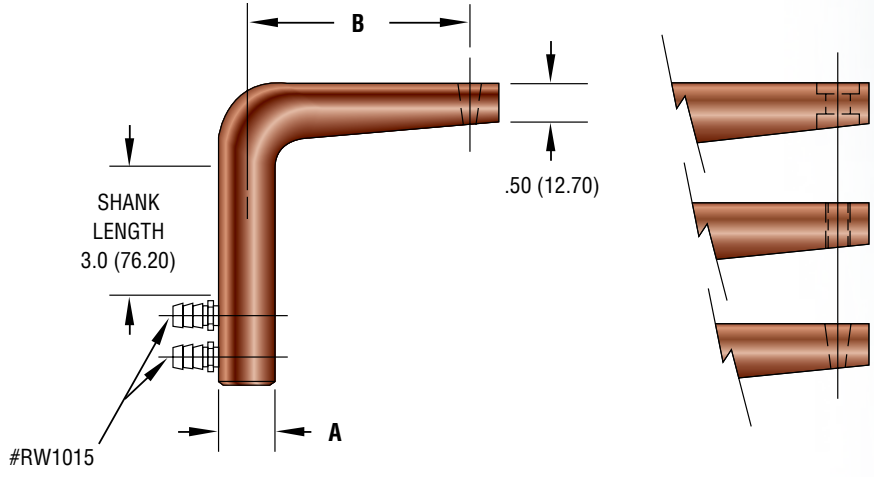
• Dimensions Shown Are: inches (mm).

OFFSET HOLDERS - Ordering Chart				
90° COMPLETE HOLDER NO.	B30304	B40304	B30305	B40305
RW Electrode Taper	4	4	5	5
A - Diameter	.463 (11.76)	.463 (11.76)	.619 (15.72)	.619 (15.72)
B - Diameter	1.00 (25.40)	1.25 (31.75)	1.00 (25.40)	1.25 (31.75)
C - Offset	2.00 (50.80)	2.00 (50.80)	2.00 (50.80)	2.00 (50.80)
Body	RW-1122-2	RW-1122-3	RW-1122-5	RW-1122-6
90° COMPLETE HOLDER NO.	G30304	G40304	G30305	G40305
RW Electrode Taper	4	4	5	5
A - Diameter	.463 (11.76)	.463 (11.76)	.619 (15.72)	.619 (15.72)
B - Diameter	1.00 (25.40)	1.25 (31.75)	1.00 (25.40)	1.25 (31.75)
C - Offset	3.00 (76.20)	3.00 (76.20)	3.00 (76.20)	3.00 (76.20)
Body	RW-1126-2	RW-1126-3	RW-1126-5	RW-1126-6
90° COMPLETE HOLDER NO.	C30304	C40304	C30305	C40305
RW Electrode Taper	4	4	5	5
A - Diameter	.463 (11.76)	.463 (11.76)	.619 (15.72)	.619 (15.72)
B - Diameter	1.00 (25.40)	1.25 (31.75)	1.00 (25.40)	1.25 (31.75)
C - Offset	4.00 (101.60)	4.00 (101.60)	4.00 (101.60)	4.00 (101.60)
Body	RW-1123-2	RW-1123-3	RW-1123-5	RW-1123-6
30° COMPLETE HOLDER NO.	D30304	D40304	D30305	D40305
RW Electrode Taper	4	4	5	5
A - Diameter	.463 (11.76)	.463 (11.76)	.619 (15.72)	.619 (15.72)
B - Diameter	1.00 (25.40)	1.25 (31.75)	1.00 (25.40)	1.25 (31.75)
C - Offset	2.00 (50.80)	2.00 (50.80)	2.00 (50.80)	2.00 (50.80)
Body	RW-1124-2	RW-1124-3	RW-1124-5	RW-1124-6
30° COMPLETE HOLDER NO.	E30304	E40304	E30305	E40305
RW Electrode Taper	4	4	5	5
A - Diameter	.463 (11.76)	.463 (11.76)	.619 (15.72)	.619 (15.72)
B - Diameter	1.00 (25.40)	1.25 (31.75)	1.00 (25.40)	1.25 (31.75)
C - Offset	3.00 (76.20)	3.00 (76.20)	3.00 (76.20)	3.00 (76.20)
Body	RW-1127-2	RW-1127-3	RW-1127-5	RW-1127-6
30° COMPLETE HOLDER NO.	F30304	F40304	F30305	F40305
RW Electrode Taper	4	4	5	5
A - Diameter	.463 (11.76)	.463 (11.76)	.619 (15.72)	.619 (15.72)
B - Diameter	1.00 (25.40)	1.25 (31.75)	1.00 (25.40)	1.25 (31.75)
C - Offset	4.00 (101.60)	4.00 (101.60)	4.00 (101.60)	4.00 (101.60)
Body	RW-1125-2	RW-1125-3	RW-1125-5	RW-1125-6

# HOLDERS

Paddle Type Holders - Type 1, 2 & 3

**ITEM NO. - CLP -**



**SAMPLE TIPS:**

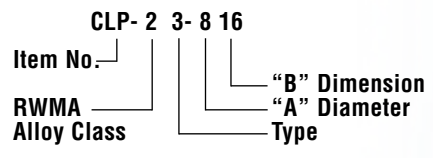
- TYPE-1 – XC-2998**  
• See Pg. 2-3 For Caps.
- TYPE-2 – CL-78-50C**  
• See Pg. 2-4 For Caps.
- TYPE-3 – CLPC-2998**  
• See Pg. 2-3 For Caps.

**FIGURE 5-4 (Material RWMA Class 2 & 3)**

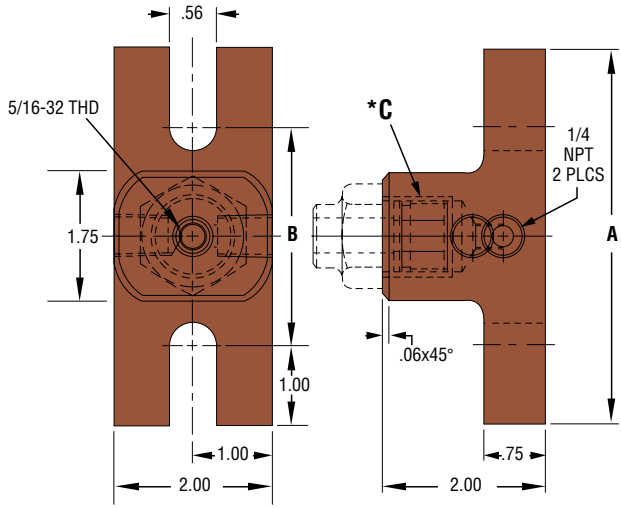
• **FINAL FIGURE USED IN ORDERING –**

- Indicate Desired Shank Diameter “A” - In .125 (3.18) Increments
- Indicate Desired Offset Dimension “B” - In .250 (6.35) Increments
- For Holders & Tips Specify RWMA Class 2 Or 3 Requirements

**EXAMPLE:**  
HOLDER, RWMA CLASS 2, TYPE - 3, “A” = 1.00 (25.40) DIAMETER, “B” = 4.00 (101.60) OFFSET.



## Platen Mount - Holders



**FIGURE 5-5 (Material RWMA Class 2)**

See pages 3-12 & 3-13 for Adapters.

See pages 8-1 & 8-2 for Water Tubes.

DIM.	CL-1-PM-“X”	CL-2-PM-“X”
A	4.75 (120.65)	7.00 (177.80)
B	2.75 (69.85)	4.31 (109.47)

C*	X
<b>For these thread/taper types</b>	<b>Replace “X” with</b>
1/2 Pipe Thread	50P
5/8 Pipe Thread	62P
3/4 Pipe Thread	75P
7/8-14 Straight Thread	87S
1-12 Straight Thread	10S
4RW Taper	4E
5RW Taper	5E
6RW Taper	6E
7RW Taper	7E
*Other threads/tapers available upon request	

# HOLDERS

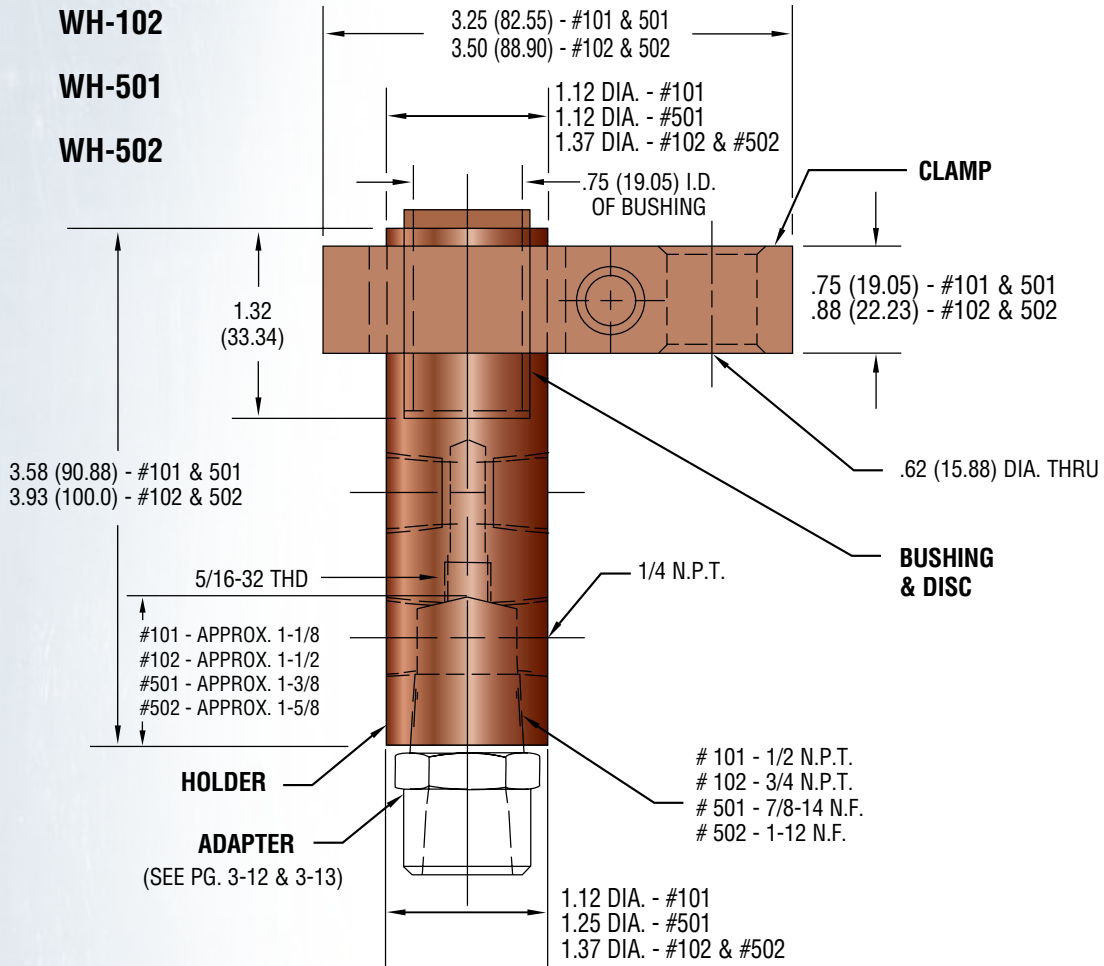
## Cylinder Mounted Holders

**ITEM NO. WH-101**

**WH-102**

**WH-501**

**WH-502**



• Dimensions Shown Are: inches (mm).

**FIGURE 5-6 (Material - Copper)**

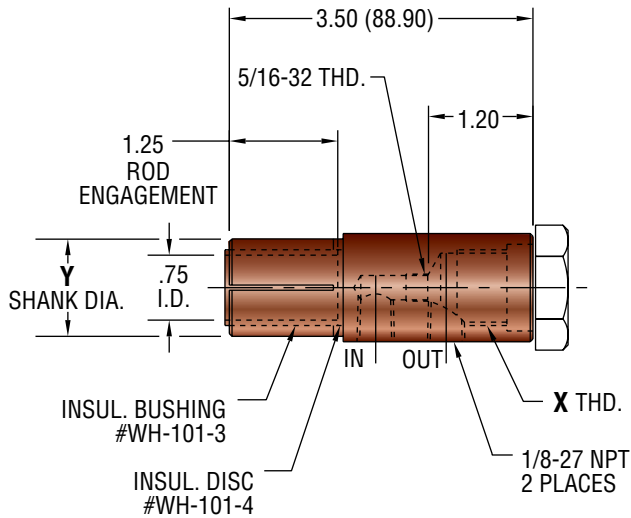
### 101, 102, 501 & 502 SERIES HOLDERS

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.	WH-101-2	WH-102-2	WH-101-2	WH-102-2
BUSHING NO.	WH-101-3	WH-101-3	WH-101-3	WH-101-3
DISC NO.	WH-101-4	WH-101-4	WH-101-4	WH-101-4

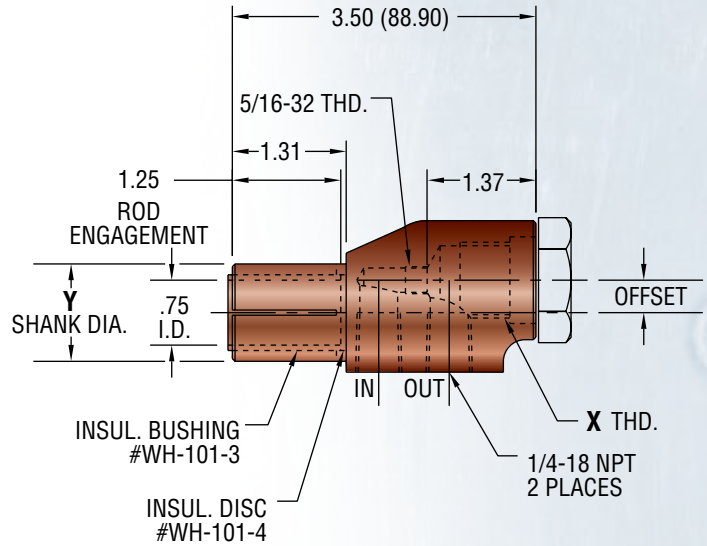
*\*A complete assembly consists of a barrel, clamp, bushing and disc.*

# HOLDERS

## Cylinder Mounted Holders

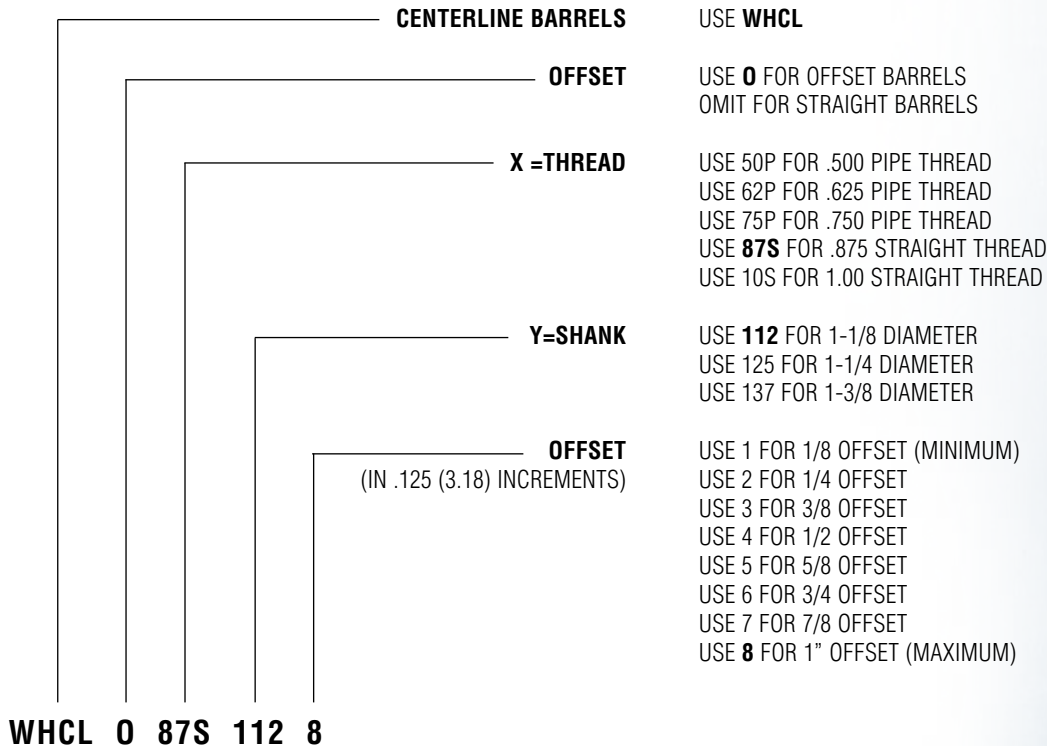


**FIGURE 5-7 (Material RWMA Class 2)  
Straight Barrel (WHCL Series)**



**FIGURE 5-8 (Material RWMA Class 3)  
Offset Barrel (WHCLO Series)**

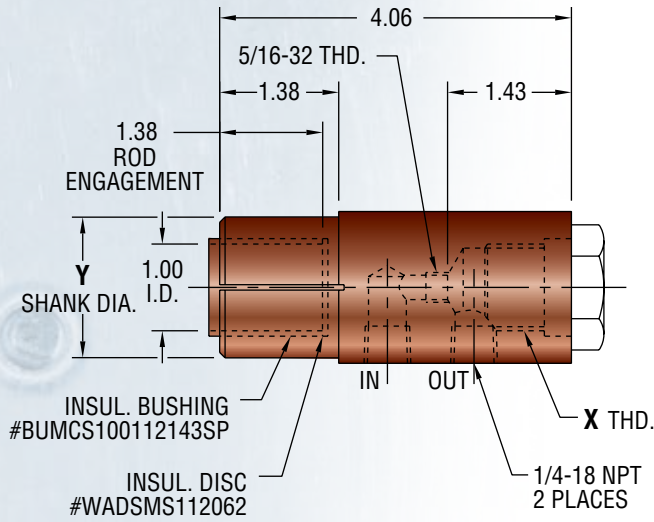
### EXAMPLE EXPLANATION CODING



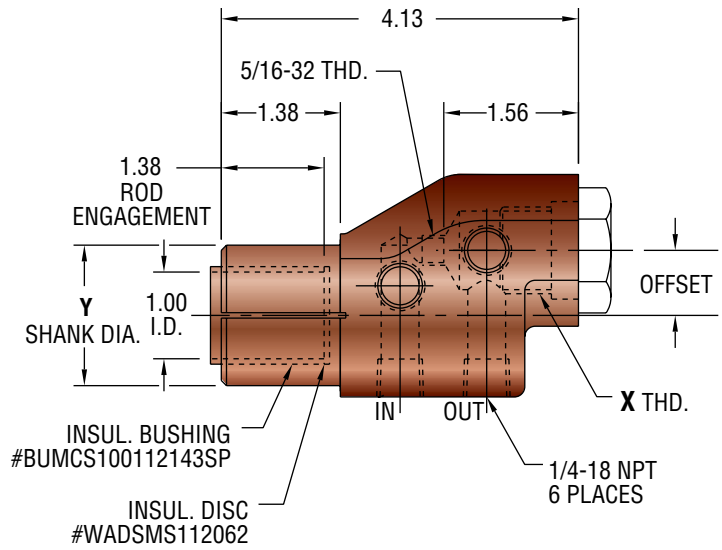


# HOLDERS

Heavy Duty Cylinder Mounted Holders

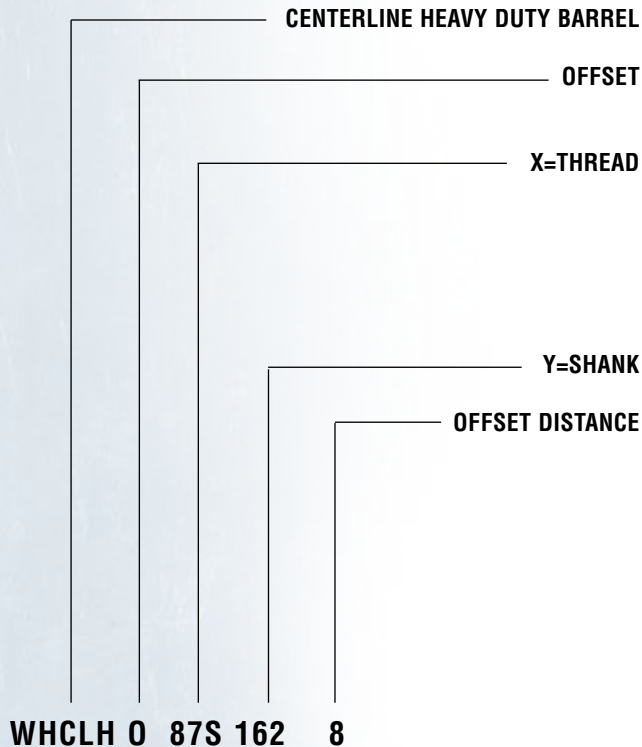


**FIGURE 5-9 (Material RWMA Class 2)  
HEAVY DUTY STRAIGHT BARREL  
(WHCLH Series)**



**FIGURE 5-10 (Material RWMA Class 3)  
HEAVY DUTY OFFSET BARREL  
(WHCLHO Series)**

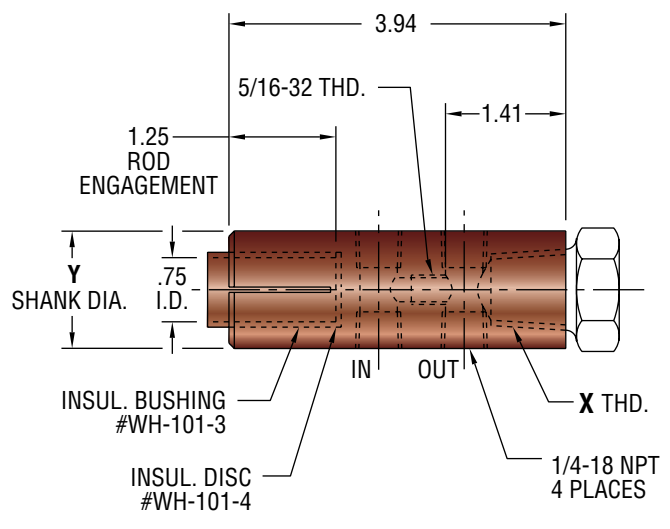
### EXAMPLE EXPLANATION CODING



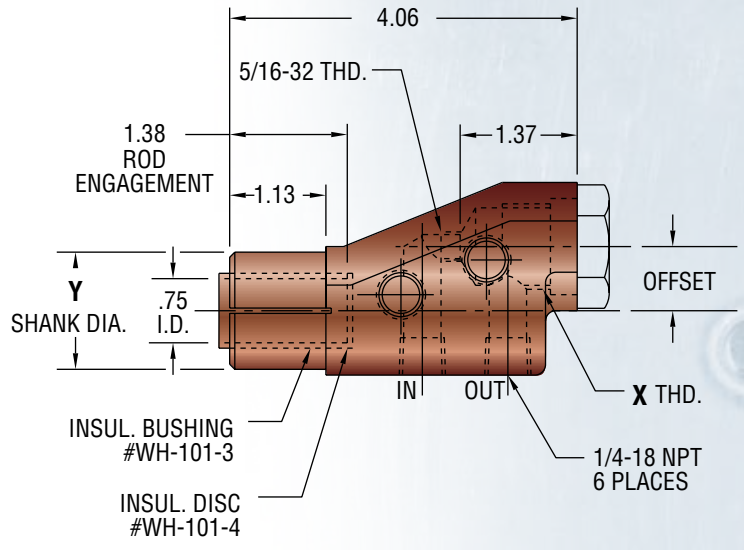
- USE **WHCLH**
- USE **0** FOR OFFSET BARRELS  
OMIT FOR STRAIGHT BARRELS
- USE 50P FOR .500 PIPE THREAD  
USE 62P FOR .625 PIPE THREAD  
USE 75P FOR .750 PIPE THREAD  
USE **87S** FOR .875 STRAIGHT THREAD  
USE 10S FOR 1.00 STRAIGHT THREAD  
USE 12S FOR 1.25 STRAIGHT THREAD
- USE **162** FOR 1-5/8 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)

# HOLDERS

Light Duty Cylinder Mounted Holders

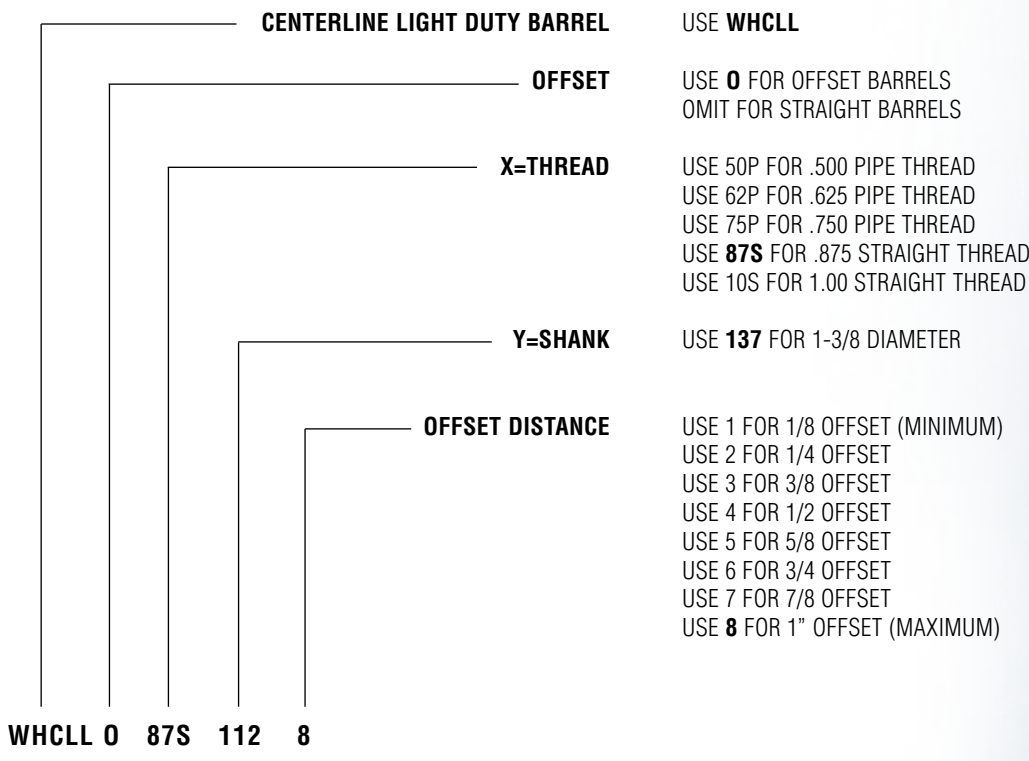


**FIGURE 5-11 (Material RWMA Class 2)  
LIGHT DUTY STRAIGHT BARREL  
(WHCLL Series)**



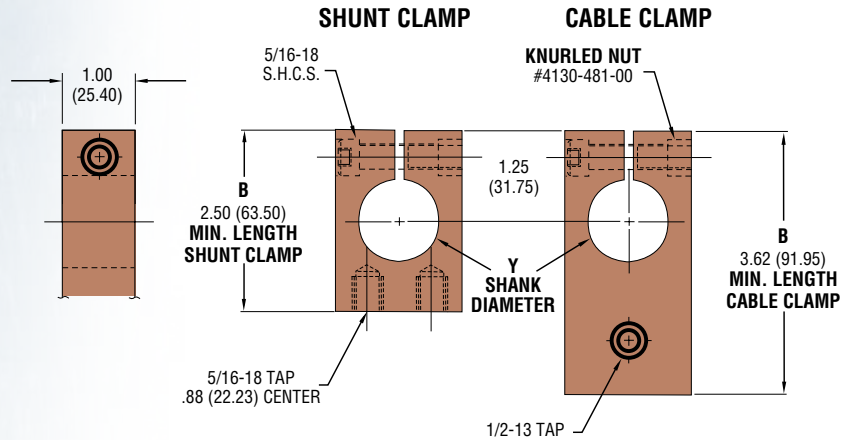
**FIGURE 5-12 (Material RWMA Class 3)  
LIGHT DUTY OFFSET BARREL  
(WHCLLO Series)**

### EXAMPLE EXPLANATION CODING



# HOLDERS

## Light Duty Shunt/Cable Clamps



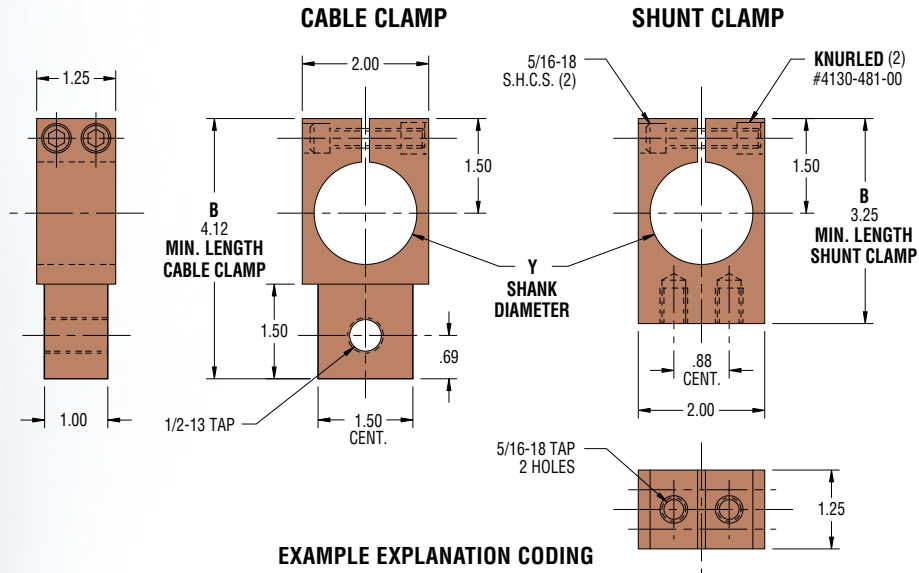
**FIGURE 5-13**

### EXAMPLE EXPLANATION CODING

<p><b>CENTERLINE CABLE/SHUNT CLAMPS</b></p> <p><b>Y = SHANK DIAMETER</b></p> <p><b>B = LENGTH</b></p>	<p>USE <b>WHCLSA</b> FOR SHUNT CLAMPS USE <b>WHCLCA</b> FOR CABLE CLAMPS</p> <p>USE <b>112</b> FOR 1.125 DIAMETER USE <b>125</b> FOR 1.250 DIAMETER USE <b>137</b> FOR 1.375 DIAMETER</p> <p>USE <b>0250</b> FOR 2.50 LENGTH (MIN. FOR WHCLSA) USE <b>0362</b> FOR 3.62 LENGTH (MIN. FOR WHCLCA) etc.</p>
---	---

**WHCLSA 112 0250**

## Heavy Duty Shunt/Cable Clamps



**FIGURE 5-14**

### EXAMPLE EXPLANATION CODING

<p><b>CENTERLINE HEAVY DUTY CABLE/SHUNT CLAMPS</b></p> <p><b>Y = SHANK DIAMETER</b></p> <p><b>B = LENGTH</b></p>	<p>USE <b>WHCLHSA</b> FOR SHUNT CLAMPS USE <b>WHCLHCA</b> FOR CABLE CLAMPS</p> <p>USE <b>162</b> FOR 1.625 DIAMETER</p> <p>USE <b>0325</b> FOR 3.25 LENGTH (MIN. FOR WHCLHSA) USE <b>0412</b> FOR 4.12 LENGTH (MIN. FOR WHCLHCA) etc.</p>
--	---

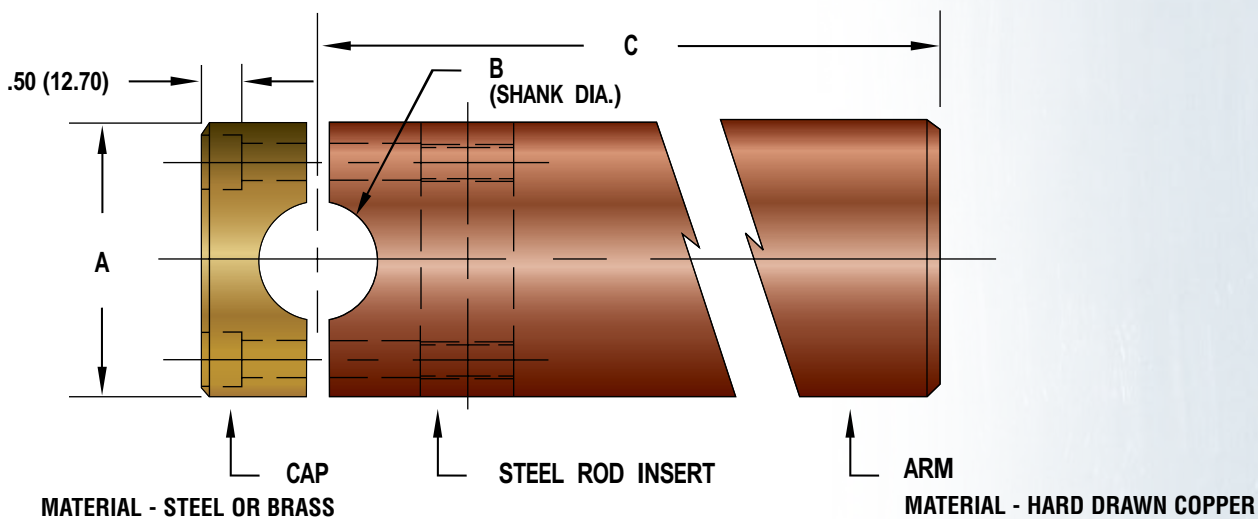
**WHCLHCA 162 0412**

**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.



**FIGURE 6-1**

ORDERING CHART	
CLRAC	STANDARD PREFIX - ARM & CAP ASSEMBLY
04 THRU 16	"A" DIAMETER - .25 (6.35) INCREMENTS
06 THRU 16	"B" DIAMETER- 12 (3.18) INCREMENTS
8 THRU 50	"C" DIMENSION - 1.00 (25.40) INCREMENTS
B OR S	CAP MATERIAL - BRASS OR STEEL

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

**CLRAC - 1210 - 36 - B**  
 Item No. \_\_\_\_\_  
 "A" \_\_\_\_\_  
 "B" \_\_\_\_\_  
 "C" \_\_\_\_\_ Cap material

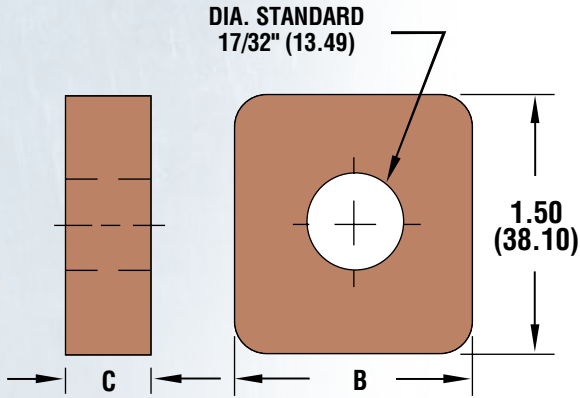
• Dimensions Shown Are: inches (mm).

Contact CenterLine to order custom caps and arms to customer specifications.



# SHUNTS & CABLES

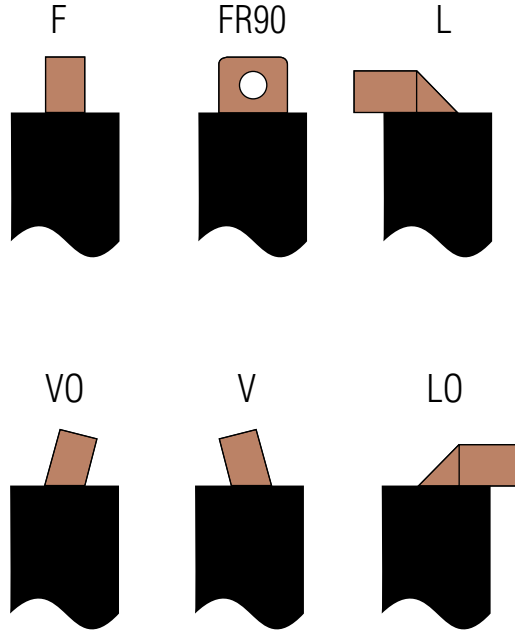
## Air-Cooled Jumper Cables



**FIGURE 7-1**

TERMINAL DIMENSIONS			
MCM	Jacket O.D.	B	C
600	1.63 (41.28)	1.38 (34.93)	.500 (12.70)
750	1.75 (44.45)	1.38 (34.93)	.600 (15.24)
1000	2.00 (50.80)	1.50 (38.10)	.700 (17.78)
1200	2.12 (53.98)	1.50 (38.10)	.820 (20.83)
1500	2.25 (57.15)	1.50 (38.10)	.990 (25.15)

### END STYLES

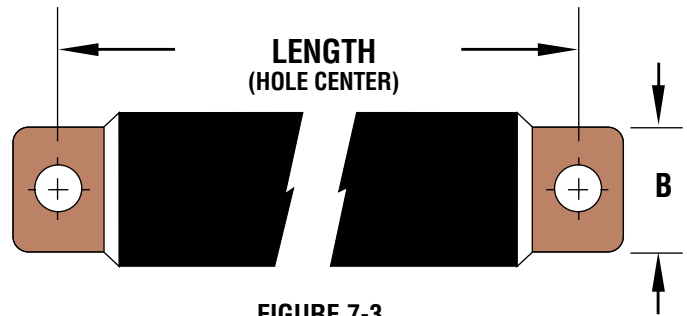


**FIGURE 7-2**

### HOW TO ORDER CENTERLINE AIR-COOLED CABLES

Please Supply the Following Information:

TERMINALS				
TYPE	1ST END	2ND END	M.C.M.	LENGTH
CLAC	F	F	600	20 (508.0)



**FIGURE 7-3**

**EXAMPLE:**

**CLAC - FF - 600 - 20**

CENTERLINE AIR-COOLED JUMPER CABLES \_\_\_\_\_

FF END STYLES \_\_\_\_\_

20 (508.1) LENGTH (HOLE CENTRE)

600 MCM SIZE

• **WATER-COOLED JUMPER CABLES ALSO AVAILABLE UPON REQUEST**

• Dimensions Shown Are: inches (mm).

# SHUNTS & CABLES

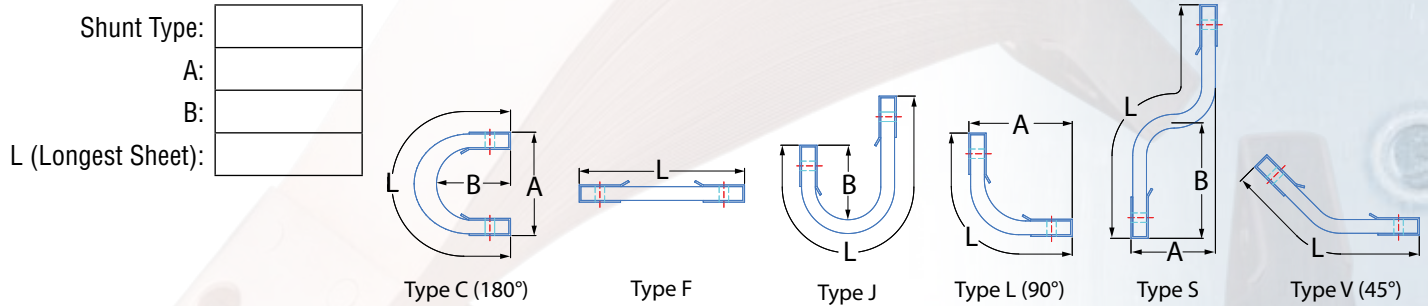
## Laminated Shunts

CenterLine shunts are designed to custom specifications and are readily available in a wide variation of hole patterns & sizes. The secondary conductor strips are made 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.

### Shunt ordering information:

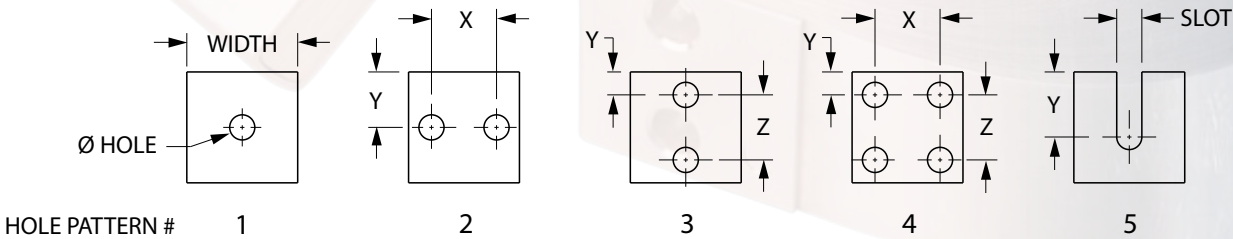
**Units of measurement:**  Imperial  Metric

### Provide required shunt type & dimensions as shown:



**FIGURE 7-4**

### Select hole pattern & provide dimensions for both ends:



**FIGURE 7-5**

	END 1	END 2
HOLE PATTERN #	<input style="width: 80%; height: 20px;" type="text"/>	<input style="width: 80%; height: 20px;" type="text"/>
X DIM.	<input style="width: 80%; height: 20px;" type="text"/>	<input style="width: 80%; height: 20px;" type="text"/>
Y DIM.	<input style="width: 80%; height: 20px;" type="text"/>	<input style="width: 80%; height: 20px;" type="text"/>
Z DIM.	<input style="width: 80%; height: 20px;" type="text"/>	<input style="width: 80%; height: 20px;" type="text"/>
HOLE/SLOT SIZE	<input style="width: 80%; height: 20px;" type="text"/>	<input style="width: 80%; height: 20px;" type="text"/>

#### Shunt Insulation:

Insulation required:

Yes

No

Other (specify)

#### Shunt Thickness:

**FIGURE 7-6** 1/16" (1.6mm)

#### Clip Thickness:

1/16" (1.6 mm) Standard

Other (specify)

#### Shunt Width:

### Flare:

**Inside Flare**

End 1

End 2

None

Other

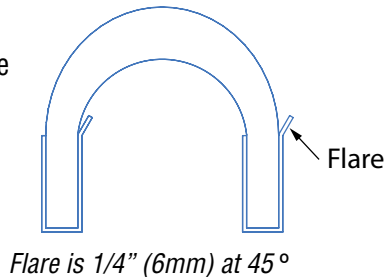
**Outside Flare**

End 1

End 2

None

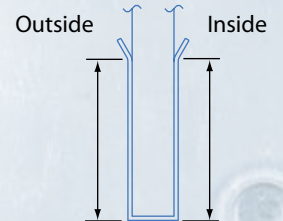
Other



**FIGURE 7-7**

### Clip Length:

End 1 Outside	<input style="width: 80%; height: 20px;" type="text"/>
End 1 Inside	<input style="width: 80%; height: 20px;" type="text"/>
End 2 Outside	<input style="width: 80%; height: 20px;" type="text"/>
End 2 Inside	<input style="width: 80%; height: 20px;" type="text"/>



**FIGURE 7-8**

Provide any additional information or special instructions.

**ITEM NO. – CLT-1000-**

**TYPE “A”**

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

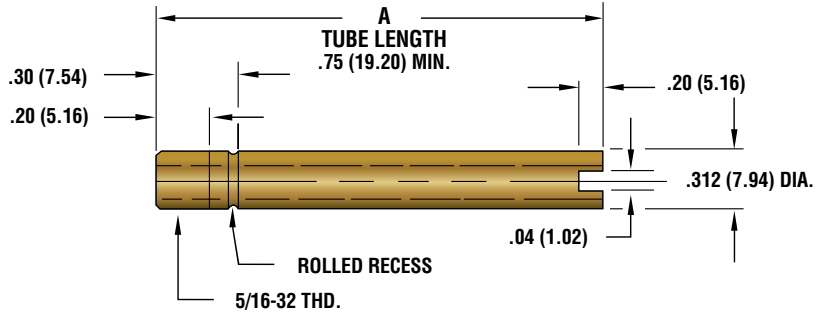


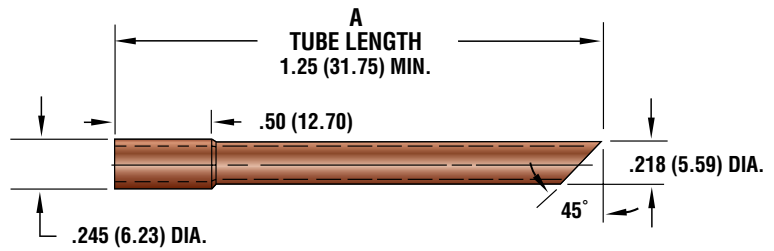
FIGURE 8-1 (Material - 1/4 ID BRASS TUBE)

**ITEM NO. – CLT-1200-**

**TYPE “B”**

*(Use with 4 RW Electrodes)*

FIGURE 8-2 (Material - Copper)

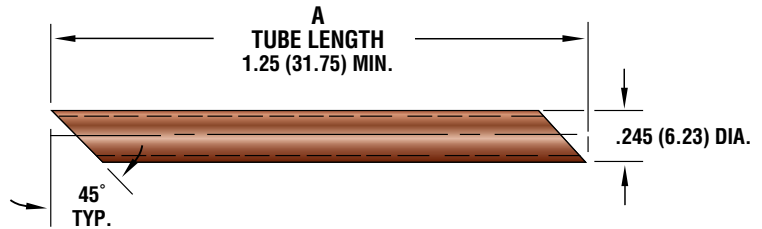


**ITEM NO. – CLT-1300-**

**TYPE “C”**

*(Use with 5, 6 & 7 RW Electrodes)*

FIGURE 8-3 (Material - Copper)

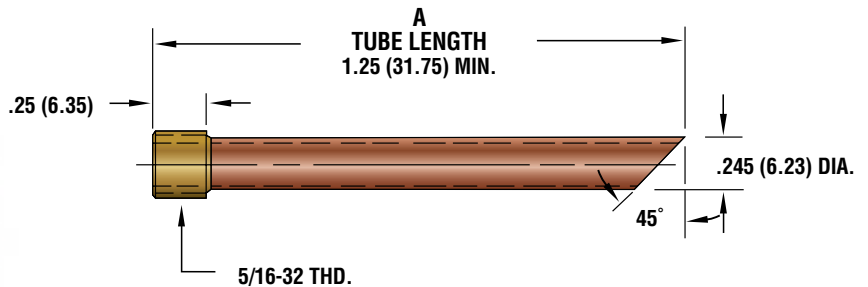


**ITEM NO. – CLT-1400-**

**TYPE “D”**

*(Use with 5, 6 & 7 RW Electrodes)*

FIGURE 8-4 (Material - Copper & Brass)

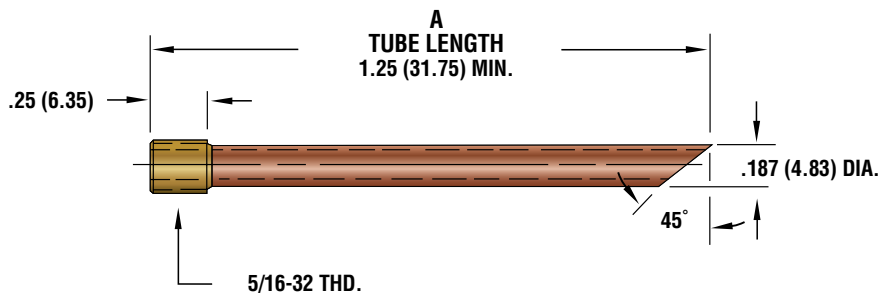


**ITEM NO. – CLT-1500-**

**TYPE “E”**

*(Use with 4 RW Electrodes)*

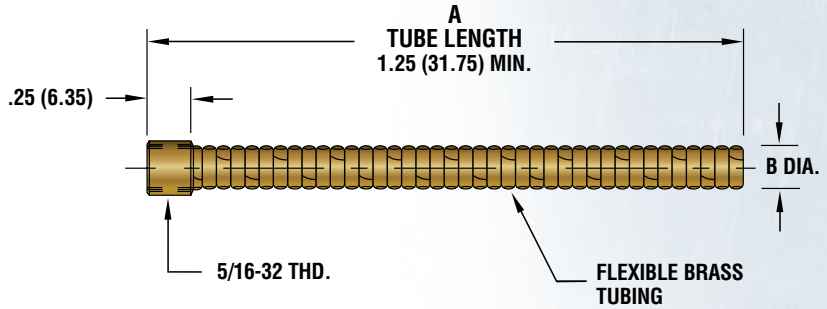
FIGURE 8-5 (Material - Copper & Brass)



ITEM NO. – CLT-1600-

TYPE “F”

B = .210 (5.31) DIA.



ITEM NO. – CLT-1700-

TYPE “G”

B = .250 (6.35) DIA.

FIGURE 8-6 (Material - Interlocked Flexible Brass)

ITEM NO. – CLT-1800-

TYPE “H”

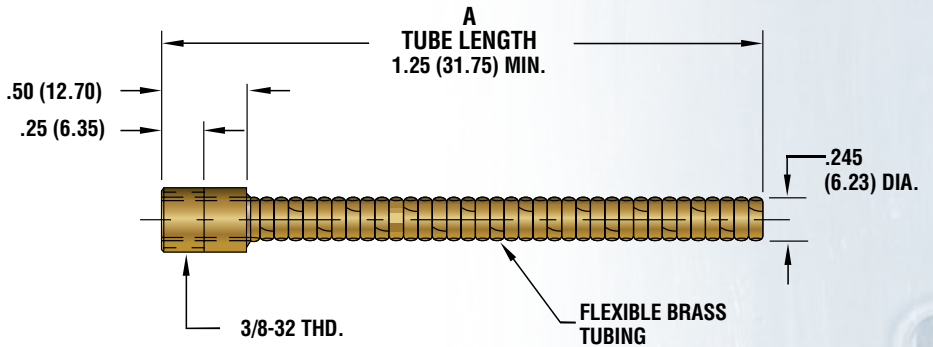


FIGURE 8-7 (Material - Interlocked Flexible Brass)

ITEM NO. – CLT-1900-

TYPE “I”

(Use with 5, 6 & 7 RW Electrodes)

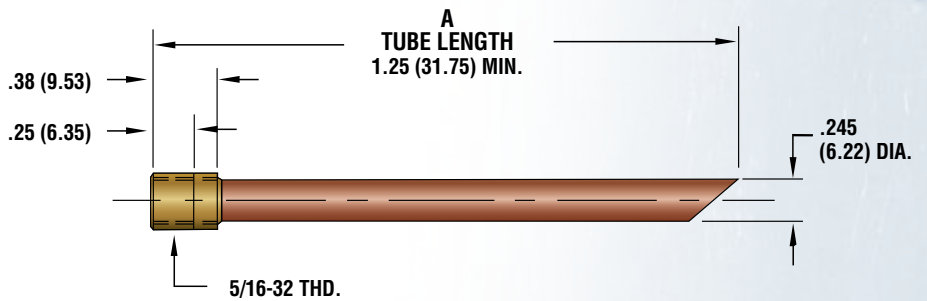


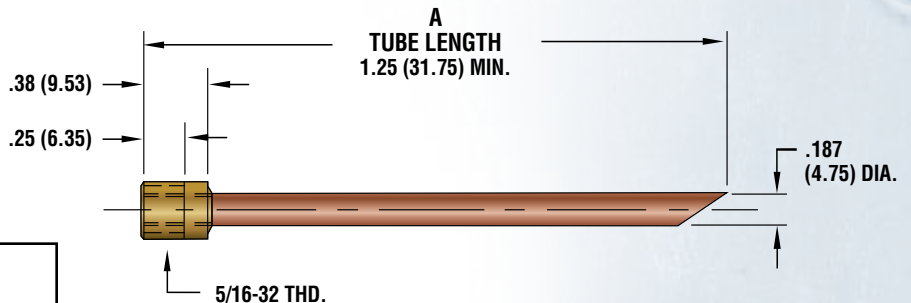
FIGURE 8-8 (Material - Copper & Brass)

ITEM NO. – CLT-2000-

TYPE “J”

(Use with 5, 6 & 7 RW Electrodes)

FIGURE 8-9 (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      “A” Length

Item No. \_\_\_\_\_

• Dimensions Shown Are: inches (mm).



# SEAM WELDING WHEELS

### 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)

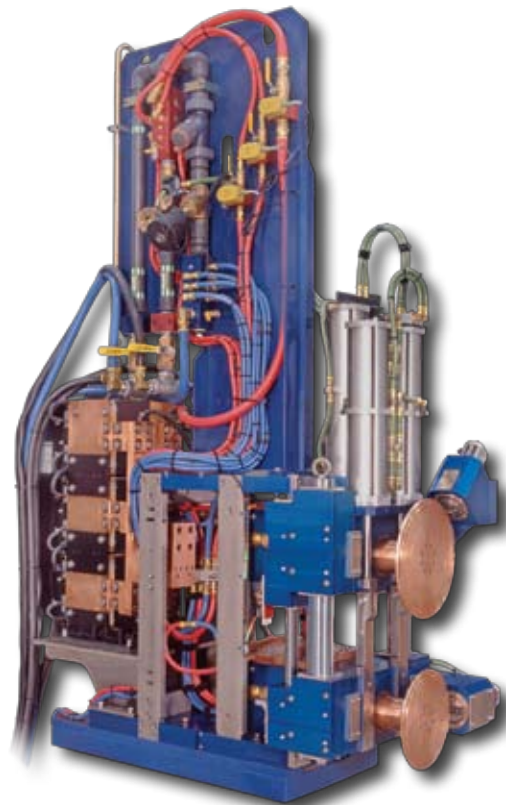
Usually recommended for seam welding of stainless steels and for use where unusually high pressures prevail.

### CenterLine (Zirconium & Dispersion Strengthened Copper)

Suggested for seam welding of galvanized materials and conditions where temperatures are relatively high.

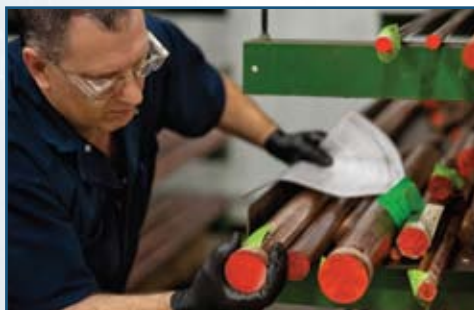
**Note:**

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



**FIGURE 9-1**  
Seam Welding Wheels shown on  
CenterLine SeamTec® Welder

## Raw Materials and Accessories



### Alloy Rod and Bar Stock

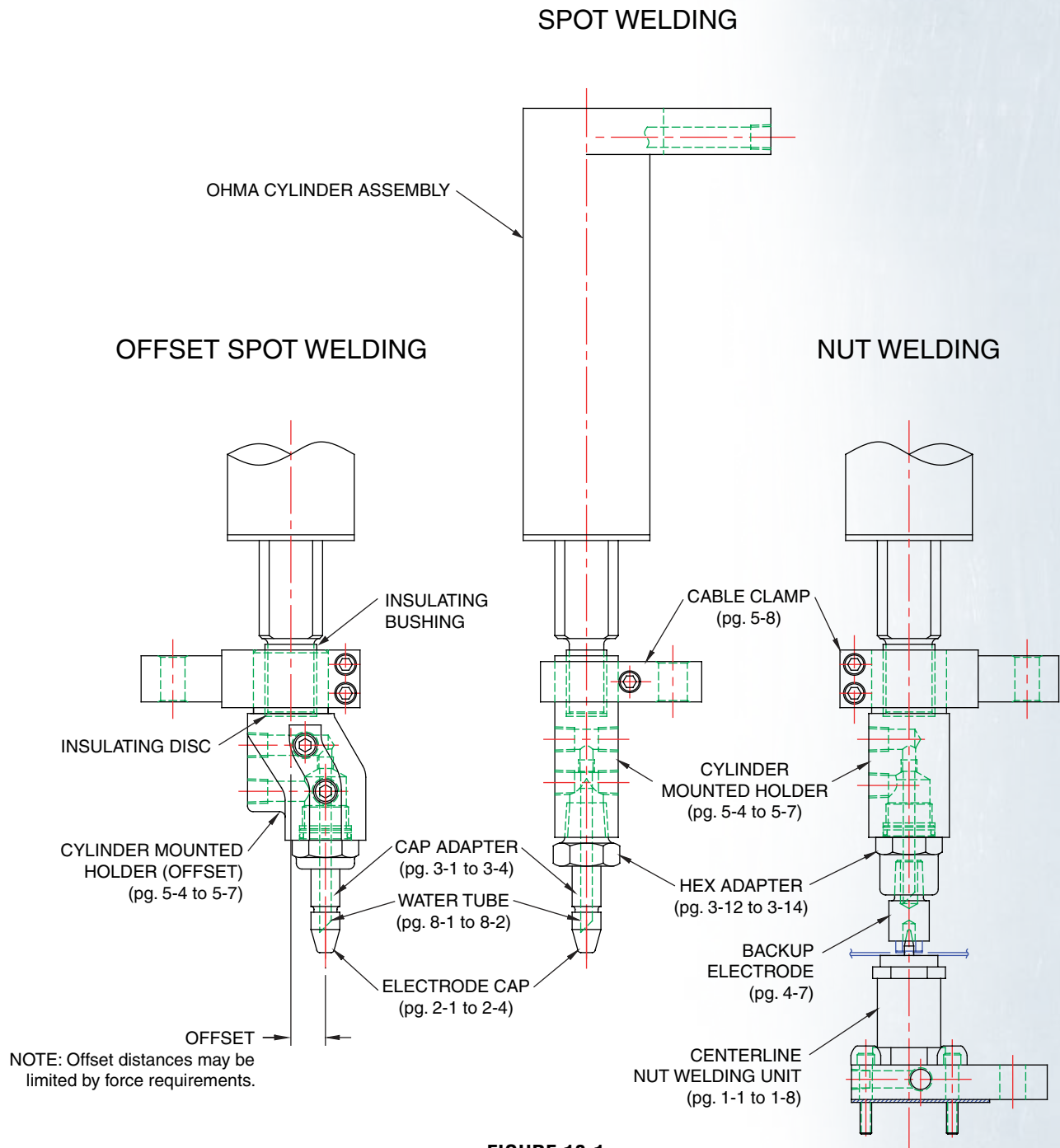
- Forged and Machine Plate
- Hexagon Bar
- Rectangular
- Solid Round Rod



### Accessories

- Seam Welder Shafts & Bushings
- Stock/Custom Forgings & Castings
- Welding Dies, Holders & Fixtures

Call or email for pricing on alloy, sizes & dimensions



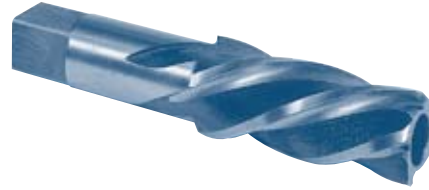
**FIGURE 10-1**

For ordering information, refer to the catalogue pages for each component.

**Reamer**

Worn tapers in electrode holders can be reworked with this high speed steel reamer.

PART NO.	DESCRIPTION
R-4E.....	4RW TAPER .463 TAPER FOR 1/2 ELECTRODE
R-5E.....	5RW TAPER .625 TAPER FOR 5/8 ELECTRODE
R-6E.....	6RW TAPER .750 TAPER FOR 3/4 ELECTRODE
R-7E.....	7RW TAPER .875 TAPER FOR 7/8 ELECTRODE
R-4C.....	.374 TAPER FOR 1/2 CAP
R-5C.....	.414 TAPER FOR 5/8 CAP
R-6C.....	.500 TAPER FOR 3/4 CAP
R-7C.....	.612 TAPER FOR 7/8 CAP



**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.

PART NO.	DESCRIPTION
230-008.....	#10 SCREW
230-009.....	#10 SCREW
HE-705-57.....	1/4 SCREW
FSD-15135.....	5/16 SCREW
FSD-15057.....	3/8 SCREW
FSD-15058.....	1/2 SCREW



**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**

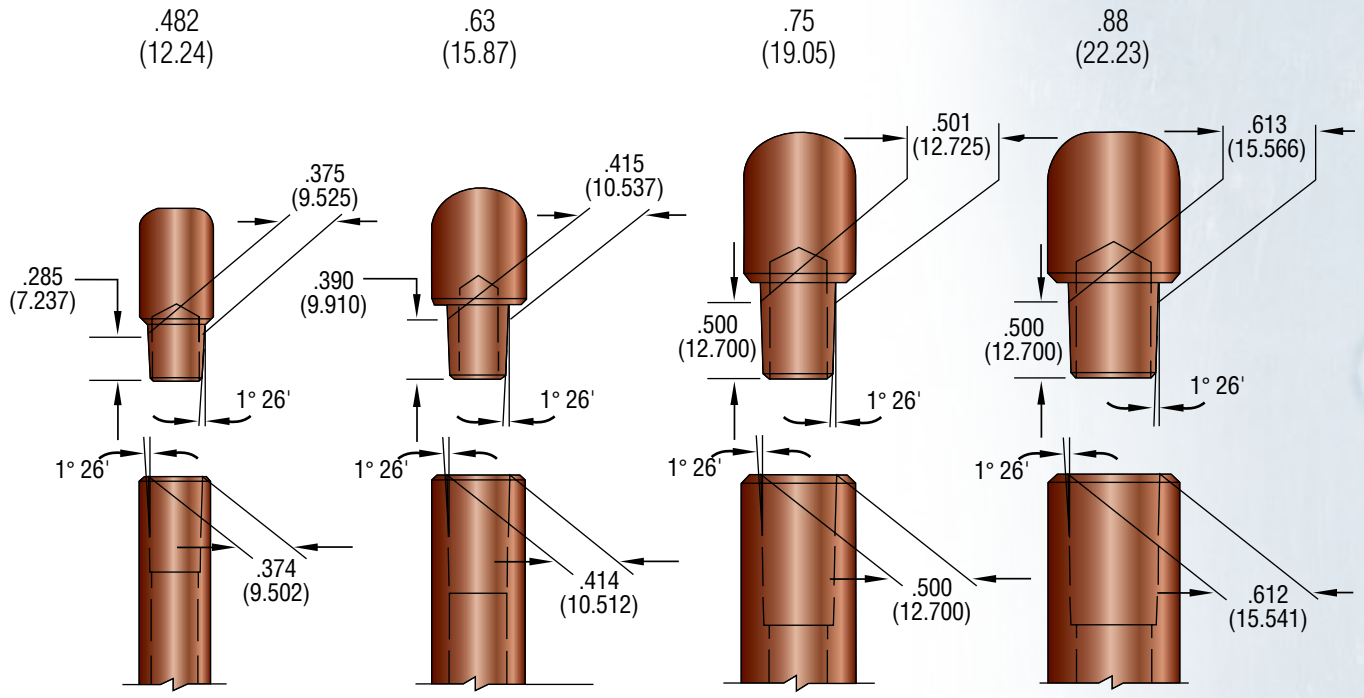
- Dimensions Shown Are: inches (mm).



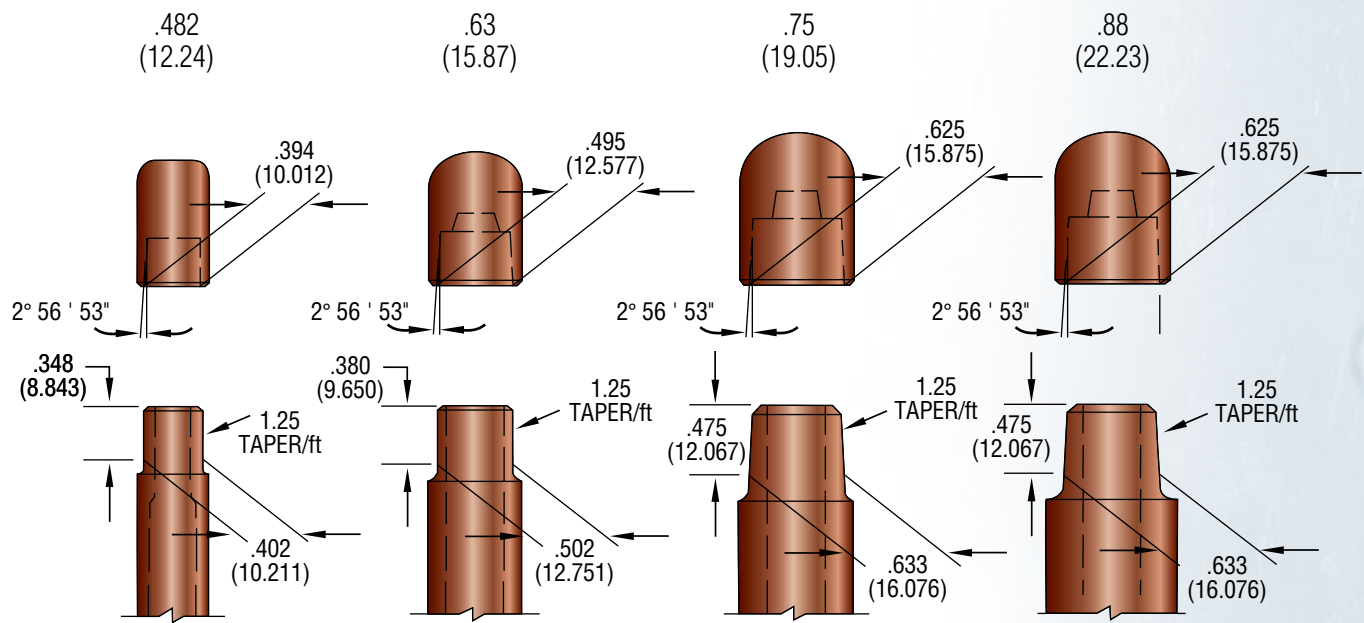


# REFERENCE DATA

## Male Cap Data



## Female Cap Data



• Dimensions Shown Are: inches (mm).



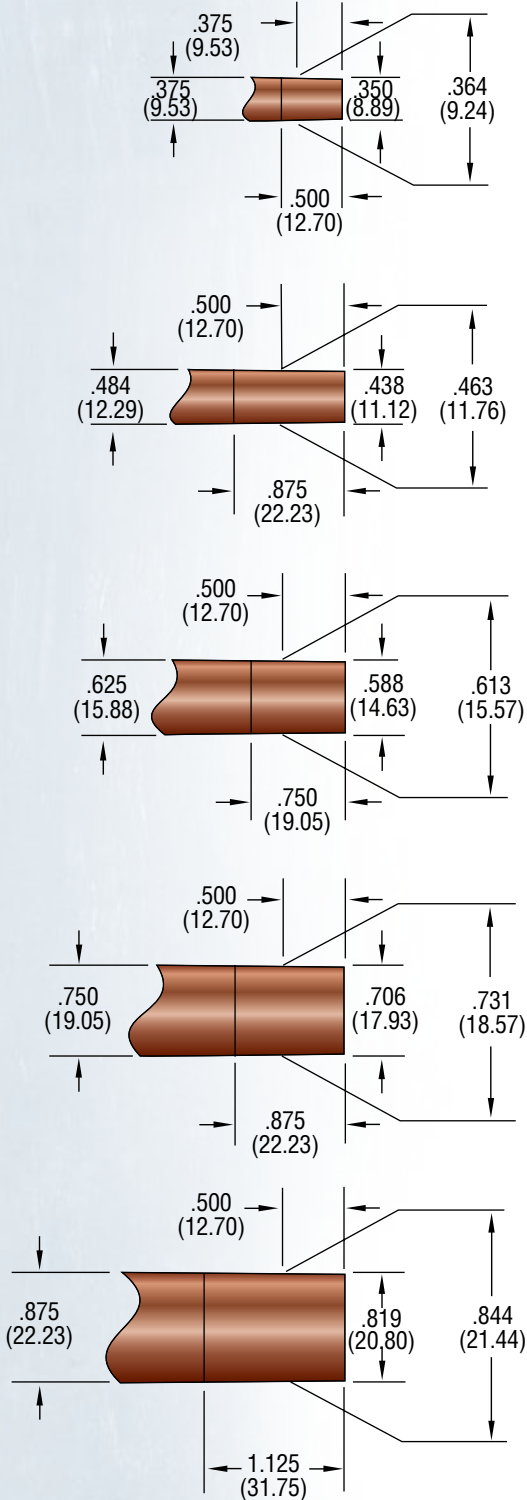
# REFERENCE DATA

Straight Female Adapter Shanks For Male Caps

## ELECTRODE AND ADAPTER TAPERS

(Refer to pages 3-12 to 3-14)

## CAP TAPERS



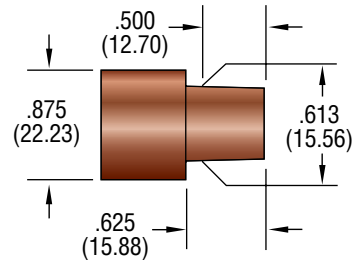
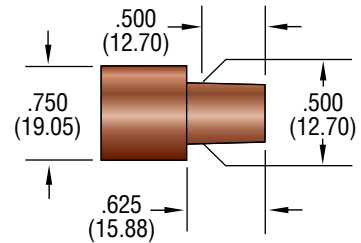
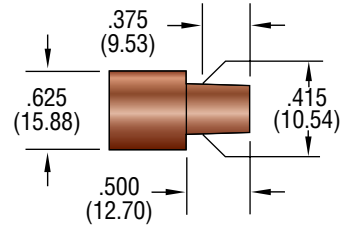
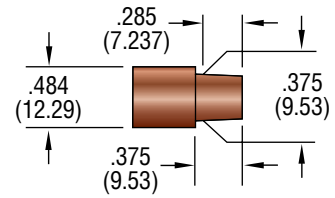
#0 MT - #3 RW

#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

ALLOY 1 **	Stainless Steel		Galvanized Steel		Tin Plate		Terne Plate		Cadmium Plate		Chrome Plate		Cold-Rolled Steel	
	A	2,3*	A	1,2,20	B	1,2,20	A	1,2,20	A	1,2,20	A	2	A	2
ALLOY 1 **	2,3*			1,2,20		1,2,20		1,2,20		1,2,20		2		2

### DISSIMILAR NONFERROUS METALS

ALLOY 1 **	Aluminum & Aluminum Alloys		Copper		Nickel-Silver		Nickel & Nickel Alloys		Phosphor Bronze		Yellow Brass		Red Brass	
	A	1	C	13,14	A	2	A	2	A	2	A	2	A	2
ALLOY 1 **	1		13,14		2		2		2		2		2	
ALLOY 1 **	Titanium		Silicon		Bronze		Cupro		Nickel		Magnesium			
	A	2,3	A	2	B	2	A	2	B	2	B	1		
	2,3		2		2		2		2		1			

### REFRACTORY METALS

ALLOY 1 → ALLOY 2 ↓	Tungsten Molybdenum		Chrome Plate		Stainless Steel		Nickel & Nickel Alloys	
Tungsten Molybdenum	B	2	B	2	B	2,3*	B	2
	2		2		2		2	

### DISSIMILAR FERROUS METALS

ALLOY 1 → ALLOY 2 ↓	Nickel & Nickel Alloy		Cold-Rolled Steel		Tin Plate		Terne Plate		Galvanized Steel		Cadmium Plate		Chrome Plate	
Stainless Steel	B	2	A	2	B	1,2,20	B	1,2,20	B	1,2,20	B	1,2,20	B	2
	2,3*		2,3*		2,3*		2,3*		2,3*		2,3*		2,3*	
Chrome Plate	B	2	B	2	B	1,2,20	B	1,2,20	B	1,2,20	B	1,2,20		
	2		2		2		2		2		2		2	
Cadmium Plate	B	2	B	2	C	1,2,20	B	1,2,20	B	1,2,20				
	1,2,20		2		1,2,20		1,2,20		1,2,20					
Galvanized Steel	C	2	B	2	B	1,2,20	C	1,2,20						
	1,2,20		1,2,20		1,2,20		1,2,20							
Terne Plate	C	2	B	2	C	1,2,20								
	1,2,20		1,2,20		1,2,20									
Tin Plate	C	2	B	2										
	1,2,20		1,2,20											
Cold-Rolled Plate	C	2												
	2													

### DISSIMILAR NONFERROUS METALS

ALLOY 1 → ALLOY 2 ↓	Nickel & Nickel Alloy		Phosphor Bronze		Silicon Bronze		Nickel-Silver		Cupro Nickel		Yellow Brass		Red Brass	
Copper			C	2	C	1,2,20	C	1,2,20	C	1,2,20	C	1,2,20	C	2
			14		14		14		14		14		14	
Red Brass	C	2	C	2	C	2	C	2	C	2	C	2		
	14		14		14		14		14		2			
Yellow Brass	C	2,10*	B	2	B	2	B	2	B	2				
	2		11		11		11		11					
Cupro Nickel	B	2	B	2	B	2	B	2						
	2		2		2		2							
Nickel-Silver	B	2,10*	B	2	B	2								
	1,2,20		1,2,20		1,2,20									
Silicon Bronze	C	2,10*	B	2										
	2		2											
Phosphor Bronze	C	2												
	2													

BLOCK INTERPRETATION	
WELDABILITY A=Excellent, B=Good, C=Fair	ELECTRODE CONTACTING ALLOY 1
ELECTRODE CONTACTING ALLOY 2	

\* Electrode materials are second choices  
\*\* Alloy 1=Alloy 2 (refer to block interpretation)

**ALLOYS**  
 1=Class 1                      10=Class 10                      14=Class 14  
 2=Class 2                      11=Class 11                      20=Class 20  
 3=Class 3                      13=Class 13

## REFERENCE DATA

### GROUP A - COPPER BASE ALLOYS

CLASS	RWMA NO.	GENERAL USE	DESCRIPTION	AVAILABILITY*					
				1	2	3	4	5	6
<b>RWMA CLASS 1</b>									
ZIRCONIUM	1.15000	Electrodes for welding aluminum alloys, magnesium alloys, coated materials, brass and bronzes. Can be used for both spot and seam welding.	A specially heat treated zirconium copper alloy that meets the minimum electrical conductivity and hardness specification of Class 1 Alloy.		x	x			
CADMIUM	1.16200		A high conductivity cadmium copper alloy, not heat treatable, but can be work hardened.		x	x			
<b>RWMA CLASS 2</b>									
CHROMIUM- ZIRCONIUM	2.18150	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 & bronze. They are also used as flash welding dies, and as electrodes for the welding of steel & other coated materials.	A specially heat treated chromium zirconium copper alloy that meets the minimum electrical and hardness specification of Class 2 Alloys.	x	x	x			
CHROMIUM	2.18200		A high conductivity chromium copper alloy, that obtains its optimum properties from a combination of both heat treatment and cold work.	x	x	x	x	x	
<b>RWMA CLASS 3</b>									
COBALT-BERYLLIUM COPPER	3.17500	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 & fixtures. They can also be used for seam welder bearing and other current carrying structural parts.	Heat treatable copper alloys with a combination of high tensile strength and good electrical and thermal conductivity.	x	x	x	x	x	
NICKEL-BERYLLIUM COPPER	3.17500			x	x	x	x	x	
BERYLLIUM-FREE COPPER	3.18000			x	x	x	x		
<b>RWMA CLASS 4</b>									
BERYLLIUM	4.17200	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 & facings.	A heat treatable copper alloy having the unusual combination of very high strength and lower electrical conductivity than Class 3. Can be annealed, machined & reheat treated to regain its properties.	x	x	x	x	x	
<b>RWMA CLASS 5</b>									
ALUMINIUM	5.95300	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.	Copper base alloy usually furnished in the form of castings. It is not heat treatable.	x					

Continued on next page.

<b>GROUP B - REFRACTORY METAL COMPOSITION</b>											
CLASS	RWMA NO.	GENERAL USE	DESCRIPTION	AVAILABILITY*							
				1	2	3	4	5	6		
<b>RWMA CLASS 10</b>											
COPPER-TUNGSTEN	10.7445	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.	A powder metallurgical combination of 45% copper & 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.			x					x
<b>RWMA CLASS 11</b>											
COPPER-TUNGSTEN	11.744	Projection welding electrodes, flash & butt welding electrodes, light upsetting electroforming & seam welder bushings. Harder than Class 10 & used where moderate pressure required.	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 & electrical conductivity.				x				x
<b>RWMA CLASS 12</b>											
COPPER-TUNGSTEN	12.7435	Heavy duty projection welding electrodes electro-forming & electroforming electrodes, electrode facing for upsetting of studs and rivets, cross wire welding of large diameter wire and rod.	A powder metallurgical combination of 20% copper and 80% of the refractory metal tungsten. Not a true alloy. This combination produces dense, hard metals of superior wear resistance and strength at elevated temperatures.			x					x
<b>RWMA CLASS 13</b>											
TUNGSTEN	13.74300	Cross wire welding of copper & brass electro brazing and some electro upsetting. Welding of braided copper wire to other materials.	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.			x	x				x
<b>RWMA CLASS 14</b>											
MOLYBDENUM	14.42300	Cross wire welding of copper & brass electro brazing and some electro upsetting. Welding of braided copper wire to other materials.	Molybdenum is not as hard as Class 13 and can be drilled and machined to special contours.			x	x	x	x		x
<b>GROUP C - SPECIALTY MATERIAL</b>											
<b>RWMA CLASS 20</b>											
DISPERSION STRENGTHENED COPPER	20.15760	Welding of metallic coated metal such as galvanized steel, tern plate, etc.	A powder metallurgy material consisting of copper and aluminum oxide with high temperature hardness and physical properties different than the copper alloys.		x	x					
<p><b>*AVAILABILITY CODING EXPLANATION</b></p> <ul style="list-style-type: none"> <li>• 1 = CASTING</li> <li>• 2 = FORGING</li> <li>• 3 = ROD &amp; BAR</li> <li>• 4 = PLATE</li> <li>• 5 = TUBE</li> <li>• 6 = INSERTS</li> </ul> <p>• GENERAL SUGGESTED APPLICATIONS, NOT TO BE INTERPRETED AS THE OPTIMUM FOR ANY SPECIFIC APPLICATION</p>											



## REFERENCE DATA

### OVEREXPOSURE EFFECTS

TYPE/LOCATION OF OVEREXPOSURE	RWMA CLASS 1	RWMA CLASS 2	RWMA CLASS 3	ZIRCONIUM	TUNGSTEN	GLIDCOP
Skin: Irritation with possible discoloration of skin or hair.	X	X		X	X	N/A
Skin: Irritation with possible discoloration of skin (Copper). On broken skin, can cause granulomatous lesions (hard 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.			X			
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.	X	X		X	X	N/A
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 (Copper). Cough, substernal pain, moderate shortness of breath, some weight loss (Beryllium). Chronic Beryllium disease 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.			X			
Eyes: Metal particles penetrating the eyes may cause irritation discoloration and damage.	X	X		X	X	X
Eyes: Copper particles penetrating the eye may cause irritation discoloration and damage. Beryllium dust and fumes may cause irritation and conjunctivitis.			X			
Cadmium – reported to increase incidence of prostate cancer.		X				
Beryllium & Nickel – classed as suspect of carcinogenic potential for man.			X			
Chromium – dust and fumes can cause skin and pulmonary sensitization and is corrosive. Overexposure is unlikely to occur.		X				
<b>REACTIVITY</b>						
Hazardous Polymerization: Will not occur. Stability: Stable Incompatibility: Dust or fume contact / acetylene gas may cause formation of copper acetylenes which are sensitive to shock.	X	X	X	X		X
Hazardous Decomposition Products: Melting may generate harmful fumes.					X	
<b>EMERGENCY &amp; FIRST AID PROCEDURES</b>	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.					

## CONTRACT TERMS &amp; CONDITIONS APPLICABLE TO ALL SALES

**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.
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- 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.

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## CORPORATE ORGANIZATION

### CenterLine Locations



### CenterLine Group of Companies

Name	Location	Products	Facility Size Sq. Ft. (m <sup>2</sup> )
CenterLine (Windsor) Limited Machinery Division	Windsor, Ontario, Canada	Custom automated assembly systems (resistance, GMAW & laser welding, metal forming) and related machinery integration components (tooling, fixtures, end effectors, rotary tables, gauging)	150,000 (14,000)
CenterLine (Windsor) Limited Electrodes Division		Standard and custom electrodes, caps, nut & stud welding systems and related welding consumables	35,000 (3,250)
CenterLine (Windsor) Limited Automation Components Division		Resistance welding guns, actuators, metalworking press and cylinder packages, nut detection	54,000 (5,000)
CenterLine (Windsor) Limited Supersonic Spray Technologies		Cold spray metal coating equipment and supplies	4,000 (370)
CenterLine de México S. de R.L. de C.V	Querétaro, Qro Mexico	Pedestal welders, welding guns, consumable electrodes, tooling and fixtures	17,000 (1,580)
CenterLine Seubert GmbH	Breidenbach, Germany	Welding guns, actuators	16,000 (1,480)
CenterLine Brazil Solda e Automação Ltda	Guaramirim, SC Brazil	Pedestal welders, welding guns, consumable electrodes, tooling and fixtures	5,000 (460)
CenterLine India Pvt Ltd	New Delhi, India	Pedestal welders, welding guns, consumable electrodes, tooling and fixtures	10,000 (920)



**Key Services**

To effectively support operations and ensure our customers remain successful,

CenterLine supplies a number of key services, including:

**Sales and Commodity Management Support**

**Installation and Start-up Assistance**

**Design and Engineering Support (all major CAD platforms)**

**Full Project Management Assistance**

**Machinery and Process Control Programming Support**

**Preventative and Emergency Maintenance Support**

**Process, Prototype and Part Development (full metallurgical and welding lab facility)**

**Rebuild and/or Re-use Assistance (to refurbish and redeploy existing equipment)**

**Weld and Process Training (in-house and onsite)**

**Equipment Wellness Audits**

**Welding Process Development/Verification**

**Detailed Technical and Operating Documentation**



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