



Tuffaloy Welding Products
Catalog



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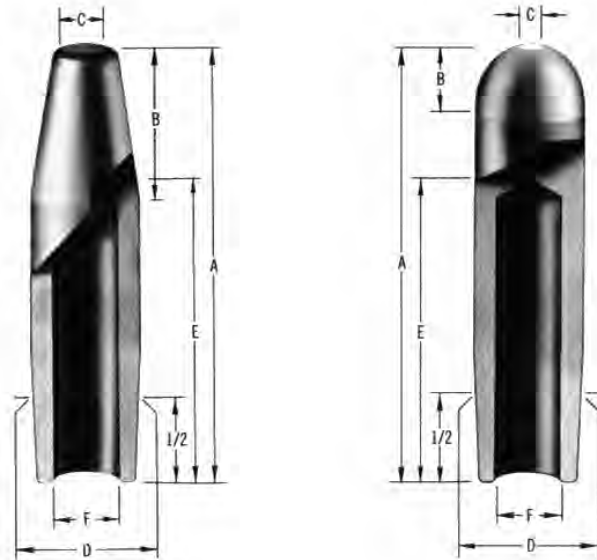
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Tuffaloy standard straight tips

Straight tips from TUFFALOY are distinguished for highest conductivity and resistance to deformation, which are the two major requirements of resistance welding tips. Modern manufacturing methods and constant scientific quality control make the difference, starting with the alloying of pure copper, through bar extrusion, and the conversion of this high-quality bar stock into welding tips.

TUFFALOY ensures conformity to all standard dimensions. Before shipment, all tips must pass inspection by gage for uniform length, taper, and outline of point.



'A' POINTED NOSE

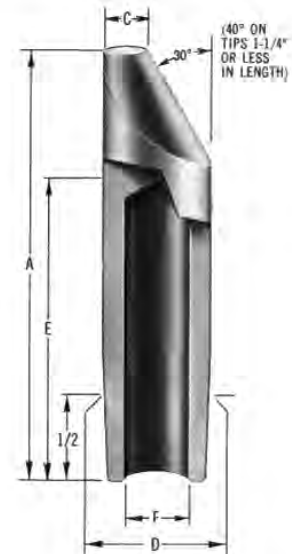
'B' DOME NOSE

A Overall Length	C Welding Face Dia.	D Gauging Dia.	E Water Hole Depth	F Water Hole Dia.	RWMA CLASS 1		RWMA CLASS 2		
					B Nose Length	Descrip- tion	Item No.	Descrip- tion	Item No.
NO. 4 RW TAPER - 1/2" DIAMETER									
1	3/16	.463	1/2	9/32	3/8	A-1404	131-1404	A-2404	132-2404
1-1/4	3/16	.463	3/4	9/32	3/4	A-1405	131-1405	A-2405	132-2405
1-1/2	3/16	.463	1	9/32	3/4	A-1406	131-1406	A-2406	132-2406
1-3/4	3/16	.463	1-1/4	9/32	3/4	A-1407	131-1407	A-2407	132-2407
2	3/16	.463	1-1/2	9/32	3/4	A-1408	131-1408	A-2408	132-2408
2-1/4	3/16	.463	1-3/4	9/32	3/4	A-1409	131-1409	A-2409	132-2409
2-1/2	3/16	.463	2	9/32	3/4	A-1410	131-1410	A-2410	132-2410
2-3/4	3/16	.463	2-1/4	9/32	3/4	A-1411	131-1411	A-2411	132-2411
3	3/16	.463	2-1/2	9/32	3/4	A-1412	131-1412	A-2412	132-2412
3-1/4	3/16	.463	2-3/4	9/32	3/4	A-1413	131-1413	A-2413	132-2413
3-1/2	3/16	.463	3	9/32	3/4	A-1414	131-1414	A-2414	132-2414
3-3/4	3/16	.463	3-1/4	9/32	3/4	A-1415	131-1415	A-2415	132-2415
4	3/16	.463	3-1/2	9/32	3/4	A-1416	131-1416	A-2416	132-2416
NO. 5 RW TAPER - 5/8" DIAMETER									
1-1/4	1/4	.613	3/4	3/8	1/2	A-1505	131-1505	A-2505	132-2505
1-1/2	1/4	.613	3/4	3/8	7/8	A-1506	131-1506	A-2506	132-2506
1-3/4	1/4	.613	1	3/8	7/8	A-1507	131-1507	A-2507	132-2507
2	1/4	.613	1-1/4	3/8	7/8	A-1508	131-1508	A-2508	132-2508
2-1/4	1/4	.613	1-1/2	3/8	7/8	A-1509	131-1509	A-2509	132-2509
2-1/2	1/4	.613	1-3/4	3/8	7/8	A-1510	131-1510	A-2510	132-2510
2-3/4	1/4	.613	2	3/8	7/8	A-1511	131-1511	A-2511	132-2511
3	1/4	.613	2-1/4	3/8	7/8	A-1512	131-1512	A-2512	132-2512
3-1/4	1/4	.613	2-1/2	3/8	7/8	A-1513	131-1513	A-2513	132-2513
3-1/2	1/4	.613	2-3/4	3/8	7/8	A-1514	131-1514	A-2514	132-2514
3-3/4	1/4	.613	3	3/8	7/8	A-1515	131-1515	A-2515	132-2515
4	1/4	.613	3-1/4	3/8	7/8	A-1516	131-1516	A-2516	132-2516
NO. 6 RW TAPER - 3/4" DIAMETER									
2	9/32	.731	1-1/4	7/16	1	A-1608	131-1608	A-2608	132-2608
2-1/2	9/32	.731	1-3/4	7/16	1	A-1610	131-1610	A-2610	132-2610
3	9/32	.731	2-1/4	7/16	1	A-1612	131-1612	A-2612	132-2612
3-1/2	9/32	.731	2-3/4	7/16	1	A-1614	131-1614	A-2614	132-2614
4	9/32	.731	3-1/4	7/16	1	A-1616	131-1616	A-2616	132-2616
NO. 7 RW TAPER - 7/8" DIAMETER									
2	5/16	.844	1-1/4	1/2	1-1/8	A-1708	131-1708	A-2708	132-2708
2-1/2	5/16	.844	1-3/4	1/2	1-1/8	A-1710	131-1710	A-2710	132-2710
3	5/16	.844	2-1/4	1/2	1-1/8	A-1712	131-1712	A-2712	132-2712
3-1/2	5/16	.844	2-3/4	1/2	1-1/8	A-1714	131-1714	A-2714	132-2714
4	5/16	.844	3-1/2	1/2	1-1/8	A-1716	131-1716	A-2716	132-2716
NO. 8 RW TAPER - 1" DIAMETER									
2	3/8	1.000	1-1/4	3/4	3/4	A-1808	131-1808	A-2808	132-2808
2-1/2	3/8	1.000	1-3/4	3/4	3/4	A-1810	131-1810	A-2810	132-2810
3	3/8	1.000	2-1/4	3/4	3/4	A-1812	131-1812	A-2812	132-2812
3-1/2	3/8	1.000	2-3/4	3/4	3/4	A-1814	131-1814	A-2814	132-2814
4	3/8	1.000	3-1/4	3/4	3/4	A-1816	131-1816	A-2816	132-2816

The bright shiny look of TUFFALOY tips is the result of a passivation process that eliminates excessive oxidation. It reflects the deep-down quality built into these tips and into all TUFFALOY products.

Only RWMA Class 1 (TUFFALOY 88) and Class 2 (TUFFALOY 77) tips are listed here. Class 3 alloy (TUFFALOY 55) tips are also available. For recommended uses of these alloys, see page 36.

To order Class 3 alloy tips, change description code to indicate it: see "Key to Description", page 4.

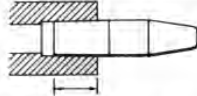


'C' FLAT NOSE

'D' OFFSET NOSE

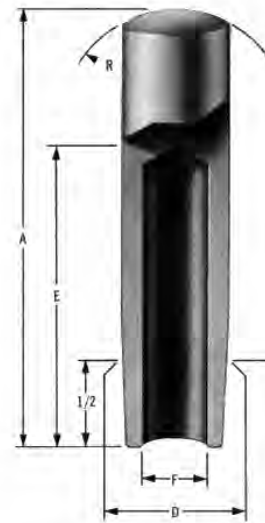
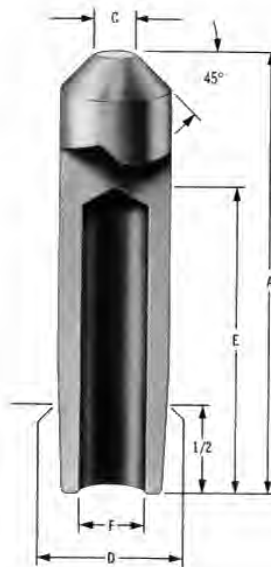
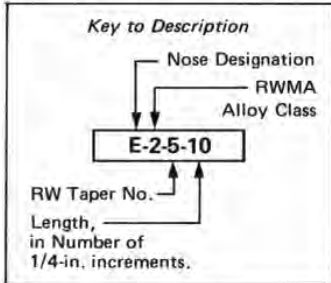
NO. 4 RW TAPER - 1/2" DIAMETER				RWMA CLASS 1				RWMA CLASS 2					
A Overall Length	D Gauging Dia.	E Water Hole Depth	F Water Hole Dia.	C Welding Face Dia.	Description	Item No.	Description	Item No.	C Welding Face Dia.	Description	Item No.	Description	Item No.
1	.463	1/2	9/32	1/2	C-1404	135-1404	C-2404	136-2404	3/16	D-1404	137-1404	D-2404	138-2404
1-1/4	.463	3/4	9/32	1/2	C-1405	135-1405	C-2405	136-2405	3/16	D-1405	137-1405	D-2405	138-2405
1-1/2	.463	1	9/32	1/2	C-1406	135-1406	C-2406	136-2406	3/16	D-1406	137-1406	D-2406	138-2406
1-3/4	.463	1-1/4	9/32	1/2	C-1407	135-1407	C-2407	136-2407	3/16	D-1407	137-1407	D-2407	138-2407
2	.463	1-1/2	9/32	1/2	C-1408	135-1408	C-2408	136-2408	3/16	D-1408	137-1408	D-2408	138-2408
2-1/4	.463	1-3/4	9/32	1/2	C-1409	135-1409	C-2409	136-2409	3/16	D-1409	137-1409	D-2409	138-2409
2-1/2	.463	2	9/32	1/2	C-1410	135-1410	C-2410	136-2410	3/16	D-1410	137-1410	D-2410	138-2410
2-3/4	.463	2-1/4	9/32	1/2	C-1411	135-1411	C-2411	136-2411	3/16	D-1411	137-1411	D-2411	138-2411
3	.463	2-1/2	9/32	1/2	C-1412	135-1412	C-2412	136-2412	3/16	D-1412	137-1412	D-2412	138-2412
3-1/4	.463	2-3/4	9/32	1/2	C-1413	135-1413	C-2413	136-2413	3/16	D-1413	137-1413	D-2413	138-2413
3-1/2	.463	3	9/32	1/2	C-1414	135-1414	C-2414	136-2414	3/16	D-1414	137-1414	D-2414	138-2414
3-3/4	.463	3-1/4	9/32	1/2	C-1415	135-1415	C-2415	136-2415	3/16	D-1415	137-1415	D-2415	138-2415
4	.463	3-1/2	9/32	1/2	C-1416	135-1416	C-2416	136-2416	3/16	D-1416	137-1416	D-2416	138-2416
NO. 5 RW TAPER - 5/8" DIAMETER				RWMA CLASS 1				RWMA CLASS 2					
1-1/4	.613	3/4	3/8	5/8	C-1505	135-1505	C-2505	136-2505	1/4	D-1505	137-1505	D-2505	138-2505
1-1/2	.613	3/4	3/8	5/8	C-1506	135-1506	C-2506	136-2506	1/4	D-1506	137-1506	D-2506	138-2506
1-3/4	.613	1	3/8	5/8	C-1507	135-1507	C-2507	136-2507	1/4	D-1507	137-1507	D-2507	138-2507
2	.613	1-1/4	3/8	5/8	C-1508	135-1508	C-2508	136-2508	1/4	D-1508	137-1508	D-2508	138-2508
2-1/4	.613	1-1/2	3/8	5/8	C-1509	135-1509	C-2509	136-2509	1/4	D-1509	137-1509	D-2509	138-2509
2-1/2	.613	1-3/4	3/8	5/8	C-1510	135-1510	C-2510	136-2510	1/4	D-1510	137-1510	D-2510	138-2510
2-3/4	.613	2	3/8	5/8	C-1511	135-1511	C-2511	136-2511	1/4	D-1511	137-1511	D-2511	138-2511
3	.613	2-1/4	3/8	5/8	C-1512	135-1512	C-2512	136-2512	1/4	D-1512	137-1512	D-2512	138-2512
3-1/4	.613	2-1/2	3/8	5/8	C-1513	135-1513	C-2513	136-2513	1/4	D-1513	137-1513	D-2513	138-2513
3-1/2	.613	2-3/4	3/8	5/8	C-1514	135-1514	C-2514	136-2514	1/4	D-1514	137-1514	D-2514	138-2514
3-3/4	.613	3	3/8	5/8	C-1515	135-1515	C-2515	136-2515	1/4	D-1515	137-1515	D-2515	138-2515
4	.613	3-1/4	3/8	5/8	C-1516	135-1516	C-2516	136-2516	1/4	D-1516	137-1516	D-2516	138-2516
NO. 6 RW TAPER - 3/4" DIAMETER				RWMA CLASS 1				RWMA CLASS 2					
2	.731	1-1/4	7/16	3/4	C-1608	135-1608	C-2608	136-2608	9/32	D-1608	137-1608	D-2608	138-2608
2-1/2	.731	1-3/4	7/16	3/4	C-1610	135-1610	C-2610	136-2610	9/32	D-1610	137-1610	D-2610	138-2610
3	.731	2-1/4	7/16	3/4	C-1612	135-1612	C-2612	136-2612	9/32	D-1612	137-1612	D-2612	138-2612
3-1/2	.731	2-3/4	7/16	3/4	C-1614	135-1614	C-2614	136-2614	9/32	D-1614	137-1614	D-2614	138-2614
4	.731	3-1/4	7/16	3/4	C-1616	135-1616	C-2616	136-2616	9/32	D-1616	137-1616	D-2616	138-2616
NO. 7 RW TAPER - 7/8" DIAMETER				RWMA CLASS 1				RWMA CLASS 2					
2	.844	1-1/4	1/2	7/8	C-1708	135-1708	C-2708	136-2708	5/16	D-1708	137-1708	D-2708	138-2708
2-1/2	.844	1-3/4	1/2	7/8	C-1710	135-1710	C-2710	136-2710	5/16	D-1710	137-1710	D-2710	138-2710
3	.844	2-1/4	1/2	7/8	C-1712	135-1712	C-2712	136-2712	5/16	D-1712	137-1712	D-2712	138-2712
3-1/2	.844	2-3/4	1/2	7/8	C-1714	135-1714	C-2714	136-2714	5/16	D-1714	137-1714	D-2714	138-2714
4	.844	3-1/2	1/2	7/8	C-1716	135-1716	C-2716	136-2716	5/16	D-1716	137-1716	D-2716	138-2716

Tuffaloy standard straight tips



TAPER ENGAGEMENT

TIP SIZE	LENGTH
4 RW	1/2-in.
5 RW	3/4-in.
6 RW	7/8-in.
7 RW	1-1/8-in.



'E' TRUNCATED CONE

'F' RADIUS FACED

A Overall Length	D Gauging Dia.	E Water Hole Depth	F Water Hole Dia.
NO. 4 RW TAPER — 1/2" DIAMETER			
1	.463	1/2	9/32
1-1/4	.463	3/4	9/32
1-1/2	.463	1	9/32
1-3/4	.463	1-1/4	9/32
2	.463	1-1/2	9/32
2-1/4	.463	1-3/4	9/32
2-1/2	.463	2	9/32
2-3/4	.463	2-1/4	9/32
3	.463	2-1/2	9/32
3-1/4	.463	2-3/4	9/32
3-1/2	.463	3	9/32
3-3/4	.463	3-1/4	9/32
4	.463	3-1/2	9/32

C Welding Face Dia.	RWMA CLASS 1		RWMA CLASS 2	
	Description	Item No.	Description	Item No.
3/16	E-1404	140-1404	E-2404	140-2404
3/16	E-1405	140-1405	E-2405	140-2405
3/16	E-1406	140-1406	E-2406	140-2406
3/16	E-1407	140-1407	E-2407	140-2407
3/16	E-1408	140-1408	E-2408	140-2408
3/16	E-1409	140-1409	E-2409	140-2409
3/16	E-1410	140-1410	E-2410	140-2410
3/16	E-1411	140-1411	E-2411	140-2411
3/16	E-1412	140-1412	E-2412	140-2412
3/16	E-1413	140-1413	E-2413	140-2413
3/16	E-1414	140-1414	E-2414	140-2414
3/16	E-1415	140-1415	E-2415	140-2415
3/16	E-1416	140-1416	E-2416	140-2416

R Nose Radius	RWMA CLASS 1		RWMA CLASS 2	
	Description	Item No.	Description	Item No.
2	F-1404	141-1404	F-2404	141-2404
2	F-1405	141-1405	F-2405	141-2405
2	F-1406	141-1406	F-2406	141-2406
2	F-1407	141-1407	F-2407	141-2407
2	F-1408	141-1408	F-2408	141-2408
2	F-1409	141-1409	F-2409	141-2409
2	F-1410	141-1410	F-2410	141-2410
2	F-1411	141-1411	F-2411	141-2411
2	F-1412	141-1412	F-2412	141-2412
2	F-1413	141-1413	F-2413	141-2413
2	F-1414	141-1414	F-2414	141-2414
2	F-1415	141-1415	F-2415	141-2415
2	F-1416	141-1416	F-2416	141-2416

A Overall Length	D Gauging Dia.	E Water Hole Depth	F Water Hole Dia.
NO. 5 RW TAPER — 5/8" DIAMETER			
1-1/4	.613	3/4	3/8
1-1/2	.613	3/4	3/8
1-3/4	.613	1	3/8
2	.613	1-1/4	3/8
2-1/4	.613	1-1/2	3/8
2-1/2	.613	1-3/4	3/8
2-3/4	.613	2	3/8
3	.613	2-1/4	3/8
3-1/4	.613	2-1/2	3/8
3-1/2	.613	2-3/4	3/8
3-3/4	.613	3	3/8
4	.613	3-1/4	3/8

C Welding Face Dia.	RWMA CLASS 1		RWMA CLASS 2	
	Description	Item No.	Description	Item No.
1/4	E-1505	140-1505	E-2505	140-2505
1/4	E-1506	140-1506	E-2506	140-2506
1/4	E-1507	140-1507	E-2507	140-2507
1/4	E-1508	140-1508	E-2508	140-2508
1/4	E-1509	140-1509	E-2509	140-2509
1/4	E-1510	140-1510	E-2510	140-2510
1/4	E-1511	140-1511	E-2511	140-2511
1/4	E-1512	140-1512	E-2512	140-2512
1/4	E-1513	140-1513	E-2513	140-2513
1/4	E-1514	140-1514	E-2514	140-2514
1/4	E-1515	140-1515	E-2515	140-2515
1/4	E-1516	140-1516	E-2516	140-2516

R Nose Radius	RWMA CLASS 1		RWMA CLASS 2	
	Description	Item No.	Description	Item No.
2	F-1505	141-1505	F-2505	141-2505
2	F-1506	141-1506	F-2506	141-2506
2	F-1507	141-1507	F-2507	141-2507
2	F-1508	141-1508	F-2508	141-2508
2	F-1509	141-1509	F-2509	141-2509
2	F-1510	141-1510	F-2510	141-2510
2	F-1511	141-1511	F-2511	141-2511
2	F-1512	141-1512	F-2512	141-2512
2	F-1513	141-1513	F-2513	141-2513
2	F-1514	141-1514	F-2514	141-2514
2	F-1515	141-1515	F-2515	141-2515
2	F-1516	141-1516	F-2516	141-2516

A Overall Length	D Gauging Dia.	E Water Hole Depth	F Water Hole Dia.
NO. 6 RW TAPER — 3/4" DIAMETER			
2	.731	1-1/4	7/16
2-1/2	.731	1-3/4	7/16
3	.731	2-1/4	7/16
3-1/2	.731	2-3/4	7/16
4	.731	3-1/4	7/16

C Welding Face Dia.	RWMA CLASS 1		RWMA CLASS 2	
	Description	Item No.	Description	Item No.
9/32	E-1608	140-1608	E-2608	140-2608
9/32	E-1610	140-1610	E-2610	140-2610
9/32	E-1612	140-1612	E-2612	140-2612
9/32	E-1614	140-1614	E-2614	140-2614
9/32	E-1616	140-1616	E-2616	140-2616

R Nose Radius	RWMA CLASS 1		RWMA CLASS 2	
	Description	Item No.	Description	Item No.
4	F-1608	141-1608	F-2608	141-2608
4	F-1610	141-1610	F-2610	141-2610
4	F-1612	141-1612	F-2612	141-2612
4	F-1614	141-1614	F-2614	141-2614
4	F-1616	141-1616	F-2616	141-2616

A Overall Length	D Gauging Dia.	E Water Hole Depth	F Water Hole Dia.
NO. 7 RW TAPER — 7/8" DIAMETER			
2	.844	1-1/4	1/2
2-1/2	.844	1-3/4	1/2
3	.844	2-1/4	1/2
3-1/2	.844	2-3/4	1/2
4	.844	3-1/2	1/2

C Welding Face Dia.	RWMA CLASS 1		RWMA CLASS 2	
	Description	Item No.	Description	Item No.
5/16	E-1708	140-1708	E-2708	140-2708
5/16	E-1710	140-1710	E-2710	140-2710
5/16	E-1712	140-1712	E-2712	140-2712
5/16	E-1714	140-1714	E-2714	140-2714
5/16	E-1716	140-1716	E-2716	140-2716

R Nose Radius	RWMA CLASS 1		RWMA CLASS 2	
	Description	Item No.	Description	Item No.
6	F-1708	141-1708	F-2708	141-2708
6	F-1710	141-1710	F-2710	141-2710
6	F-1712	141-1712	F-2712	141-2712
6	F-1714	141-1714	F-2714	141-2714
6	F-1716	141-1716	F-2716	141-2716

Tuffcap caps and shanks

Tuffcap electrodes consist of two pieces: a shank and a replaceable cap. These two-part electrodes can offer major economies, because when the nose geometry is worn out, only the cap need be replaced. And it costs far less than a standard one-piece electrode. (A Tuffcap shank will normally outlast ten to twelve caps.) Also, electrode inventory can be kept small because all nose designs will fit the same size shank.

TWO TYPES: TUFFALOY offers two kinds of Tuffcap electrodes. One uses a male cap that fits into the shank. The other has a female cap that fits over the shank. The major functional difference is that coolant water enters male caps, and does not enter female caps (unless ordered with through-holes).

MALE CAPS are available in the widest range of sizes, alloys, and styles. They are made in both Class 1 and Class 2 alloy, and in sizes to fit shanks sized 4 through 7 RW. They are more effectively cooled than female caps.

FEMALE CAPS are made in the same nose designs as the male caps, in conformance with RWMA standards. They are made of Class 2 alloy. Female caps can be changed without shutting off coolant water, and are less likely to leak.

SHANKS are made of Class 2 alloy, either straight, or bent to provide an offset. Shanks other than those cataloged can be special ordered. Tuffcap caps and shanks should be used only in a directly opposed, straight-line manner. They do not work as well as standard electrodes on heavily coated metal such as galvanized or tin-plate.

TUFFTRODE-Z CAPS for coated steels

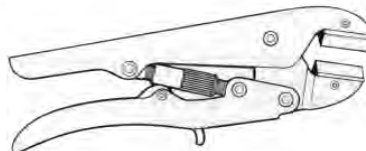
To avoid electrode sticking problems common when welding galvanized and aluminized materials, these copper-zirconium alloy caps are offered. They give the same performance as dispersion-strengthened caps but cost far less. They are roughly equivalent to Class 2 caps in mechanical and physical properties.

Both male and female caps are offered in the same nose designs as Class 1 & 2 caps, but only in 1/2-in. and 5/8-in. diameter (to fit shanks with 4RW and 5RW taper).

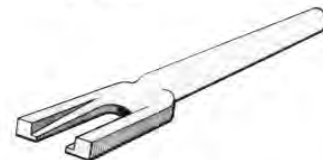
SPECIFICATIONS: Nominal composition, Cr .9-1.2%, Zr .02-.08%, Cu balance; conductivity, 83-88%, Hardness, Rockwell B 83.



Male cap extractor has long-lever handles for easier cap removal. In two dual-size models: EX-45 and EX-56.



Toggle-type male cap extractor, model EX-4 adjusts to handle size 4 & 5 RW shanks and caps.



Female cap extractors are made for three Tuffcap shank sizes: Models EX-4F, EX-5F, and EX-6F.

Male Cap Type
Electrode Assembly

Female Cap Type
Electrode Assembly



Size 5 RW straight and offset style shanks holding male type caps with swivel heads. These caps are cataloged on page 12.

NEW! SUPER NOSE DESIGN CAPS

To avoid mushrooming and brassing problems associated with standard designs, these caps have a self-dressing weld face ring that acts as a control zone. The Super Nose caps are available in TUFFALOY'S new "Z" material, that eliminates electrode sticking problems common when welding galvanized and aluminized materials.

Both male and female designs are offered, designed to fit shanks with 5 RW taper.

U.S. Patent Number
5,155,320
Other patents pending

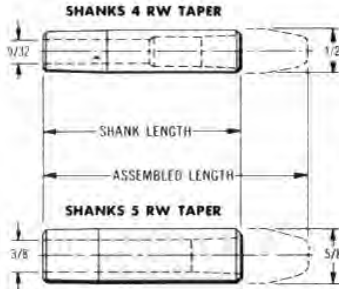


CAP EXTRACTORS

Remove caps easily without damage.
Item numbers are on page 42.

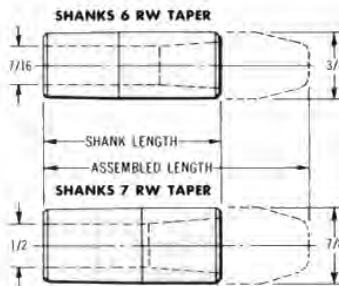
Tuffcap caps and shanks

STRAIGHT SHANKS FOR MALE CAPS (CLASS 3 AVAILABLE)



Shank Length	Assembled Length	Description	Item No.
1-1/4	2	TG-2405	161-2405
1-1/2	2-1/4	TG-2406	161-2406
1-3/4	2-1/2	TG-2407	161-2407
2	2-3/4	TG-2408	161-2408
2-1/4	3	TG-2409	161-2409
2-1/2	3-1/4	TG-2410	161-2410
2-3/4	3-1/2	TG-2411	161-2411
3	3-3/4	TG-2412	161-2412
3-1/4	4	TG-2413	161-2413

1-1/4	2	TG-2505	161-2505
1-1/2	2-1/4	TG-2506	161-2506
1-3/4	2-1/2	TG-2507	161-2507
2	2-3/4	TG-2508	161-2508
2-1/4	3	TG-2509	161-2509
2-1/2	3-1/4	TG-2510	161-2510
2-3/4	3-1/2	TG-2511	161-2511
3	3-3/4	TG-2512	161-2512
3-1/4	4	TG-2513	161-2513

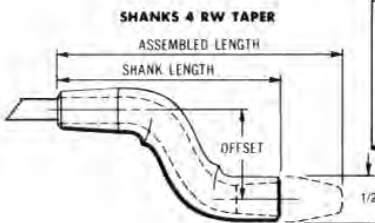


1-1/2	2-1/2	TG-2606	161-2606
2	3	TG-2608	161-2608
2-1/2	3-1/2	TG-2610	161-2610
3	4	TG-2612	161-2612

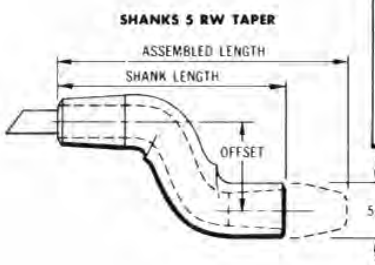
1-1/2	2-1/2	TG-2706	161-2706
2	3	TG-2708	161-2708
2-1/2	3-1/2	TG-2710	161-2710
3	4	TG-2712	161-2712



BENT SHANKS FOR MALE CAPS (CLASS 3 AVAILABLE)

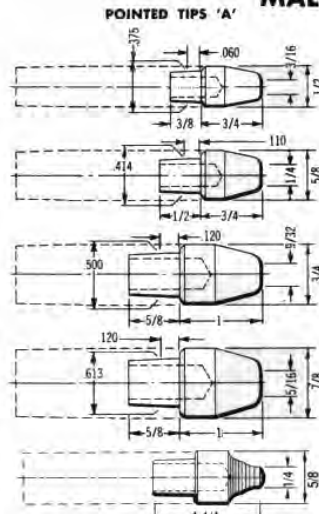


Shank Length	Off-set	Length	Description	Item No.
2-1/2	1/2	3-1/4	TG-2410-08	162-2410
2-1/2	3/4	3-1/4	TG-2410-12	162-2420
2-1/2	1	3-1/4	TG-2410-16	162-2430
3	1/2	3-3/4	TG-2412-8	162-2450
3	1-1/4	3-3/4	TG-2412-20	162-2460
3-1/4	1	4	TG-2413-16	162-2470
3-1/4	1-1/4	4	TG-2413-20	162-2480

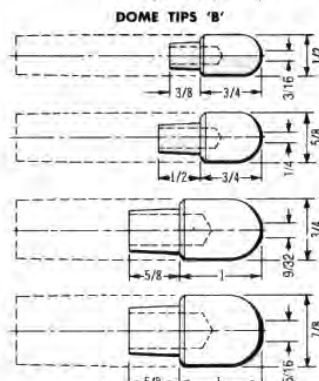


2-1/4	1/4	3	TG-2509-4	162-2505
2-1/2	1/2	3-1/4	TG-2510-8	162-2510
2-1/2	3/4	3-1/4	TG-2510-12	162-2520
2-1/2	1	3-1/4	TG-2510-16	162-2530
3	1/2	3-3/4	TG-2512-8	162-2550
3	1-1/4	3-3/4	TG-2512-20	162-2560
3-1/4	1	4	TG-2513-16	162-2570
3-1/4	1-1/4	4	TG-2513-20	162-2580

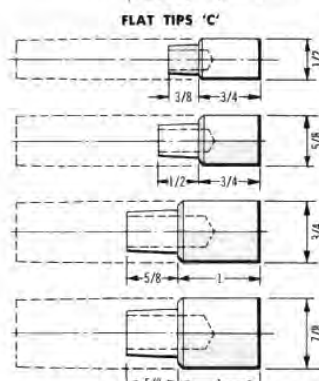
MALE CAPS



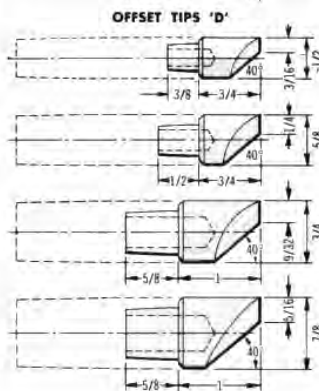
Alloy Class	Taper of Adapter Shank	Description	Item No.
1	4RW	TA-14	111-0014
2	4RW	TA-24	112-0024
3	4RW	TA-34	122-1034
1	5RW	TA-15	111-0015
1&2	5RW	TA-25Z	126-0025
2	5RW	TA-25	112-0025
3	5RW	TA-35	122-1035
1	6RW	TA-16	111-0016
2	6RW	TA-26	112-0026
1	7RW	TA-17	111-0017
2	7RW	TA-27	112-0027
Z	5RW	TS-25Z	127-0025
Z	4RW	TS24Z	127-0024



1	4RW	TB-14	113-0014
2	4RW	TB-24	114-0024
1	5RW	TB-15	113-0015
2	5RW	TB-25	114-0025
1	6RW	TB-16	113-0016
2	6RW	TB-26	114-0026
1	7RW	TB-17	113-0017
2	7RW	TB-27	114-0027

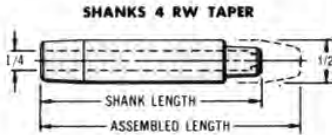


1	4RW	TC-14	115-0014
2	4RW	TC-24	116-0024
3	4RW	TG-34	122-3034
1	5RW	TC-15	115-0015
2	5RW	TC-25	116-0025
3	5RW	TC-35	122-3035
1	6RW	TC-16	115-0016
2	6RW	TC-26	116-0026
1	7RW	TC-17	115-0017
2	7RW	TC-27	116-0027

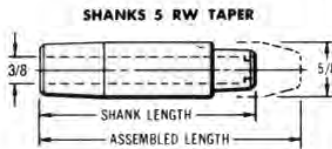


1	4RW	TD-14	117-0014
2	4RW	TD-24	118-0024
3	4RW	TD-34	122-4034
1	5RW	TD-15	117-0015
2	5RW	TD-25	118-0025
3	5RW	TD-35	122-4035
1	6RW	TD-16	117-0016
2	6RW	TD-26	118-0026
1	7RW	TD-17	117-0017
2	7RW	TD-27	118-0027

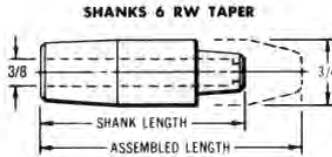
**STRAIGHT SHANKS FOR FEMALE CAPS
(CLASS 3 AVAILABLE)**



Shank Length	Assembled Length	Description	Item No.
1-1/2	2	TP-2406	163-2406
1-3/4	2-1/4	TP-2407	163-2407
2	2-1/2	TP-2408	163-2408
2-1/4	2-3/4	TP-2409	163-2409
2-1/2	3	TP-2410	163-2410
2-3/4	3-1/4	TP-2411	163-2411
3	3-1/2	TP-2412	163-2412
3-1/4	3-3/4	TP-2413	163-2413
3-1/2	4	TP-2414	163-2414



Shank Length	Assembled Length	Description	Item No.
1-1/2	2	TP-2506	163-2506
1-3/4	2-1/4	TP-2507	163-2507
2	2-1/2	TP-2508	163-2508
2-1/4	2-3/4	TP-2509	163-2509
2-1/2	3	TP-2510	163-2510
2-3/4	3-1/4	TP-2511	163-2511
3	3-1/2	TP-2512	163-2512
3-1/4	3-3/4	TP-2513	163-2513
3-1/2	4	TP-2514	163-2514



Shank Length	Assembled Length	Description	Item No.
1-1/2	2	TP-2606	163-2606
2	2-1/2	TP-2608	163-2608
2-1/2	3	TP-2610	163-2610
3	3-1/2	TP-2612	163-2612

**'E' NOSE
4 AND 5 CAP**

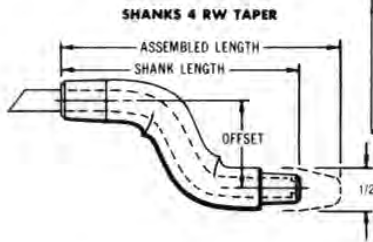


**'F' NOSE
4 AND 5 CAP**

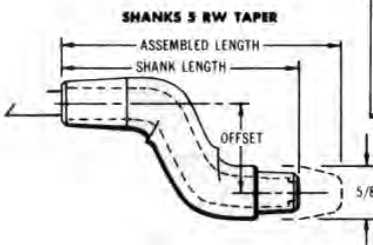


For improved cooling, female shanks are drilled through (to put water in contact with cap). Shanks may be ordered with blind water hole, upon request. (Special price.)

**BENT SHANKS FOR FEMALE CAPS
(CLASS 3 AVAILABLE)**

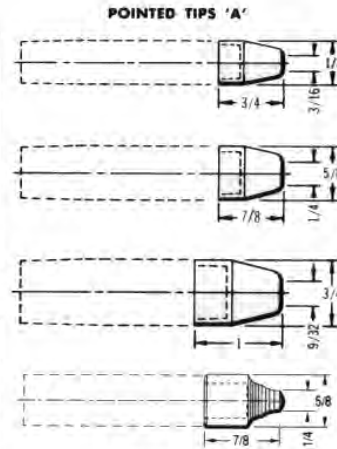


Shank Length	Offset	Length	Description	Item No.
2-3/4	1/2	3-1/4	TP-2411-08	164-2442
2-3/4	3/4	3-1/4	TP-2411-12	164-2445
2-3/4	1	3-1/4	TP-2411-16	164-2447
3-1/4	1/2	3-3/4	TP-2413-08	164-2465
3-1/4	1-1/4	3-3/4	TP-2413-20	164-2480
3-1/2	1	4	TP-2414-16	164-2490



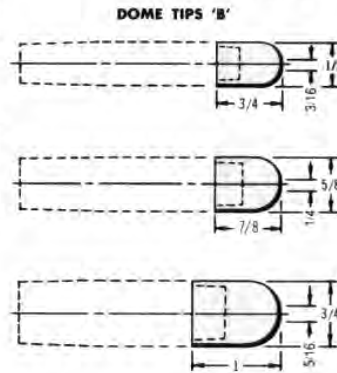
Shank Length	Offset	Length	Description	Item No.
2-3/4	1/2	3-1/4	TP-2511-08	164-2542
2-3/4	3/4	3-1/4	TP-2511-12	164-2545
2-3/4	1	3-1/4	TP-2511-16	164-2547
3-1/4	1/2	3-3/4	TP-2513-08	164-2565
3-1/2	1	4	TP-2513-16	164-2570
3-1/4	1-1/4	3-3/4	TP-2513-20	164-2580

FEMALE CAPS

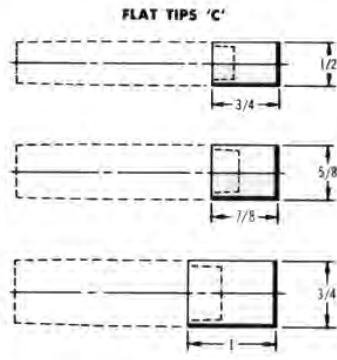


Alloy Class	Taper of Adapter Shank	Description	Item No.
2	4RW	TP-24A	125-0241
2	5RW	TP-25A	125-0251
2	6RW	TP-26A	125-0261
Z	5RW	TP-25SZ	127-0251
Z	4RW	TP24SZ	127-0241

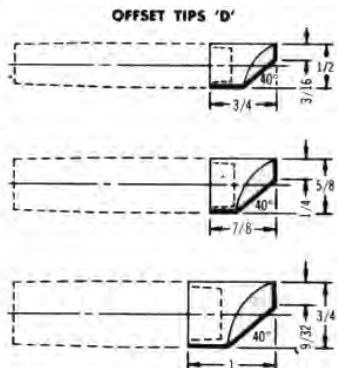
Other sizes available



Alloy Class	Taper of Adapter Shank	Description	Item No.
2	4RW	TP-24B	125-0242
2	5RW	TP-25B	125-0252
2	6RW	TP-26B	125-0262



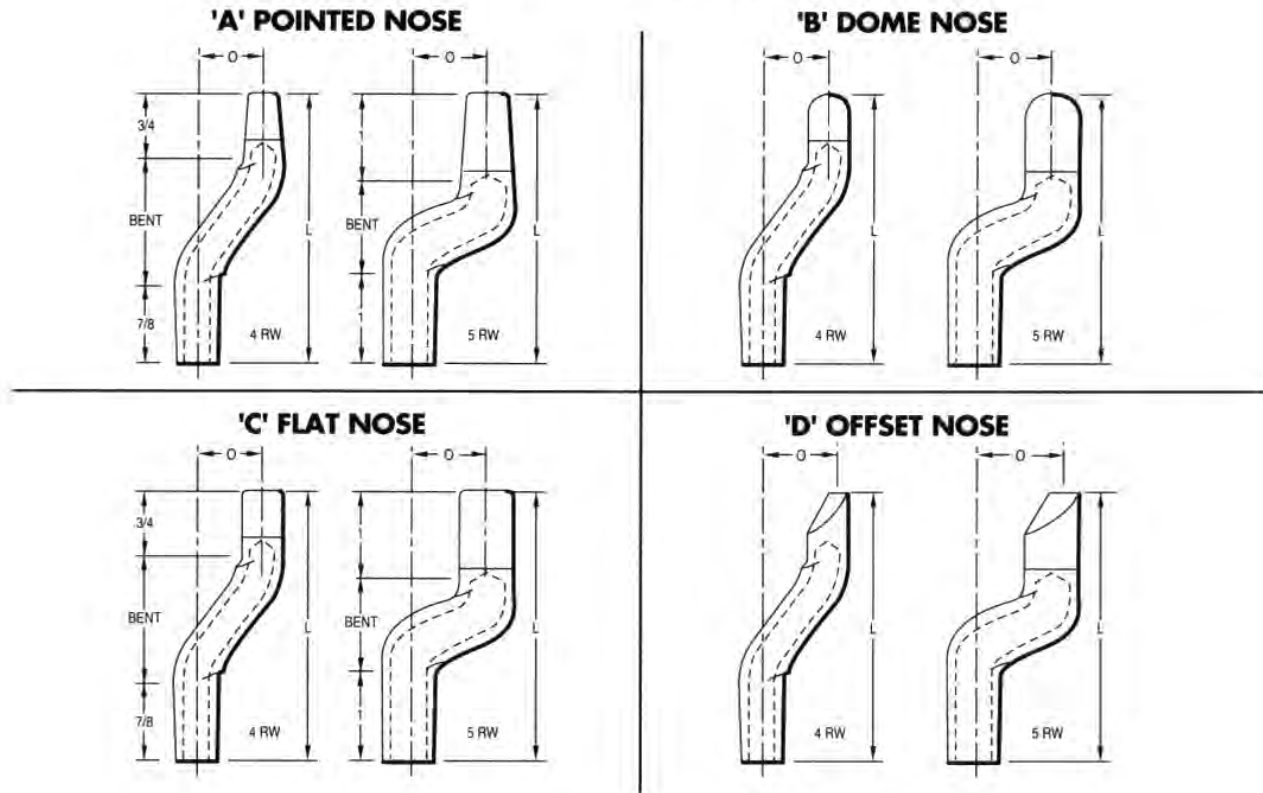
Alloy Class	Taper of Adapter Shank	Description	Item No.
2	4RW	TP-24C	125-0243
2	5RW	TP-25C	125-0253
2	6RW	TP-26C	125-0263



Alloy Class	Taper of Adapter Shank	Description	Item No.
2	4RW	TP-24D	125-0244
2	5RW	TP-25D	125-0254
2	6RW	TP-26D	125-0264

Tuffaloy bent tips

DOUBLE-BEND, ADDITIONAL NOSE DESIGNS



TUFFALOY has a wide selection of double bent electrodes as standards. Select the nose, alloy, taper-length and offset you need from the table below.

Key to Description

FX-YZLD-O

Example: **FB-1438-16**

F = Cold-Formed, Double-Bend Tips

X = Nose Type
 A _____
 B _____
 C _____
 D _____

Y = RWMA Alloy Class
 1 = Class 1
 2 = Class 2

Z = RW Taper Number
 4 = 4RW
 5 = 5RW

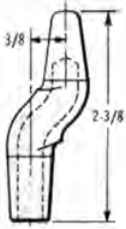
L = Length in inches
 Refer to table for availability

D = Additional Length in 16ths

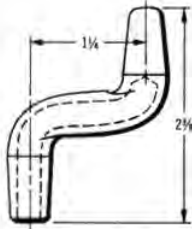
O = Offset in 16ths
 Refer to table for availability

Length	OFFSET							
	1/4 Description	3/8 Description	1/2 Description	3/4 Description	1 Description	1-1/4 Description	1-1/2 Description	1-3/4 Description
1-1/2	FA-2518-4		FA-2518-8	FA-2518-12	FA-2518-16			
1-5/8	FA-25110-4		FA-25110-8	FA-25110-12	FA-25110-16			
1-3/4	FA-25112-4		FA-25112-8	FA-25112-12	FA-25112-16			
1-7/8	FA-25114-4		FA-25114-8	FA-25114-12	FA-25114-16			
2	FA-2520-4		FA-2520-8	FA-2520-12	FA-2520-16			
2-1/8	FA-25-22-4		FA-2522-8	FA-2522-12	FA-2522-16			
2-3/16					FA-2523-16			
2-1/4	FA-25224-4		FA-2524-8	FA-2524-12	FA-2524-16			
2-3/8	FA-2526-4	FA-2526-6	FA-2526-8	FA-2526-12	FA-2526-16			
2-1/2	FA-2528-4		FA-2528-8	FA-2528-12	FA-2528-16	FA-2528-20	FA-2528-24	FA-2528-28
2-5/8	FA-25210-4		FA-25210-8	FA-25210-12	FA-25210-16	FA-25210-20	FA-25210-24	FA-25210-28
2-3/4	FA-25212-4		FA-25212-8	FA-25212-12	FA-25212-16	FA-25212-20	FA-25212-24	FA-25212-28
2-7/8	FA-25214-4		FA-25214-8	FA-25214-12	FA-25214-16	FA-25214-20	FA-25214-24	FA-25214-28
3	FA-2530-4		FA-2530-8	FA-2530-12	FA-2530-16	FA-2530-20	FA-2530-24	FA-2530-28
3-1/8	FA-2532-4		FA-2532-8	FA-2532-12	FA-2532-16	FA-2532-20	FA-2532-24	FA-2532-28
3-1/4	FA-2534-4		FA-2534-8	FA-2534-12	FA-2534-16	FA-2534-20	FA-2534-24	FA-2534-28
3-3/8	FA-2536-4	FA-2536-6	FA-2536-8	FA-2536-12	FA-2536-16	FA-2536-20	FA-2536-24	FA-2536-28
3-1/2	FA-2538-4		FA-2538-8	FA-2538-12	FA-2538-16	FA-2538-20	FA-2538-24	FA-2538-28

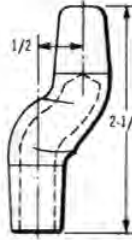
'A' POINTED NOSE



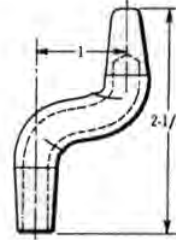
FA-1426-6 | FA-2426-6
FA-1526-6 | FA-2526-6



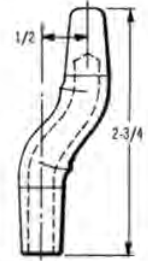
FA-1426-20 | FA-2426-20



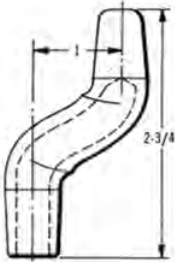
FA-2428-8
FA-1528-8 | FA-2528-8



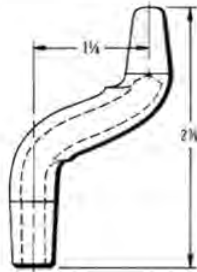
FA-1428-16 | FA-2428-16
FA-1528-16 | FA-2528-16



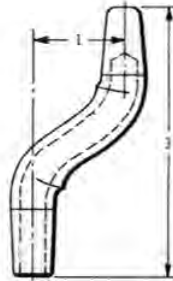
FA-14212-8 | FA-24212-8
FA-15212-8 | FA-25212-8



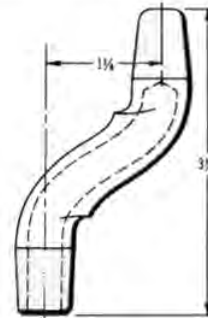
FA-15212-16 | FA-25212-16



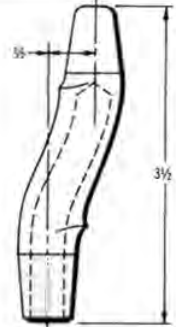
FA-14214-20 | FA-24214-20
FA-15214-20 | FA-25214-20



FA-14030-16 | FA-2430-16

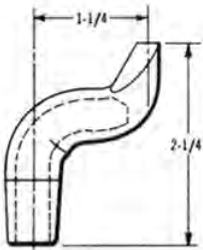


FA-2436-20
FA-1536-20 | FA-2536-20

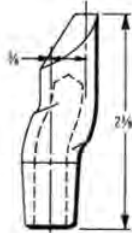


FA-1538-8 | FA-2538-8

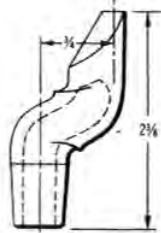
'D' OFFSET NOSE



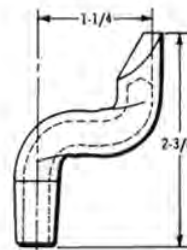
FD-1524-20 | FD-2524-20



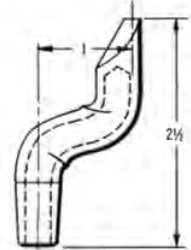
FD-2526-6



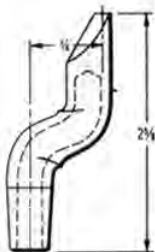
FD-1526-12 | FD-2526-12



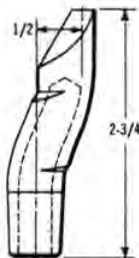
FD-1426-20 | FD-2426-20



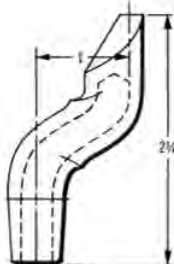
FD-1428-16 | FD-2428-16



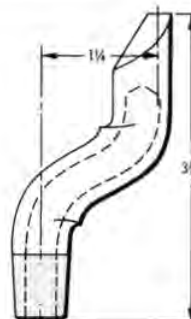
FD-24210-12



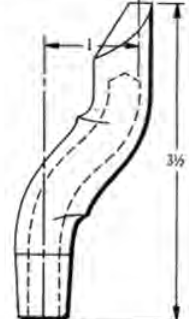
FD-24212-8
FD-15212-8 | FD-25212-8



FD-15212-16 | FD-25212-16



FD-1536-20 | FD-2536-20



FD-2538-16

(Refer to table for complete specifications.)

Tuffaloy bent tips

DOUBLE-BEND, WITH STANDARD NOSE DESIGNS

These standard cold-formed tips are bent from straight tips (some after added machining) and have the same hardness and conductivity. They outlast, many times over, the old cast and forged tips of similar geometry, which are impossible to cool adequately.

The table shows a wide range of tips generally available from stock. For sizes not shown, refer to the diagrams and description key at the bottom of the page, and order what you need. All measurements

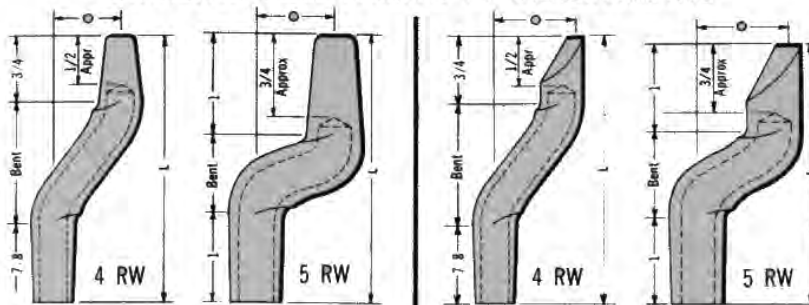
will be accurate. However, over-all length, in $\frac{1}{8}$ -in. multiples, will be held to within $\frac{1}{16}$ -in. Lengths will not vary from one order to the next.

Tapers, water holes, and nose designs are the same as the standard straight tips in this catalog. Water tubes can be furnished.

Standard nose designs other than those shown here may be furnished on short order. Follow the "Key to Description", using a 'B' for Dome nose, 'C' for flat nose, 'E' for truncated cone, and 'F' for radius nose.

Taper No.	Length	Offset	CLASS 1				CLASS 2			
			FA Pointed Nose		FD Offset Nose		FA Pointed Nose		FD Offset Nose	
			Description	Item No.	Description	Item No.	Description	Item No.	Description	Item No.
4 RW	1-1/16	1/2					FA-2317-8	167-0060		
	2-3/16	1							FD-2423-16	167-2080
	2-1/4	1/2	FA-1424-8	165-0100			FA-2424-8	167-0100		
	2-1/4	3/4					FA-2424-12	167-0120		
	2-3/8	3/8	FA-1426-6	165-0160			FA-2426-6	167-0160		
	2-3/8	3/4					FA-2426-12	167-0180		
	2-3/8	1-1/4	FA-1426-20	165-0200	FD-1426-20	165-2200	FA-2426-20	167-0200	FD-2426-20	167-2200
	2-1/2	1/2					FA-2428-8	167-0240		
	2-1/2	1	FA-1428-16	165-0280	FD-1428-16	165-2280	FA-2428-16	167-0280	FD-2428-16	167-2280
	2-5/8	3/4	FA-14210-12	165-0320			FA-24210-12	167-0320	FD-24210-12	167-2320
	2-3/4	1/2	FA-14212-8	165-0360			FA-24212-8	167-0360	FD-24212-8	167-2360
	2-3/4	1					FA-24212-16	167-0400		
	2-3/4	1-1/4					FA-24212-20	167-0420		
	2-7/8	3/4					FA-24214-12	167-0430		
	2-7/8	1-1/4	FA-14214-20	165-0460			FA-24214-20	167-0460		
3	1	FA-1430-16	165-0520			FA-2430-16	167-0520			
3-3/8	1-1/4					FA-2436-20	167-0580			
3-1/2	1					FA-2438-16	167-0620			
5 RW	2-1/4	1/2			FD-1524-20	165-3140			FD-2524-8	167-3100
	2-1/4	1-1/4							FD-2524-20	167-3140
	2-3/8	3/8	FA-1526-6	165-1160	FD-1526-12	165-3180	FA-2526-6	167-1160	FD-2526-6	167-3160
	2-3/8	3/4					FA-2526-12	167-1180	FD-2526-12	167-3180
	2-7/16	1-5/16								
	2-1/2	1/2	FA-1528-8	165-1240			FA-2528-8	167-1240		
	2-1/2	1					FA-2528-16	167-1280		
	2-3/4	1/2	FA-15212-8	165-1360	FD-15212-8	165-3360	FA-25212-8	167-1360	FD-25212-8	167-3360
	2-3/4	3/4					FA-25212-12	167-1380		
	2-3/4	1	FA-15212-16	165-1400	FD-15212-16	165-3400	FA-25212-16	167-1400	FD-25212-16	167-3400
	2-7/8	1					FA-25214-16	167-1440		
	2-7/8	1-1/4	FA-15214-20	165-1460			FA-25214-20	167-1460		
	3	1/2	FA-1530-8	165-1480			FA-2530-8	167-1480	FD-2530-8	167-3480
	3	3/4					FA-2530-12	167-1500		
	3	1					FA-2530-28	167-1540	FD-2530-16	167-3520
3-1/4	1	FA-1534-16	165-1560			FA-2534-16	167-1560			
3-3/8	3/8			FD-1536-6	165-3570					
3-3/8	1-1/4	FA-1536-20	165-1580	FD-1536-20	165-3580	FA-2536-20	167-1580	FD-2536-20	167-3580	
3-1/2	1/2	FA-1538-8	165-1600			FA-2538-8	167-1600			
3-1/2	1					FA-2538-16	167-1620	FD-2538-16	167-3620	

STANDARD COLD-FORMED TIP MEASUREMENTS



Cold-Formed Tips FA, FB, FC, FE, FF

Cold-Formed Tips FD

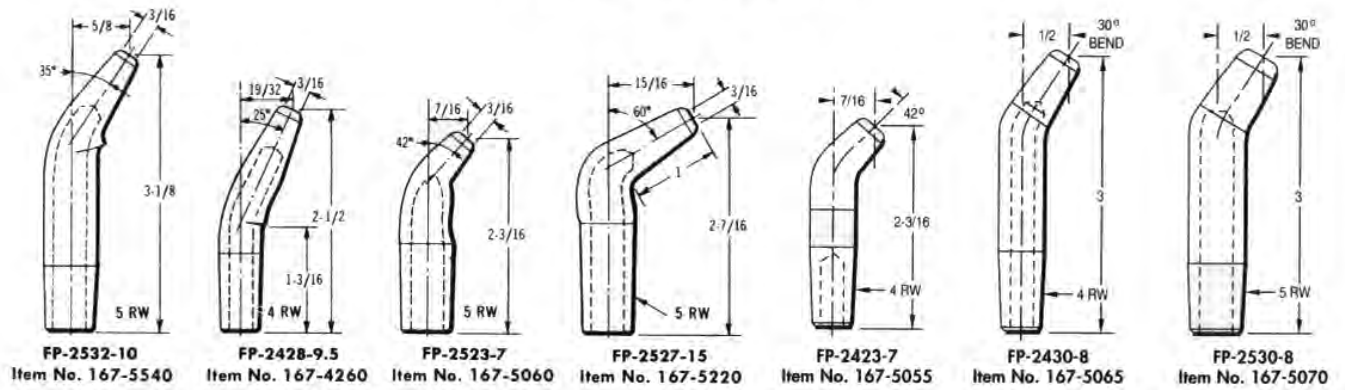
Key to Description

FA-25212-8

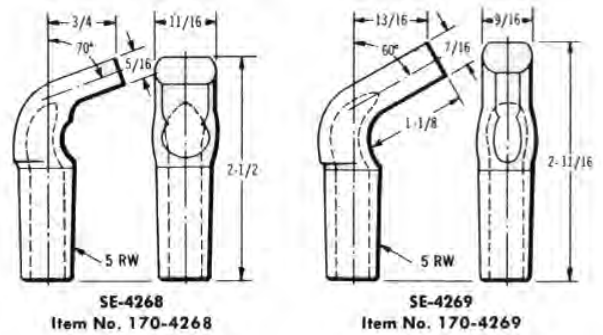
- F - Cold-Formed
- A - Nose Designation
- 2 - RWMA Alloy Class
- 5 - RW Taper No.
- 2 - Length in Whole Inches
- 12 - Additional Length, in 16ths
- 8 - Offset, in 16ths of Inches

Tuffaloy bent tips

SINGLE-BEND TIPS

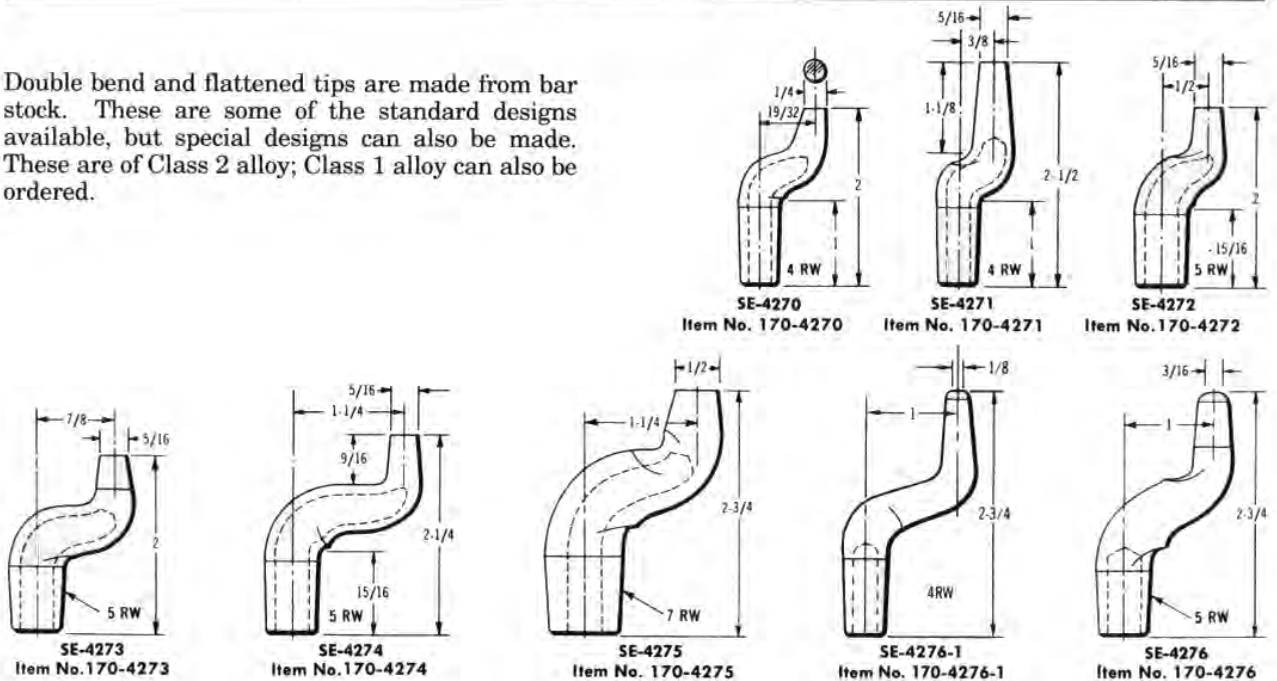


Portable gun-type cold-formed tips with a single bend have standard pointed-nose design. Other single-bend tips with flat noses (below) or other special designed noses and configurations are available on special order. Class 2 alloy is recommended.



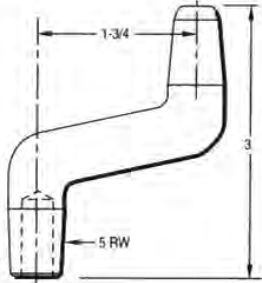
Tuffaloy miscellaneous tips

Double bend and flattened tips are made from bar stock. These are some of the standard designs available, but special designs can also be made. These are of Class 2 alloy; Class 1 alloy can also be ordered.

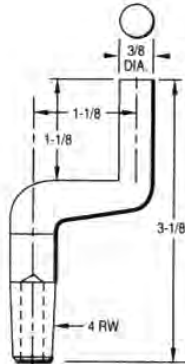


Tuffaloy miscellaneous tips

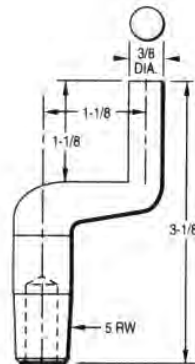
These standard bent tips are in addition to those shown on page 10. They are of class 2 alloy; Class 1 alloy can also be ordered.



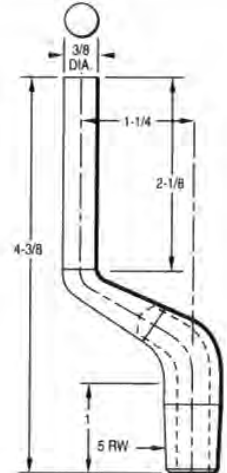
SE-4284 (short water hole)
Item No. 170-4284



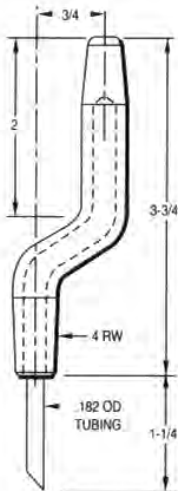
SE-4285
Item No. 170-4285



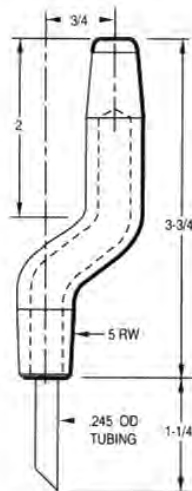
SE-4286
Item No. 170-4286



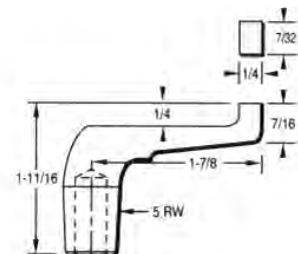
SE-4287
Item No. 170-4287



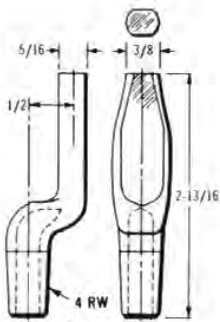
SE-4282
Item No. 170-4282



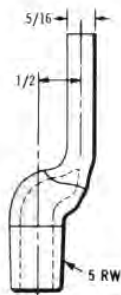
SE-4283
Item No. 170-4283



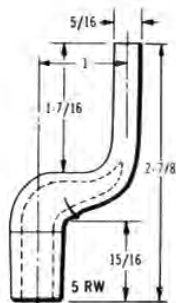
SE-4288
Item No. 170-4288



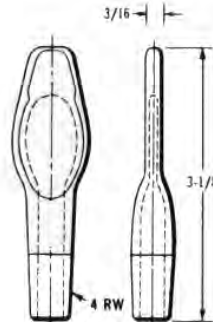
SE-4277
Item No. 170-4277



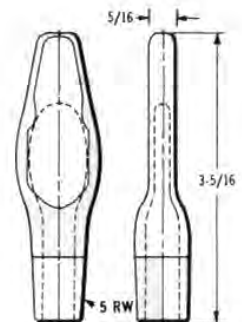
SE-4278
Item No. 170-4278



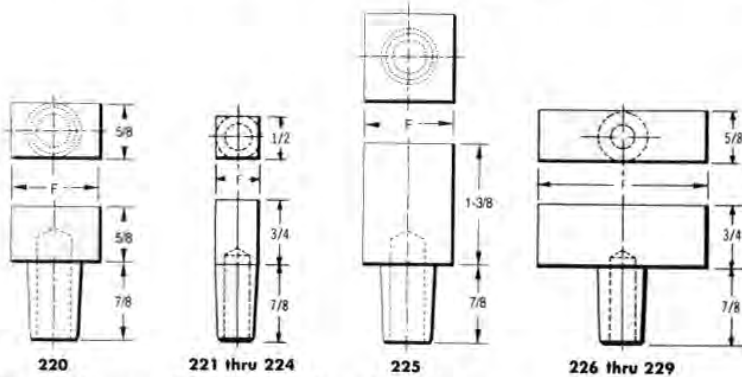
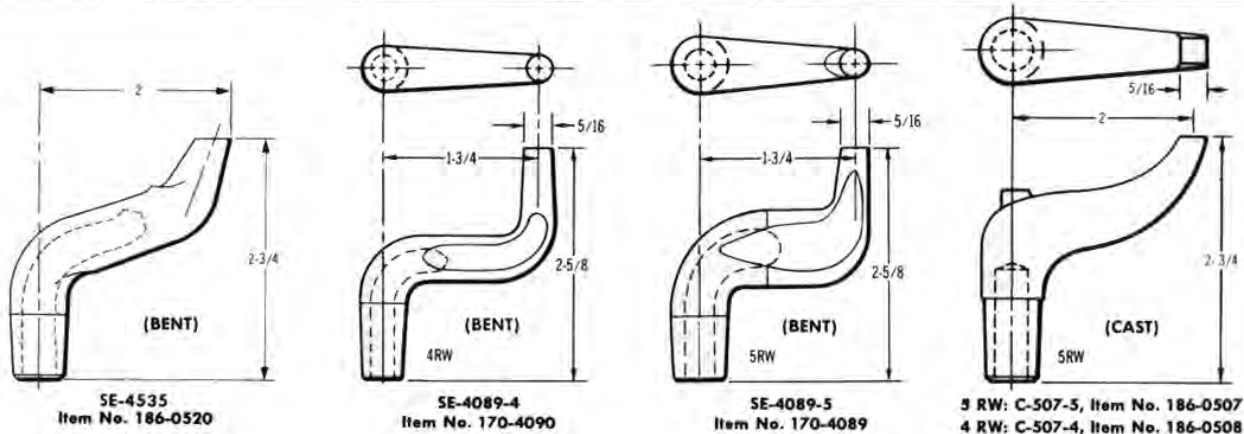
SE-4279
Item No. 170-4279



SE-4280
Item No. 170-4280



SE-4281
Item No. 170-4281



These tips are all machined from bar stock.
Special designs can be made to order.

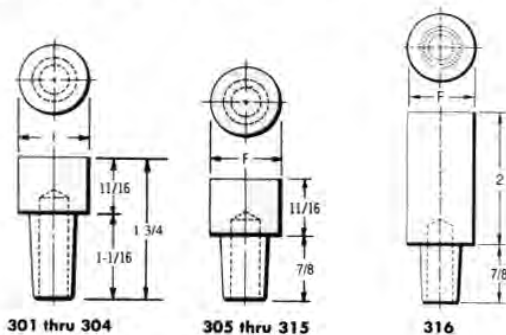
RECTANGULAR FACE

Alloy Class	Taper No.	Face 'F'	Description	Item No.
2	5RW	1	220	186-0220
2	4RW	1/2	221	186-0221
2	4RW	1	223	186-0223
2	5RW	1	224	186-0224
2	5RW	1	225	186-0225
2	5RW	2	226	186-0226
2	4RW	2	227	186-0227
2	5RW	1-1/2	228	186-0228
2	4RW	1-1/2	229	186-0229

ROUND FACE

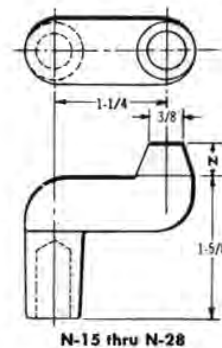
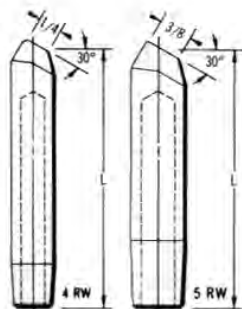
Alloy Class	Taper No.	Face 'F'	Description	Item No.
2	4RW	7/8	301	186-0301
1	4RW	7/8	302	186-0302
2	5RW	7/8	303	186-0303
1	5RW	7/8	304	186-0304
2	4RW	7/8	305	186-0305
1	4RW	7/8	306	186-0306
2	5RW	7/8	307	186-0307
1	5RW	7/8	308	186-0308
2	4RW	1	309	186-0309
1	4RW	1	310	186-0310
2	5RW	1	*311	186-0311
1	5RW	1	312	186-0312
2	5RW	1-1/4	*313	186-0313
2	5RW	1-1/2	315	186-0315
2	5RW	1	*316	186-0316

*311, 313 and 316 available with
Copper Tungsten face. See pg. 29



These straight tips have welding
faces angled 30°.

Alloy Class	Taper No.	Length 'L'	Description	Item No.
2	4RW	2	H-2408-30	145-2408
2	4RW	3	H-2412-30	145-2412
2	4RW	4	H-2416-30	145-2416
2	5RW	2	H-2508-30	145-2508
2	5RW	3	H-2512-30	145-2512
2	5RW	4	H-2516-30	145-2516



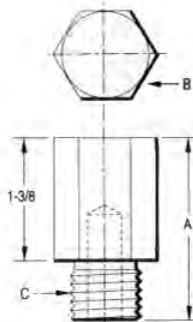
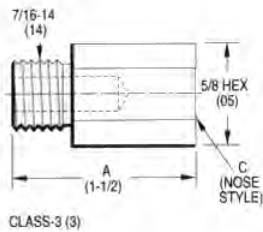
Alloy Class	Taper No.	Length 'N'	Description	Item No.
2	4RW	3/8	N-15	186-0015
2	4RW	3/4	N-16	186-0016
2	5RW	3/8	N-27	186-0027
2	5RW	3/4	N-28	186-0028

Tuffaloy threaded tips

Key to Description
for following charts

5100-11-C

5 = Threaded Electrode
100 = Hex Size
11 = Thread Size
C = Nose



FLAT ELECTRODES

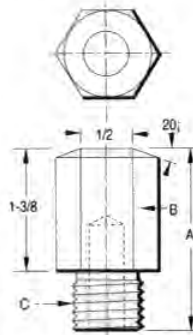
A Overall Length	B Tip Dia. (Hex)	C Male Thread	Description
2	1	5/8-11	5100-11-C
	1	5/8-18	5100-18-C
	1	3/4-101	5100-10-C
	1-1/4	3/4-10	5125-10-C

BUILD AN ORDERING CODE

Example: 3 05 12-14-C

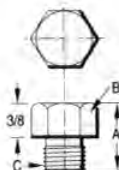
Class Alloy	Hex Size	Overall Length 'A' 1/8" Increments	Thread Size	Nose Style
Class 2	1/2"	6	*	B C E F
		7		
		8		
		9		
		10		
		11		
Class 3	5/8"	12		
		13		
		14		
ZIRCONIUM Alloy (Z)	1-1/4"	15		
		16		
		17		
		18		
		19		
		20		

*Metric Threads Available.



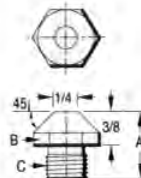
TRUNCATED ELECTRODES

A Overall Length	B Tip Dia. (Hex)	C Male Thread	Description
2	1	5/8-11	5100-11-E
	1	5/8-18	5100-18-E
	1	3/4-10	5100-10-E
	1-1/4	3/4-10	5125-10-E



'C' NOSE ELECTRODES

A Overall Length	B Tip Dia. (Hex)	C Male Thread	Description
3/4	5/8	7/16-14	5062-14-C
3/4	5/8	3/8-16	5062-16-C



'E' NOSE ELECTRODES

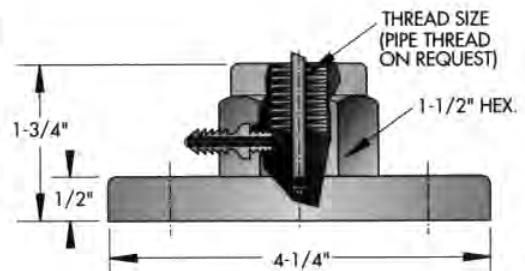
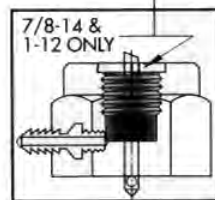
A Overall Length	B Tip Dia. (Hex)	C Male Thread	Description
3/4	5/8	7/16-14	5062-14-E

THREADED PM HOLDERS

Thread Size	Size 1	Size 2
5/8-11	350-4580	350-4590
3/4-10	350-4581	350-4591
7/8-14	350-4582	350-4592
1-12	350-4583	350-4593

See adapters page 18

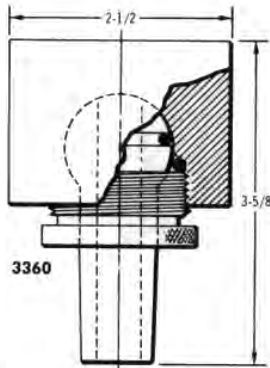
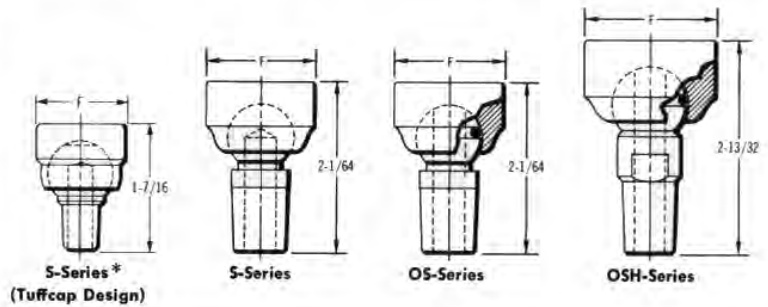
This Style Only.



PAGE 14

Swivel tips

Swivel tips have ball-jointed swivel heads to compensate for minor misalignment, and to eliminate marking of the work surface. They are all machined from Class 2 alloy bar stock. The S-Series tip water hole does not reach the head. In the OS and OSH models, the water does contact the head, and O-rings are used to seal it. **Class 1 and class 3 heads are also available.**



Taper No.	Face Dia. 'F'	S-Series		OS-Series		OSH Series	
		Description	Item No.	Description	Item No.	Description	Item No.
5-CT*	7/8	S-248	182-0248				
	1	S-249	182-0249				
	1-1/4	S-250	182-0250				
4RW	7/8	S-348	182-0348	OS-348	182-1348		
	1	S-350	182-0350	OS-350	182-1350		
	1-1/4	S-351	182-0351	OS-351	182-1351		
5RW	7/8	S-349	182-0349	OS-349	182-1349		
	1	S-353	182-0353	OS-353	182-1353	OSH-353	182-2353
	1-1/4	S-354	182-0354	OS-354	182-1354	OSH-354	182-2354
	2					OSH-356	182-2356
7RW	2-1/2					OSH-358	182-2358
						3360	182-3360

The Giant

The Giant swivel-head electrode for projection welding has a face 2-1/2 inches in diameter, a double O-ring seal, and a replaceable head. It is ideal for accomplishing uniform set-down of multiple projections. It is the largest tip TUFFALOY offers from stock. If a larger one should be needed, TUFFALOY is prepared to supply it. 7 RW.

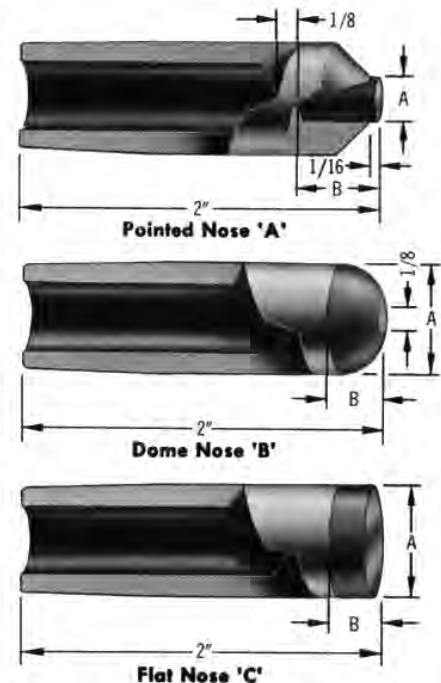
*Will fit Tuffcap adapter shanks having No. 5 RW tapers, as shown on page 6.

Note: Standard swivel tilt is approximately 18°, a 25° swivel is available on request. Add suffix "HS" to above part number.

Refractory metal-faced tips

Nose Type	Taper No.	Facing Alloy Class	Dimensions		Description	Item No.
			A	B		
Pointed	4RW	14	3/16	3/8	A-1408-100M	185-0120
	4RW	13	3/16	3/8	A-1408-100W	185-0130
	5RW	11	1/4	3/8	A-1508-10W	185-0150
	5RW	14	1/4	3/8	A-1508-100M	185-0160
	5RW	13	1/4	3/8	A-1508-100W	185-0170
Dome	4RW	11	.482	1/4	B-1408-10W	185-1110
	5RW	11	.625	1/4	B-1508-10W	185-1120
	5RW	13	.625	1/4	B-1508-100W	185-1170
Flat	4RW	11	.482	1/2	C-1408-10W	185-1210
	4RW	14	.482	1/2	C-1408-100M	185-1220
	4RW	13	.482	1/2	C-1408-100W	185-1230
	5RW	11	.625	1/4	C-1508-10W	185-1250
	5RW	14	.625	1/4	C-1508-100M	185-1260
	5RW	13	.625	1/4	C-1508-100W	185-1270

The TUFFALOY copper-tungsten and copper-molybdenum faced tips listed here withstand greater heat and pressure, at the expense of some conductivity. Besides being used for spot welding high resistance base metals, they are useful in achieving "heat balance" when welding dissimilar metals. (The higher resistance electrode is used against the lower resistance, or thinner, member, to help contain the heat generated.) They have the same diameters and tapers as the standard straight tips in this catalog. Bodies are of Class 1 alloy. Lengths other than those shown can be ordered.

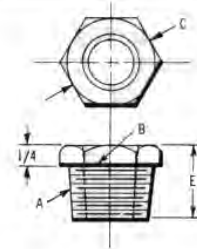


Tuffaloy tip adapters

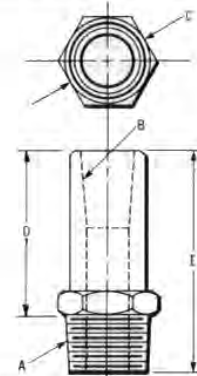
TUFFALOY threaded electrode adapters are used to provide longer electrode holder life, by providing a changable tip socket in holders having threaded openings. Class 2 alloy.

A Pipe Thread or Taper	B Taper Socket	C Body Size	D Body Length	E Over-All Length	Description	Item Number
1/2	4RW	1" Hex	1/4	7/8	AD-124-.8	190-1408
			3/8	1	AD-124-1.0	190-1410
			5/8	1-1/4	AD-124-1.2	190-1412
			7/8	1-1/2	AD-124-1.5	190-1415
			1-1/8	1-3/4	AD-124-1.7	190-1417
			1-3/8	2	AD-124-2.0	190-1420
			1-5/8	2-1/4	AD-124-2.2 *	
			1-7/8	2-1/2	AD-124-2.5	190-1425
			2-1/8	2-3/4	AD-124-2.7 *	
			2-3/8	3	AD-124-3.0	190-1430
			2-5/8	3-1/4	AD-124-3.2 *	
			2-7/8	3-1/2	AD-124-3.5	190-1435
			3-1/8	3-3/4	AD-124-3.7 *	
			3-3/8	4	AD-124-4.0	190-1440
4-3/8	5	AD-124-5.0 *				
1/2	5RW	1" Hex	1/4	7/8	AD-125-.8	190-1508
			3/8	1	AD-125-1.0	190-1510
			5/8	1-1/4	AD-125-1.2	190-1512
			7/8	1-1/2	AD-125-1.5	190-1515
			1	1-5/8	AD-125-1.6 *	
			1-1/8	1-3/4	AD-125-1.7	190-1517
			1-3/8	2	AD-125-2.0	190-1520
			1-5/8	2-1/4	AD-125-2.2 *	
			1-7/8	2-1/2	AD-125-2.5	190-1525
			2-1/8	2-3/4	AD-125-2.7 *	
			2-3/8	3	AD-125-3.0	190-1530
			2-5/8	3-1/4	AD-125-3.2 *	
			2-7/8	3-1/2	AD-125-3.5	190-1535
			3-1/8	3-3/4	AD-125-3.7 *	
3-3/8	4	AD-125-4.0	190-1540			
3-7/8	4-1/2	AD-125-4.5	190-1545			
5/8	4RW	1" Hex	1/4	7/8	AD-584-.8	190-2408
			3/8	1	AD-584-1.0 *	
			7/8	1-1/2	AD-584-1.5 *	
			1-3/8	2	AD-584-2.0 *	
5/8	5RW	1" Hex	1/4	7/8	AD-585-.8	190-2508
			3/8	1	AD-585-1.0 *	
			5/8	1-1/4	AD-585-1.2	190-2512
			7/8	1-1/2	AD-585-1.5	190-2515
			1-1/8	1-3/4	AD-585-1.7	190-2517
			1-3/8	2	AD-585-2.0 *	
			1-7/8	2-1/2	AD-585-2.5 *	
			2-3/8	3	AD-585-3.0 *	
3-3/8	4	AD-585-4.0 *				
3/4	5RW	1.25	3/16	1-1/8	AD-345-1.1 *	
			7/16	1-3/8	AD-345-1.3 *	
			9/16	1-1/2	AD-345-1.5	190-3515
			13/16	1-3/4	AD-345-1.7	190-3517
			1-1/16	2	AD-345-2.0	190-3520
			1-9/16	2-1/2	AD-345-2.5	190-3525
			2-1/16	3	AD-345-3.0	190-3530
			2-9/16	3-1/2	AD-345-3.5	190-3535
3-1/16	4	AD-345-4.0	190-3540			
3-9/16	4-1/2	AD-345-5.0	190-3545			
4-1/16	5	AD-345-5.0	190-3550			
3/4	6RW	1.25	5/16	1-1/4	AD-346-1.2 *	
			7/16	1-3/8	AD-346-1.3 *	
			9/16	1-1/2	AD-346-1.5	190-3615
			1-1/16	2	AD-346-2.0	190-3620
			1-9/16	2-1/2	AD-346-2.5	190-3625
			1-13/16	2-3/4	AD-346-2.7 *	
			2-1/16	3	AD-346-3.0	190-3630
			2-9/16	3-1/2	AD-346-3.5	190-3635
3-1/16	4	AD-346-4.0	190-3640			
3-9/16	4-1/2	AD-346-4.5	190-3645			
4-1/16	5	AD-346-5.0	190-3650			
3/4	7RW	1.25	9/16	1-1/2	AD-347-1.5	190-3715
			1-1/16	2	AD-347-2.0	190-3720
			1-9/16	2-1/2	AD-347-2.5	190-3725
			2-1/16	3	AD-347-3.0	190-3730
			2-9/16	3-1/2	AD-347-3.5	190-3735
3-1/16	4	AD-347-4.0	190-3740			
3-9/16	4-1/2	AD-347-4.5	190-3745			
4-1/16	5	AD-347-5.0	190-3750			
4RW	5RW	7/8	1	2	AD-45-2	190-4520
			2	3	AD-45-3	190-4530
			3	4	AD-45-4	190-4540
5RW	4RW	7/8	1/4	1-1/8	AD-54-1	190-5410
			1	2	AD-54-2	190-5420
			1-1/2	2-1/2	AD-54-2.5 *	
			2	3	AD-54-3	190-5430
3	4	AD-54-4	190-5440			
5RW	5RW	7/8	1	2	AD-55-2	190-5520
			1-1/2	2-1/2	AD-55-2.5 *	
			2	3	AD-55-3 *	
			3	4	AD-55-4 *	
			4	5	AD-55-5	190-5550
5RW	6RW	1" Hex	1-1/8	2	AD-56-2	190-5620
			1/4	1-1/4	AD-64-1	190-6410
			1/4	1-1/4	AD-65-1	190-6510
6RW	5RW	1" Hex	1/4	1-1/2	AD-74-1	190-7410
			1/4	1-1/2		
7RW	5RW	1" Hex	1/4	1-1/2	AD-75-1	190-7510
			3/4	2	AD-75-2	190-7520
			2-1/4	3-1/2	AD-73-3.5 *	
			2-3/4	4	AD-75-4 *	

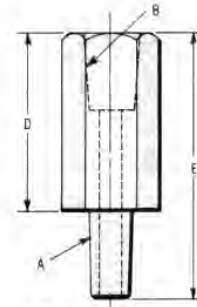
* Not commonly stocked - other adapters available upon request



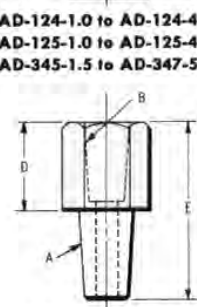
AD-124-.8, AD-125-.8,
AD-584-.8, AD-585-.8



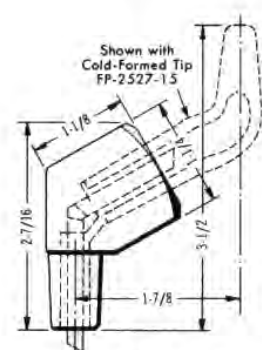
AD-124-1.0 to AD-124-4.0
AD-125-1.0 to AD-125-4.0
AD-345-1.5 to AD-347-5.0



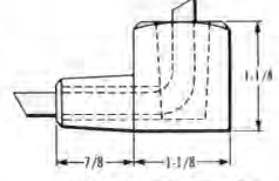
AD-45-2 to AD-45-4



AD-54-1 to AD-75-2

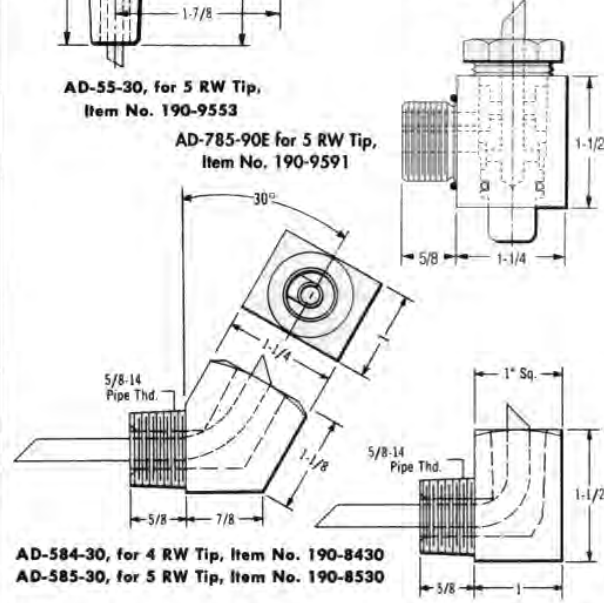


AD-55-30, for 5 RW Tip,
Item No. 190-9553



AD-55-90, for 5 RW Tip,
Item No. 190-9559
AD-54-90, for 4 RW Tip,
Item No. 190-9549

AD-785-90E for 5 RW Tip,
Item No. 190-9591



AD-584-30, for 4 RW Tip, Item No. 190-8430
AD-585-30, for 5 RW Tip, Item No. 190-8530

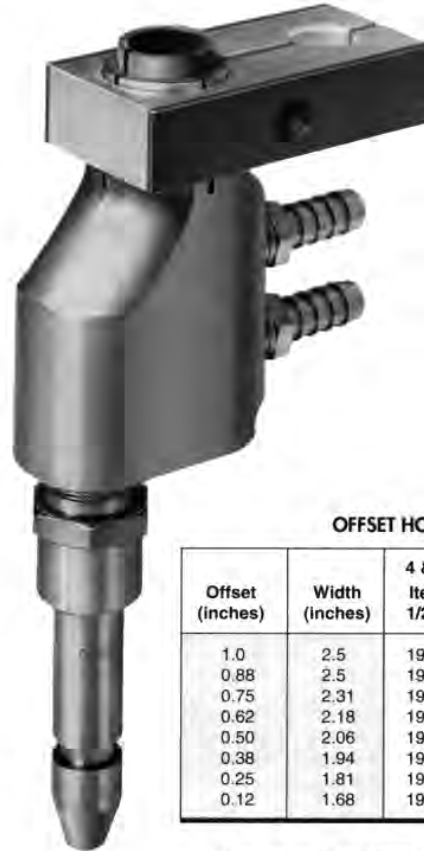
AD-584-90, for 4 RW Tip, Item No. 190-8490
AD-585-90, for 5 RW Tip, Item No. 190-8590

Tuffaloy cylinder-mounted holders

These standard-tip holders are mounted directly to air or hydraulic cylinder pistons. They are ideal for assembling special multi-head resistance welding equipment. Current and coolant water are brought to each of the holders in a set-up separately.

Electrode adapters for the tip diameter being used and in lengths to suit your set-up are ordered separately: see page 16. Water tubes, for carrying water into the tip, should also be ordered separately.

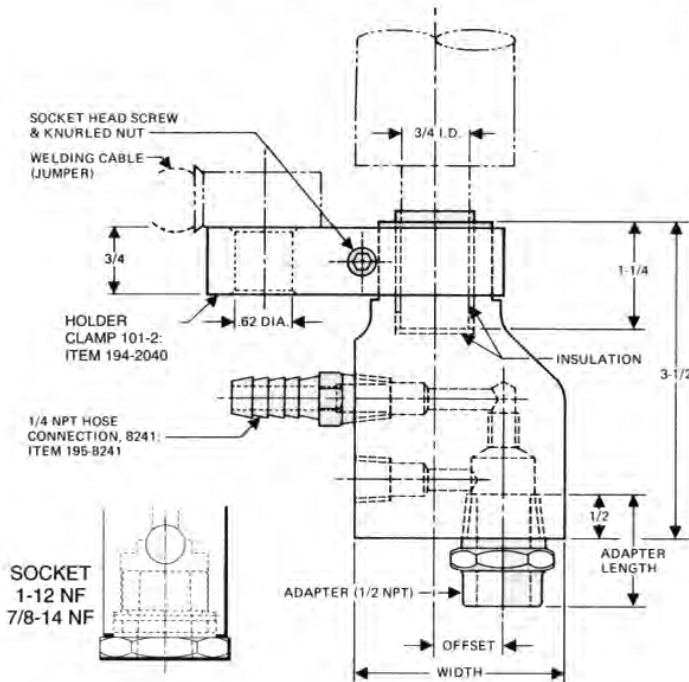
TUFFALOY offers both straight and offset holders for cylinder mounting. Clamps not included. Separate order item.



OFFSET HOLDERS

Offset holders are offered in eight offset sizes, from 1/8 to 1 inch. The standard models have a 1/2-NPT adapter socket, to hold adapters for 4 & 5RW tips. Ordering a 3/4-NPT socket will permit adapters for 6 & 7RW tips to be used.

ORDER CLAMP SEPARATELY



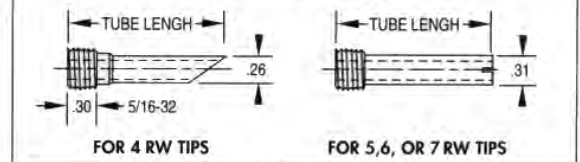
To determine distance adapter sticks out from holder, deduct 1/2-in from length of adapter selected. Water tubes 1/2-in. longer than adapter will install approximately flush with adapter face.

OFFSET HOLDERS

Offset (inches)	Width (inches)	4 & 5 RW Item No. 1/2" Pipe	6 & 7 RW Item No. 3/4" Pipe
1.0	2.5	194-1588	194-1598
0.88	2.5	194-1587	
0.75	2.31	194-1586	194-1596
0.62	2.18	194-1585	
0.50	2.06	194-1584	194-1594
0.38	1.94	194-1583	
0.25	1.81	194-1582	
0.12	1.68	194-1581	

For straight-thread adapters use suffix "7/8-14 N.F." Example: 194-1588-7/8-14 NF.

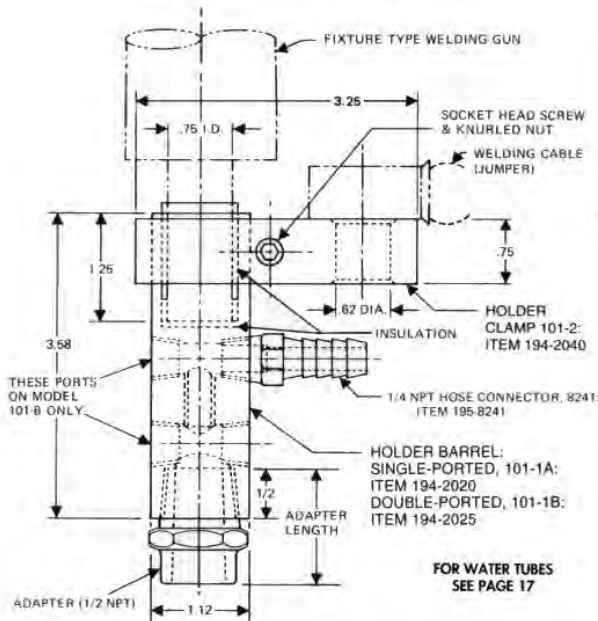
STATIONARY WATER TUBES



STATIONARY WATER TUBES

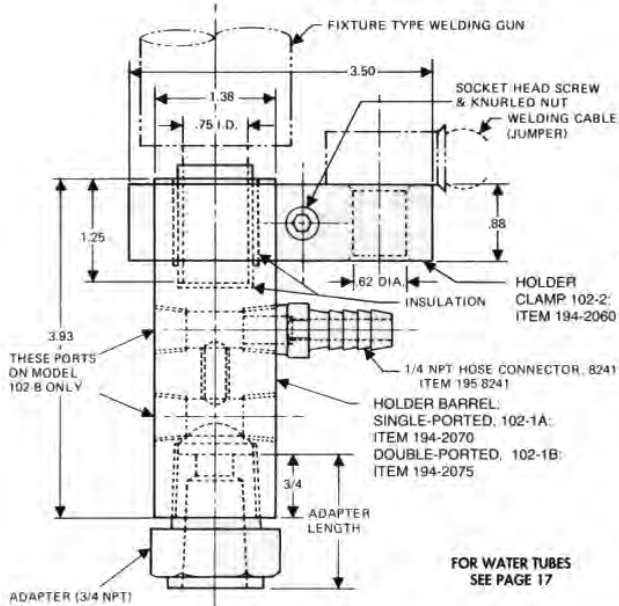
Length	FOR 4RW USE		FOR 5RW, 6RW OR 7RW USE	
	Description	Item No.	Description	Item No.
3/4	301-7	194-3107	312-7	194-3207
1	301-1.0	194-3110	312-1.0	194-3210
1-1/4	301-1.2	194-3112	312-1.2	194-3212
1-1/2	301-1.5	194-3115	312-1.5	194-3215
1-3/4	301-1.7	194-3117	312-1.7	194-3217
2	301-2.0	194-3120	312-2.0	194-3220
2-1/2	301-2.5	194-3125	312-2.5	194-3225
3	301-3.0	194-3130	312-3.0	194-3230
3-1/2	301-3.5	194-3135	312-3.5	194-3235
4	301-4.0	194-3140	312-4.0	194-3240
4-1/2	301-4.5	194-3145	312-4.5	194-3245

101 SERIES HOLDERS (For 4 & 5 RW Tips)

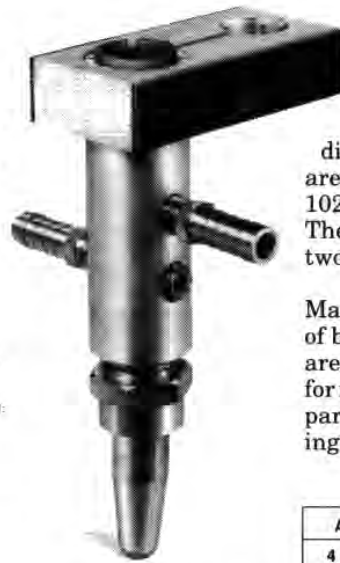


To determine distance adapter sticks out from holder, deduct 1/2" from length of adapter selected. Water tubes 1/2" longer than adapter will install approximately flush with adapter face.

102 SERIES HOLDERS (For 6 & 7 RW Tips)



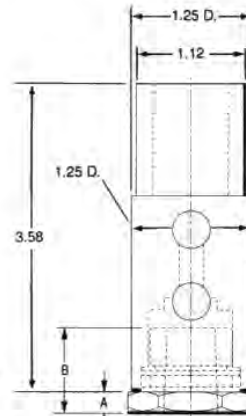
To determine distance adapter sticks out from holder deduct 3/4" from length of adapter selected. Water tubes 3/4" longer than adapter will install approximately flush with adapter face.



STRAIGHT HOLDERS

Straight holders are available in two sizes, to carry tips having four different diameters. Series 101 holders are for 4 & 5RW tips, and Series 102 holders are for 6 & 7RW tips. They may be ordered with one or two sets of coolant ports.

Mating electrical contact surfaces of both the barrels and the clamp are silver plated. Item Numbers for replacement barrels and clamp parts are called out on the drawings.



A	B	Description	Item No.
4 RW TAPER — 7/8-14 NF			
3/8	1-1/8	AD-134-1.1	190-3211
1/2	1-1/4	AD-134-1.2	190-3212
5/8	1-3/8	AD-134-1.3	190-3213
3/4	1-1/2	AD-134-1.5	190-3215
1	1-3/4	AD-134-1.7	190-3217
1-1/4	2	AD-134-2.0	190-3220
1-1/2	2-1/4	AD-134-2.2	190-3222
1-3/4	2-1/2	AD-134-2.5	190-3225
2-1/4	3	AD-134-3.0	190-3230
2-3/4	3-1/2	AD-134-3.5	190-3250
5 RW TAPER — 7/8-14 NF			
3/8	1-1/8	AD-135-1.1	190-3311
1/2	1-1/4	AD-135-1.2	190-3312
5/8	1-3/8	AD-135-1.3	190-3313
3/4	1-1/2	AD-135-1.5	190-3315
1	1-3/4	AD-135-1.7	190-3317
1-1/4	2	AD-135-2.0	190-3320
1-1/2	2-1/4	AD-135-2.2	190-3322
1-3/4	2-1/2	AD-135-2.5	190-3325
2-1/4	3	AD-135-3.0	190-3330
2-3/4	3-1/2	AD-135-3.5	190-3350
5 RW TAPER — 1-12 NF			
3/8	1-1/8	AD-105-1.1	190-4311
1/2	1-1/4	AD-105-1.2	190-4312
5/8	1-3/8	AD-105-1.3	190-4313
3/4	1-1/2	AD-105-1.5	190-4315
1	1-3/4	AD-105-1.7	190-4317
1-1/4	2	AD-105-2.0	190-4320
5 RW TAPER — 1-12 NF			
1-1/2	2-1/4	AD-105-2.2	190-4322
1-3/4	2-1/2	AD-105-2.5	190-4325
2	2-3/4	AD-105-2.7	190-4327
2-1/4	3	AD-105-3.0	190-4330
2-3/4	3-1/2	AD-105-3.5	190-4335

CLAMP AND BARREL ARE SEPARATE PARTS

Adapters, water connectors and water tubes (see page 17) are sold separately.

HOLDERS

Holders For Tip Sizes	Number of Coolant Ports					
	One Set Description	Item No.	Two Sets Description	Item No.	Clamp Description	Item No.
4 & 5 RW	101-A	194-2020	101-B	194-2025	101-2	194-2040
6 & 7 RW	102-A	194-2070	102-B	194-2075	102-2	194-2060

Tuffaloy straight welding tip holders

GOLDCROWN® AND STANDARD EJECTOR HOLDERS

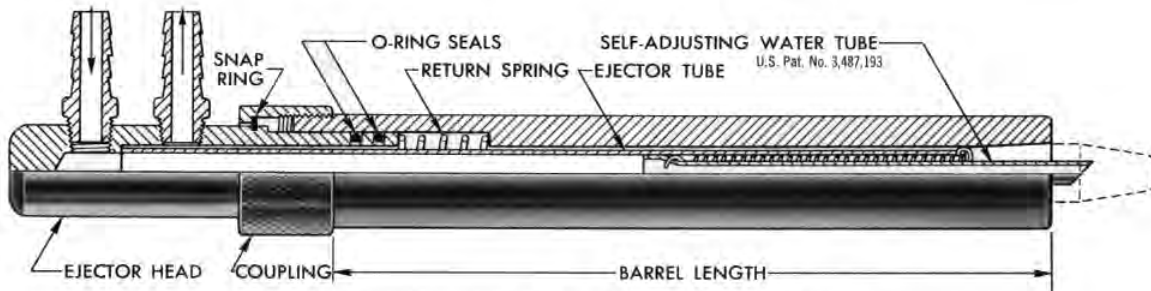
with self-adjusting water tubes

TUFFALOY straight tip-ejecting holders deliver dependable, first class performance. They are designed with a maximum of simplicity to require a minimum of maintenance. All TUFFALOY straight holders now feature exclusive spring-loaded self-adjusting water tubes to ensure the proper flow of coolant through resistance welding electrodes. The larger ejector holders incorporate bigger fittings for higher coolant flow rates.

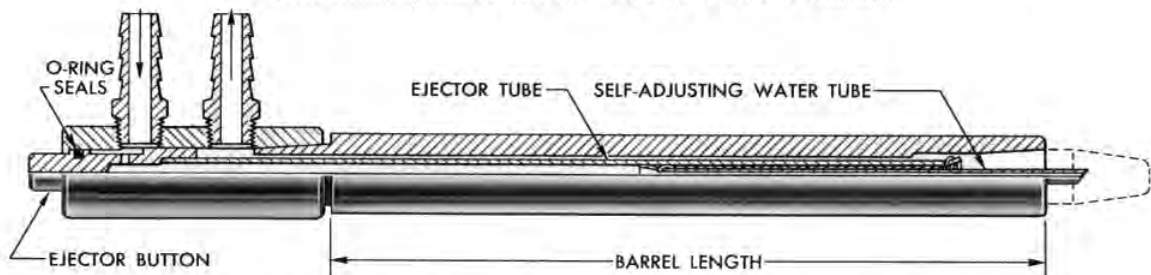
Goldcrown premium holders are made of extra-strength Class 2 alloy and are ground and polished to yield greatest conductivity.

GOLDCROWN					STANDARD	
Barrel Dia.	Tip Socket RW	Barrel Length	Description	Item No.	Description	Item No.
5/8	4	8	E-05084	320-0100		
5/8	4	12	E-05124	320-0120		
3/4	4	8	E-06084	320-0140		
3/4	5	8	E-06085	320-0150		
3/4	4	12	E-06124	320-0160		
3/4	5	12	E-06125	320-0170 *		
7/8	4	8	E-07084	320-0180		
7/8	5	8	E-07085	320-0190		
7/8	4	12	E-07124	320-0200		
7/8	5	12	E-07125	320-0210		
1	4	8	E-08084	320-0220	SHE-08084	321-0220
1	5	8	E-08085	320-0230	SHE-08085	321-0230
1	6	8	E-08086	320-0240 *	SHE-08086	321-0240 *
1	4	12	E-08124	320-0250	SHE-08124	321-0250
1	5	12	E-08125	320-0260	SHE-08125	321-0260
1	6	12	E-08126	320-0270 *	SHE-08126	321-0270 *
1-1/4	4	8	E-10084	320-0280	SHE-10084	321-0280
1-1/4	5	8	E-10085	320-0290	SHE-10085	321-0290
1-1/4	6	8	E-10086	320-0300 *	SHE-10086	321-0300 *
1-1/4	7	8	E-10087	320-0310	SHE-10087	321-0310
1-1/4	4	12	E-10124	320-0320	SHE-10124	321-0320
1-1/4	5	12	E-10125	320-0330	SHE-10125	321-0330
1-1/4	6	12	E-10126	320-0340 *	SHE-10126	321-0340 *
1-1/4	7	12	E-10127	320-0350	SHE-10127	321-0350
1-1/2	4	8	E-12084	320-0360 *	SHE-12084	321-0360 *
1-1/2	5	8	E-12085	320-0370	SHE-12085	321-0370
1-1/2	5	8	E-12085-A	320-0375 *	SHE-12085-A	321-0375 *
1-1/2	6	8	E-12086	320-0380	SHE-12086	321-0380
1-1/2	6	8	E-12086-A	320-0385	SHE-12086-A	321-0385
1-1/2	7	8	E-12087	320-0390	SHE-12087	321-0390
1-1/2	4	12	E-12124	320-0410	SHE-12124	321-0410
1-1/2	4	12	E-12124-A	320-0415 *	SHE-12124-A	321-0415 *
1-1/2	5	12	E-12125	320-0420	SHE-12125	321-0420
1-1/2	5	12	E-12125-A	320-0425 *	SHE-12125-A	321-0425 *
1-1/2	6	12	E-12126	320-0440 *	SHE-12126	321-0440 *
1-1/2	7	12	E-12127	320-0450	SHE-12127	321-0450

Suffix 'A' in holder description denotes a threaded tip adapter is supplied.
*Item not normally stocked



Cross-section of holders with barrels 1 inch or more in diameter.



Cross-section of holders with barrels 3/8 inch or less in diameter.

**GOLDSPOT® AND STANDARD
NON-EJECTOR HOLDERS**
with self-adjusting water tubes

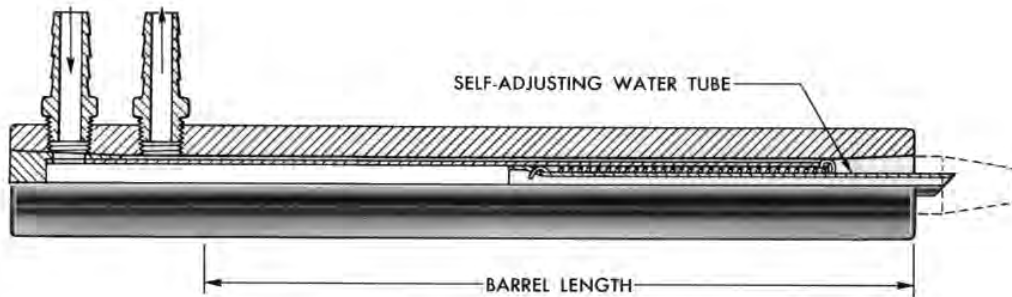
TUFFALOY straight non-ejector holders are now equipped with the same spring-loaded self-adjusting water tubes as the Goldcrown ejector unit, so electrode cooling is facilitated and improved. They are low in initial cost and inexpensive to maintain. Simple design and few parts contribute to low maintenance cost and excellent performance. Holders are of heavy-duty construction, built to withstand very high welding temperatures.

Goldspot premium holders have barrels of Class 2 alloy, ground and polished for best conductivity.

Examples of standard holders in use are shown on page 23.

GOLDSPOT					STANDARD	
Barrel Dia.	Tip Socket RW	Barrel Length	Description	Item No.	Description	Item No.
5/8	4	8	N-05084	325-0100		
5/8	4	12	N-05124	325-0120 *		
3/4	4	8	N-06084	325-0140		
3/4	5	8	N-06085	325-0150 *		
3/4	4	12	N-06124	325-0160 *		
3/4	5	12	N-06125	325-0170 *		
7/8	4	8	N-07084	325-0180		
7/8	5	8	N-07085	325-0190 *		
7/8	4	12	N-07124	325-0200		
7/8	5	12	N-07125	325-0210 *		
1	4	8	N-08084	325-0220	SHN-08084	326-0220
1	4	8	N-08084-A	325-0225	SHN-08084-A	326-0225
1	5	8	N-08085	325-0230	SHN-08085	326-0230
1	5	8	N-08085-A	325-0235 *	SHN-08085-A	326-0235 *
1	6	8	N-08086	325-0240 *	SHN-08086	326-0240 *
1	4	12	N-08124	325-0250	SHN-08124	326-0250
1	4	12	N-08124-A	325-0255	SHN-08124-A	326-0255
1	5	12	N-08125	325-0260	SHN-08125	326-0260
1	5	12	N-08125-A	325-0265	SHN-08125-A	326-0265
1	6	12	N-08126	325-0270 *	SHN-08126	326-0270 *
1-1/4	4	8	N-10084	325-0280 *	SHN-10084	326-0280 *
1-1/4	4	8	N-10084-A	325-0285	SHN-10084-A	326-0285
1-1/4	5	8	N-10085	325-0290	SHN-10085	326-0290
1-1/4	5	8	N-10085-A	325-0295	SHN-10085-A	326-0295
1-1/4	6	8	N-10086	325-0300 *	SHN-10086	326-0300 *
1-1/4	7	8	N-10087	325-0310 *	SHN-10087	326-0310 *
1-1/4	4	12	N-10124	325-0320	SHN-10124	326-0320
1-1/4	4	12	N-10124-A	325-0325 *	SHN-10124-A	326-0325 *
1-1/4	5	12	N-10125	325-0330	SHN-10125	326-0330
1-1/4	5	12	N-10125-A	325-0335	SHN-10125-A	326-0335
1-1/4	6	12	N-10126	325-0340 *	SHN-10126	326-0340 *
1-1/4	7	12	N-10127	325-0350 *	SHN-10127	326-0350 *
1-1/2	4	8	N-12084	325-0360 *	SHN-12084	326-0360 *
1-1/2	4	8	N-12084-A	325-0365 *	SHN-12084-A	326-0365 *
1-1/2	5	8	N-12085	325-0370	SHN-12085	326-0370
1-1/2	5	8	N-12085-A	325-0375	SHN-12085-A	326-0375
1-1/2	6	8	N-12086	325-0380 *	SHN-12086	326-0380 *
1-1/2	7	8	N-12087	325-0390	SHN-12087	326-0390
1-1/2	4	12	N-12124	325-0410 *	SHN-12124	326-0410 *
1-1/2	5	12	N-12125	325-0420	SHN-12125	326-0420
1-1/2	5	12	N-12125-A	325-0425 *	SHN-12125-A	326-0425 *
1-1/2	6	12	N-12126	325-0440 *	SHN-12126	326-0440 *
1-1/2	7	12	N-12127	325-0450 *	SHN-12127	326-0450 *

Suffix 'A' in holder description denotes a threaded tip adapter is supplied.
*Item not normally stocked



Cross-section view of holders with barrels 1 inch or more in diameter.

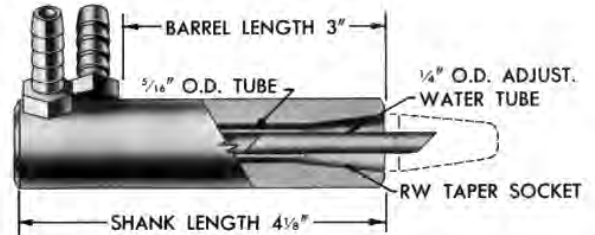
Tuffaloy tip holders

CLOSE-COUPLED HOLDERS

For use where welding space is limited. Standard body length is 3 inches. Other lengths are made on request; minimum length 2 inches.

Body Dia.	Tip Socket	Description	Item No.
3/4	4RW	N-06034	330-0140
7/8	4RW	N-07034	330-0180
7/8	5RW	N-07035	330-0190
1	4RW	N-08034	330-0220
1	5RW	N-08035	330-0230
1-1/4	4RW	N-10034	330-0280
1-1/4	5RW	N-10035	330-0290
1-1/2	4RW	N-12034	330-0360 *
1-1/2	5RW	N-12035	330-0370 *

*Item not normally stocked



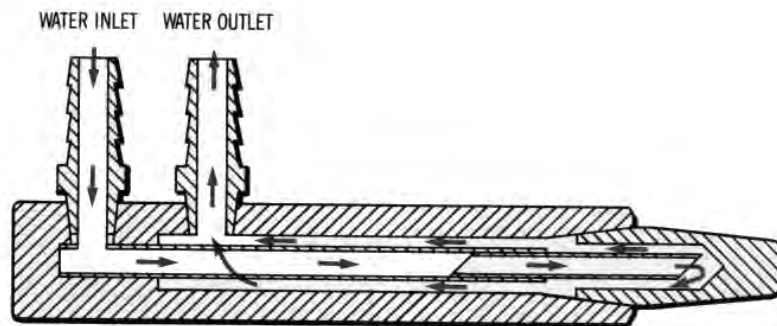
ADJUSTABLE WATER TUBE USE

It is very important that resistance welding electrodes be kept as cool as possible; excessive heat softens them, allowing the nose to mushroom and weld quality to drop.

Adjustable water tubes are used to deflect incoming coolant water to the full extent of the water hole in

the electrode. Before installing a tip, check that there is an adjustable water tube in place and that it is pulled out far enough so that it will contact the end of the water hole in the tip.

The drawing shows a typical straight holder, but the principle is the same for other kinds as well.



Adjustable water tube correctly positioned in tip. Cold water will strike the hottest part of the tip first.

Tuffaloy offset holders

BARREL LENGTH
2 1/4"
HOLE DIA. (TEE CONNECTOR)
BARREL DIA.
SHANK LENGTH 4"
SHANK DIA.
5/8-14 Pipe Thd
1-1/4
1-1/8
5/8 7/8
1-1/2
1" Sq.
5/8-14 Pipe Thd
5/8 1 1-1/2

AD-584-30, for 4 RW Tip
AD-585-30, for 5 RW Tip

AD-584-90, for 4 RW Tip
AD-585-90, for 5 RW Tip

AD-585-90E for 5 RW Tip

UNIVERSAL HOLDER ASSEMBLIES

Holders, Tee Connectors, and Adapters may be assembled as shown, line by line in the table, to make up holder assemblies that will do spot welding in many otherwise inaccessible places. **Goldcrown (ejector-type) holders may be used in place of the non-ejector holders listed.** The Tee Connector is Class 3 RWMA alloy.

HOLDERS				TEE CONNECTORS				ADAPTERS			
Barrel Dia.	Barrel Length	Description	Item No.	Hole Dia.	Shank Dia.	Description	Item No.	Tip Socket	Angle Degrees	Description	Item No.
1	8	N-08085-A	325-0235	1	1	T-1-1	192-1100			Various	
1-1/4	8	N-10085-A	325-0295	1-1/4	1	T-1	192-1000	4RW	90	AD-584-90	190-8490
1-1/4	8	N-10085-A	325-0295	1-1/4	1	T-1	192-1000	4RW	30	AD-584-30	190-8430
1-1/4	8	N-10085-A	325-0295	1-1/4	1-1/4	T-125	192-1250	5RW	90	AD-585-90	190-8590
1-1/4	8	N-10085-A	325-0295	1-1/4	1-1/4	T-125	192-1250	5RW	30	AD-585-30	190-8530
1-1/4	8	N-10085-A	325-0295	1-1/4	1-1/4	T-125	192-1250	6RW	90	AD-586-90	190-8690
1-1/2	8	N-12085-A	325-0375	1-1/2	1-1/2	T-15	192-1500	5RW	90	AD-585-90	190-8590
1-1/2	8	N-12085-A	325-0375	1-1/2	1-1/2	T-15	192-1500	5RW	30	AD-585-30	190-8530
1-1/2	8	N-12085-A	325-0375	1-1/2	1-1/2	T-15	192-1500	6RW	90	AD-586-90	190-8690

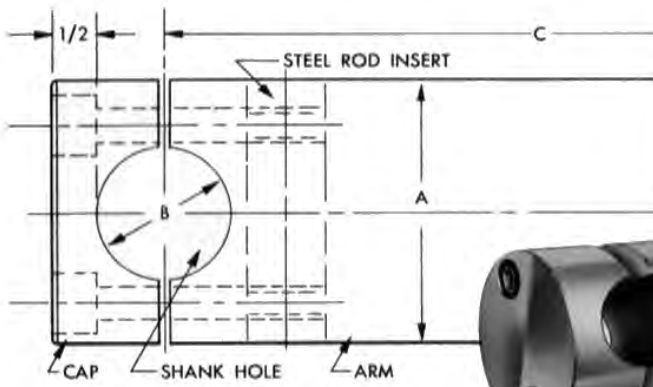
Tuffaloy welder arms

Spot welding machine arms made by Tuffaloy reduce set up time and give longer life.

Electrode holder shanks can be attached to these arms from the front, by bolting the cap over them. This means no extra clearance is required between the arms to allow running a shank up (or down) into a hole in the arm. It makes the insertion of Tuffaloy multiple-welding holders, (which are bulkier than simple straight holders) much easier.

One of the most common failures of welder arms is the destruction of the bolt hole threads, due to the relatively soft copper involved. Tuffaloy arms have a transverse steel bar insert in which the bolt hole threads are cut. This provides greatly increased thread life.

Standard arm configurations are shown in the table. Special arms are also available.



A Arm Diameter	B Hole Diameter*	C Arm Length	Description	Item No.
2	1	12	SH-7320-1	630-7321
		16	SH-7320-2	630-7322
		20	SH-7320-3	630-7323
2-1/2	1-1/4	12	SH-7320-4	630-7324
		16	SH-7320-5	630-7325
		20	SH-7320-6	630-7326
3	1-1/2	12	SH-7320-7	630-7327
		16	SH-7320-8	630-7328
		20	SH-7320-9	630-7329

*These diameters will be supplied unless otherwise specified.

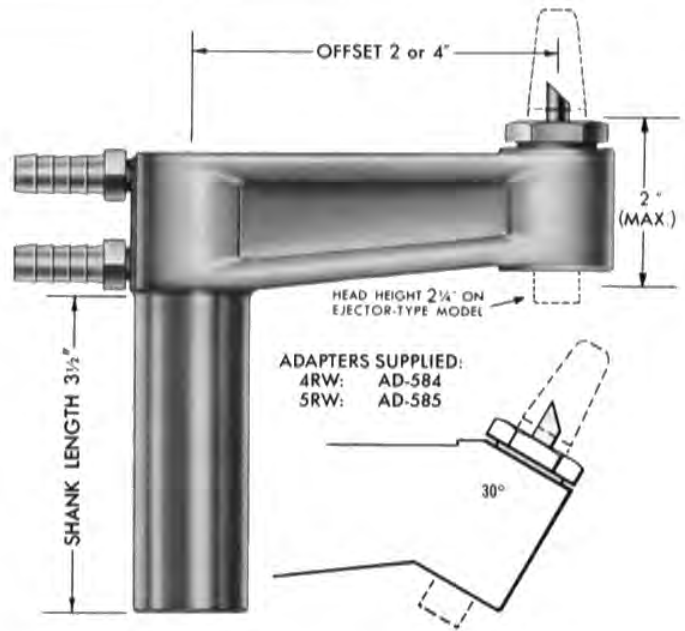


STANDARD OFFSET HOLDERS

TUFFALOY Cast Class 3 Alloy offset holders combine long life with good conductivity. Threaded tip adapters are easily replaced when tip socket is worn beyond use, or when you wish to change to a different taper size. The 'in-water' tube, projecting beyond the adapter, is not rigidly fixed, will withstand considerable mistreatment.

TUFFALOY offset holders are made in 2- and 4-inch offsets, and in four shank sizes, with 90° and 30° heads. They are supplied with adapters for No. 4 or No. 5 RW taper tips.

Tip Ejector mechanisms are available on all 90° head holders and the 30° head 4-in. offset holders. When ordering this feature change order number prefix from 'ON' to 'OE'. Example: OE-874-290.



TWO-INCH OFFSET HOLDERS

Adapter Tip Socket	Socket Angle	3/4" SHANK DIA.		7/8" SHANK DIA.		1" SHANK DIA.		1-1/4" SHANK DIA.		1-1/2" SHANK DIA.	
		Description	Item No.	Description	Item No.	Description	Item No.	Description	Item No.	Description	Item No.
4RW	30°	ON-754-230	335-1300*	ON-874-230	335-1400*	ON-14-230	335-1000	ON-1254-230	335-1100	ON-154-230	335-1200*
4RW	90°	ON-754-290	335-1310*	ON-874-290	335-1410*	ON-14-290	335-1010	ON-1254-290	335-1110	ON-154-290	335-1210*
5RW	30°	ON-755-230	335-1350*	ON-875-230	335-1450*	ON-15-230	335-1050	ON-1255-230	335-1150	ON-155-230	335-1250*
5RW	90°	ON-755-290	335-1360*	ON-875-290	335-1460*	ON-15-290	335-1060	ON-1255-290	335-1160	ON-155-290	335-1260

FOUR-INCH OFFSET HOLDERS

4RW	30°	ON-754-430	335-1320*	ON-874-430	335-1420*	ON-14-430	335-1020	ON-1254-430	335-1120	ON-154-430	335-1220*
4RW	90°	ON-754-490	335-1330*	ON-874-490	335-1430*	ON-14-490	335-1030	ON-1254-490	335-1130	ON-154-490	335-1230*
5RW	30°	ON-755-430	335-1370*	ON-875-430	335-1470*	ON-15-430	335-1070	ON-1255-430	335-1170	ON-155-430	335-1270
5RW	90°	ON-755-490	335-1380*	ON-875-490	335-1480*	ON-15-490	335-1080	ON-1255-490	335-1180	ON-155-490	335-1280

*May not be in stock

USING STANDARD HOLDERS

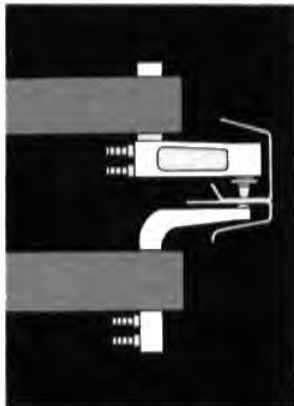


Figure 1: An offset holder over a low-profile paddle-type holder that works in confined spaces.

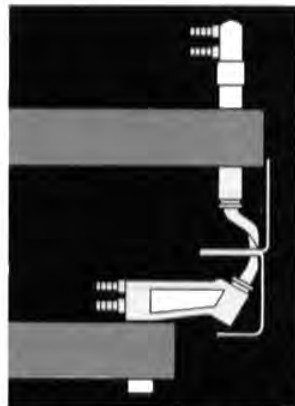


Figure 2: An offset holder with bent tip is used to weld close to the corner of a box section.

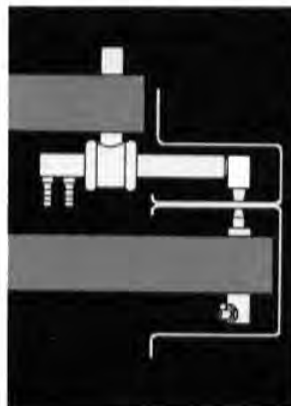


Figure 3: A universal holder (economical because it adjusts to many jobs) over a close-coupled holder.

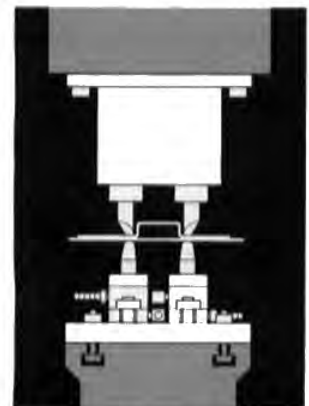
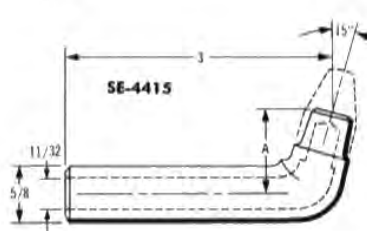
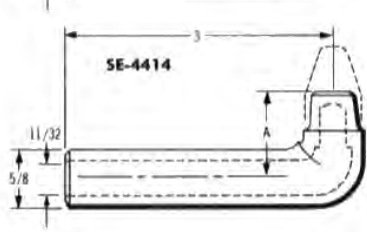
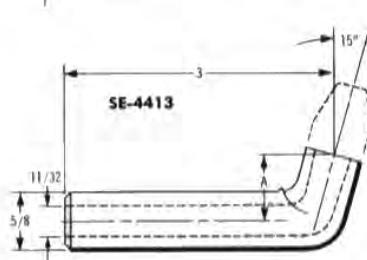
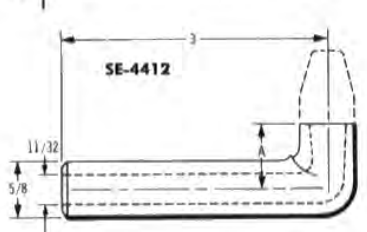
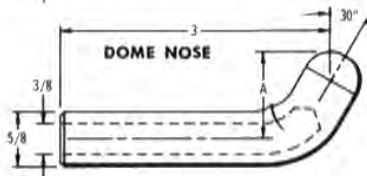
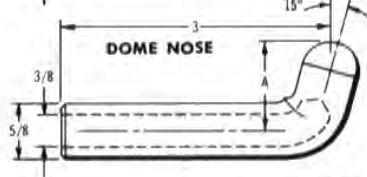
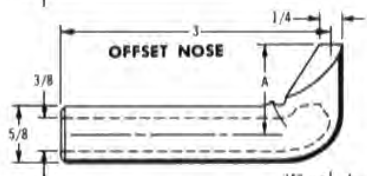
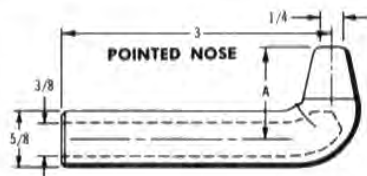


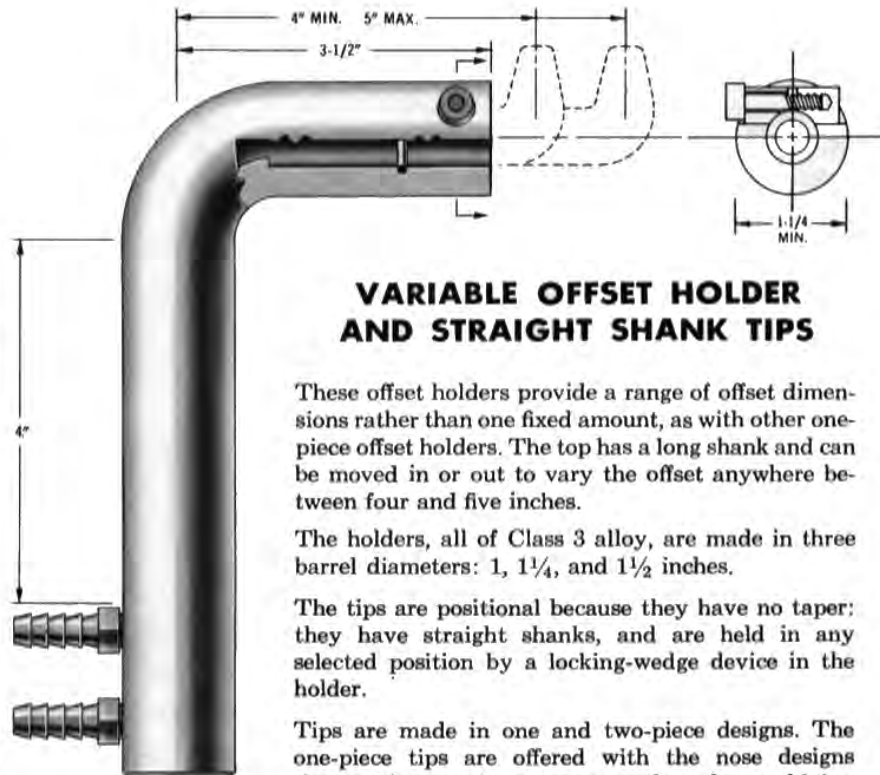
Figure 4: A platen set-up using platen-mounted standard tips under an Equa-Press dual holder.

Tuffaloy variable-offset holders



VARIABLE-OFFSET HOLDERS

Shank Dia.	Description	Item No.
1	SH-7223	345-7223
1-1/4	SH-7224	345-7224
1-1/2	SH-7225	345-7225



VARIABLE OFFSET HOLDER AND STRAIGHT SHANK TIPS

These offset holders provide a range of offset dimensions rather than one fixed amount, as with other one-piece offset holders. The top has a long shank and can be moved in or out to vary the offset anywhere between four and five inches.

The holders, all of Class 3 alloy, are made in three barrel diameters: 1, 1 1/4, and 1 1/2 inches.

The tips are positional because they have no taper; they have straight shanks, and are held in any selected position by a locking-wedge device in the holder.

Tips are made in one and two-piece designs. The one-piece tips are offered with the nose designs shown. The two-piece tips are made up by combining the shanks shown here with Tuffcap caps (normally used with No. 5 RW size Tuffcap shanks). Either male or female tips can be used, with any nose design offered (on pages 6 & 7). All integral tips and shanks shown here are of Class 2 alloy.

STRAIGHT-SHANK TIPS

Type of Tip	Nose Length 'A'	Description	Item No.
Pointed	1"	SE-4408-1	170-4408
Offset	1"	SE-4409-1	170-4409
15° Dome	1"	SE-4410-1	170-4410
30° Dome	1"	SE-4411-1	170-4411
Pointed	2"	SE-4408-2	170-4418
Offset	2"	SE-4409-2	170-4419
15° Dome	2"	SE-4410-2	170-4420
30° Dome	2"	SE-4411-2	170-4421

STRAIGHT-SHANK TUFFCAP SHANKS

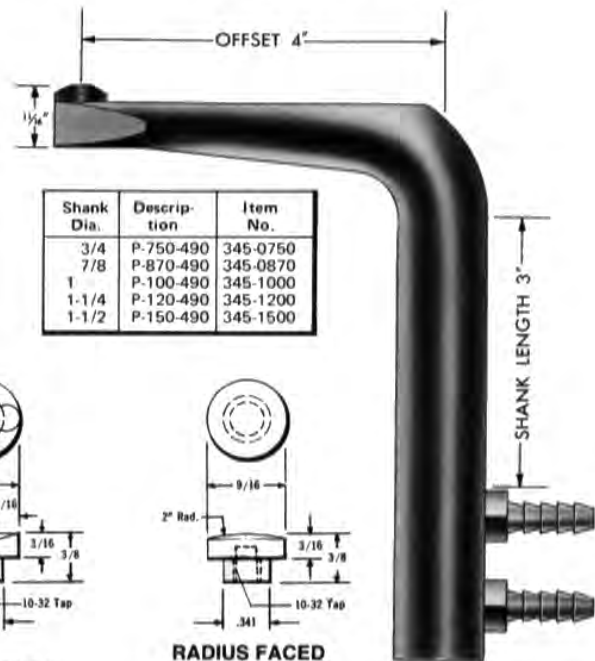
Tuffcap Cap Type	Nose Length 'A'	Angle	Description	Item No.
Male	3/4"	90°	SE-4412	170-4422
Male	3/4"	15°	SE-4413	170-4423
Female	1"	90°	SE-4414	170-4424
Female	1"	15°	SE-4415	170-4425

Tuffaloy paddle-type holders

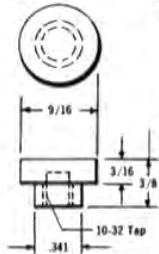
TUFFALOY Paddle-Type Holders and Socket-Type Tips

This holder is for welding in very restricted areas. It provides a very low head height and a four-inch offset. It is made in shank diameters of 3/4, 7/8, 1, and 1-1/4 inches. An adapter bushing is used to add a 1-1/2-in. dia. model to the line. Each holder comes complete with a socket-type tip (SE-3101) and holding screw. The tip may be inserted in either side of the paddle. Holders are of Class 2 alloy. Tips are available in Class 1, Class 2, Class 3 alloy, or Z alloy.

The four socket-type tips shown here can be used in special welding fixtures and dies as well as in the paddle-type holders.

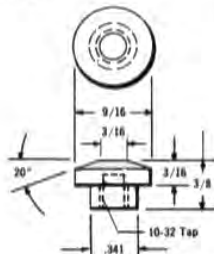


Shank Dia.	Description	Item No.
3/4	P-750-490	345-0750
7/8	P-870-490	345-0870
1	P-100-490	345-1000
1-1/4	P-120-490	345-1200
1-1/2	P-150-490	345-1500



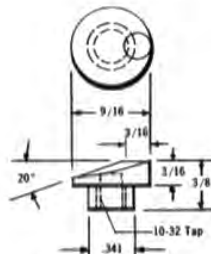
FLAT FACED

Class 1 SE-3099-1:
Item No. 170-3099-1
Class 2 SE-3099:
Item No. 170-3099
Class 3 SE-3111:
Item No. 170-3111
ZIRC SE-3099-Z
Item No. 170-3099-Z



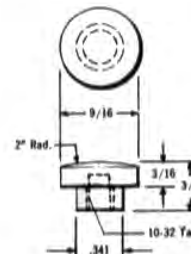
TRUNCATED CONE

Class 1 SE-3101-1:
Item No. 170-3101-1
Class 2 SE-3101:
Item No. 170-3101
Class 3 SE-3113:
Item No. 170-3113
ZIRC SE-3101-Z
Item No. 170-3101-Z



OFFSET

Class 1 SE-3102-1:
Item No. 170-3102-1
Class 2 SE-3102:
Item No. 170-3102
Class 3 SE-3123:
Item No. 170-3123
ZIRC SE-3102-Z
Item No. 170-3102-Z



RADIUS FACED

Class 1 SE-3110-1:
Item No. 170-3110-1
Class 2 SE-3110:
Item No. 170-3110
Class 3 SE-3133:
Item No. 170-3133
ZIRC SE-3110-Z
Item No. 170-3110-Z

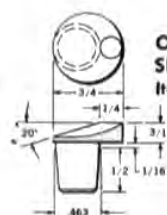


Shank Dia.	Description	Item No.
1	SH-7194	345-7194
1-1/4	SH-7195	345-7195
1-1/2	SH-7196	345-7196



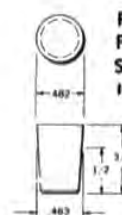
TRUNCATED CONE

SE-3247
Item No. 170-3247



OFFSET

SE-3248
Item No. 170-3248



FLAT FACED

SE-3249
Item No. 170-3249

TUFFALOY HEAVY-DUTY Paddle-Type Holders and Tips

TUFFALOY heavy-duty paddle-type holders are made of the stronger Class 3 alloy, for greater rigidity and minimum deflection, even under loads of 1000 pounds and more. Class 3 alloy provides 154% more tensile strength (up to 100,000 psi). Head height is a low 1/4 -in. and the shank length is a usable 4 inches.

Three low-profile electrodes of Class 2 alloy are offered for use in this heavy-duty holder. If applications permit greater head height, any standard No. 4 RW tip may be used.

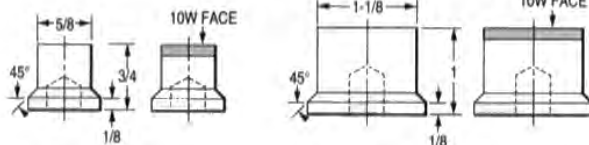
Tuffaloy high pressure welding

HIGH PRESSURE TIPS

Spot and projection welding operations utilize pressures over 2000 lbs. TUFFALOY high-pressure tips have flat bottoms. Elimination of the usual tapered-sockets and tip-jamming. Assembled tip and holder heights are always the same, as contrasted to tapered tips which can be forced into the sockets varying distances.

TUFFALOY high pressure tips can be used in the two holder styles shown: PM holders for mounting on the platens of press-type welders, and straight holders for spot welder arm mounting. The tips are held to the holders by a threaded coupling. Copper tungsten faced tips are available for high pressure wear and projection welding.

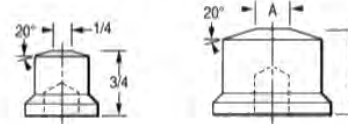
FLAT FACED



Size 1 PMC-2503
Item No. 180-2203
Item No. 180-2203-10W

Size 2 PMC-2104
Item No. 180-1040
Item No. 180-2104-10W

TRUNCATED CONE

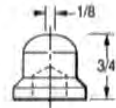


Size 1 PME-2503
Item No. 180-2303

Size 2

'A'	Description	Item No.
1/4	PME-21041	180-1041
5/16	PME-21042	180-1042
3/8	PME-21043	180-1043
7/16	PME-21044	180-1044
1/2	PME-21045	180-1045

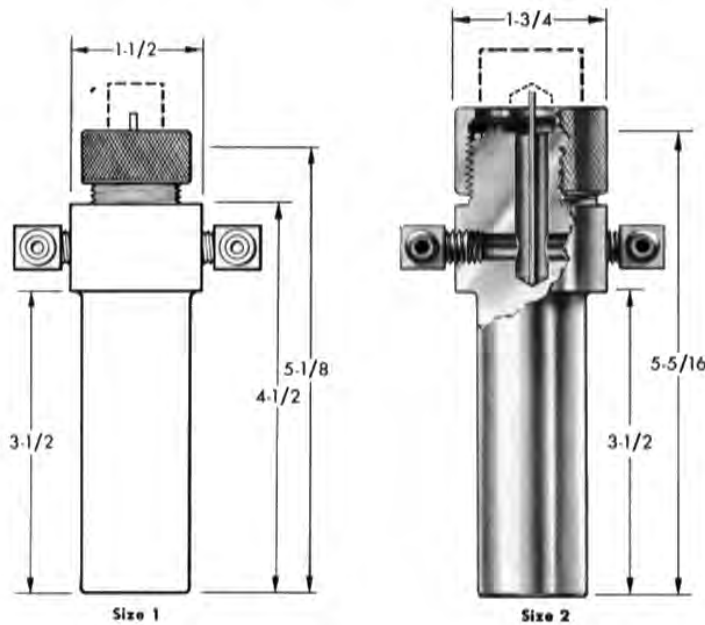
DOME NOSED



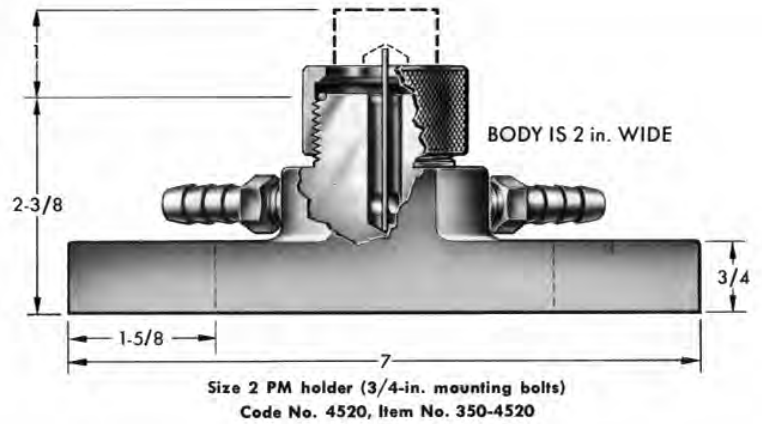
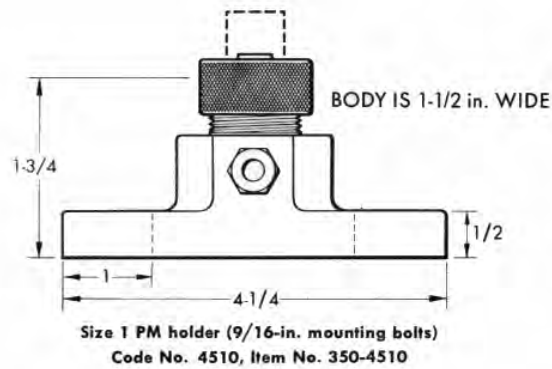
Size 1 PMB-2503
Item No. 180-2103

STRAIGHT HOLDERS CLASS 2 ALLOY

Straight holders are made for carrying TUFFALOY high pressure tips in rocker arm welders or press-type welder horn extensions. They are made in two basic sizes, to accommodate the Size 1 and 2 tips. They are of Class 2 alloy and hold the tips in the same manner as do the PM holders.



Size	Barrel Dia.	Description	Item No.
1	1	4511	350-4511
1	1-1/4	4512	350-4512
1	1-1/2	4513	350-4513
2	1-1/4	4521	350-4521
2	1-1/2	4522	350-4522



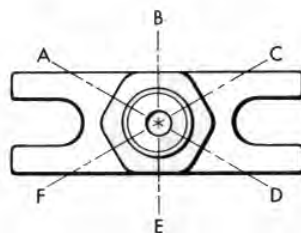
PM HOLDERS

TUFFALOY PM holders are mounted directly to press-type welder platens, or are used as components of special weld fixturing.

Platen Mounting: PM holders bolt easily to the platen T-slots at any desired location, in a minimum of time (no intermediary device is required). Big half-inch mounting bolts may be used to assure good conductivity. They are the first such standard, stocked holders to be made available. They come in two sizes, to match standard T-slot spacing, and to hold the 2 sizes of tips shown. The small size 1 PM holder is for use on RWMA Size 1 press-type welders (3-1/2-in. spacing) and the large size 2 PM holder is for Size 2 and 3 welders (5- and 6-in. spacing). The electrodes used do not require any particular radial positioning to obtain proper coolant flow. These are compact holders that may be used one-to-one or in multiples in close proximity to one another.

Fixture Building: PM holders make special fixture building easy too. They can be bolted to a fixture or backup base as easily as to a platen. They are compact and have self-contained coolant systems that eliminate making a coolant manifold out of the fixture.

Hose Connections: You may specify where you want the hose connectors in the hexagonal base. Select any two of the six possible locations and specify by using the symbols shown on the diagram (connector locations: A-B, or A-D, etc.). Position A-C is standard. (A-F and C-D are not possible.)



Tuffaloy automatic nut feeder systems

METRIC NUT ELECTRODES

TUFFALOY now stocks the head/pin style welding system components that adds to your selection of stud and nut welding needs. From our standard style to our Arctic, that produces higher quality welds and longer life, you can select the product that best meets your needs.

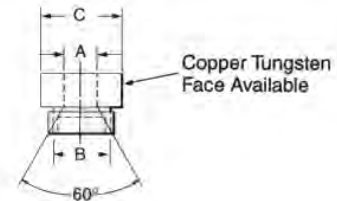
Heads are made from RWMA class 2 material that are an optimal cost consumable. Class 3 and 10W are optional for longer life. With a concave seat the pin locates in the center of assembly when

air is applied to the system. This gives you a repeatable location for automated nut feeders to introduce the nut to the environment.

Pins have a nonconductive surface of a steel matrix that gives longer life in a repetitive motion environment. With the threaded head securing the pin in place it makes it easy to replace the pin to meet your requirements. TUFFALOY can design pins for specials applications.

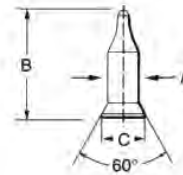
HEADS

Part Number	A Pin Size	B Thread	C Dia.
175-8004	4mm	M18	1"
175-8005	5mm		
175-8006	6mm		
175-8007	7mm		
175-8008	8mm		
175-8009	9mm		
175-8010	10mm	M22	1.125"
175-8011	11mm		
175-8012	12mm		



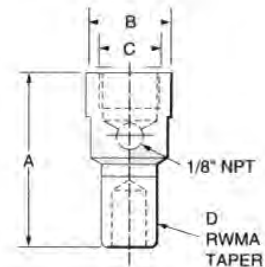
PINS

Part Number	A Nut	B OAL	C Base
195-3004	4mm	1.12"	12mm
195-3005	5mm	1.17"	
195-3006	6mm	1.23"	
195-3007	7mm	1.24"	
195-3008	8mm	1.25"	
195-3009	9mm	1.19"	
195-3010	10mm	1.37"	16mm
195-3011	11mm	1.38"	
195-3012	12mm	1.40"	
195-3013	13mm	1.37"	



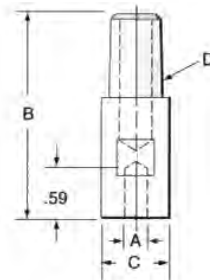
BODIES

Description	Part Number	A OAL	B Dia.	C Thread	D Taper
TDH-25A	301-0004	1.77"	1"	18mm	#4
TDH-25C	301-0005	1.97"	1"	18mm	#5
TDH-30A	301-0015	1.97"	1.125"	22mm	#5



UPPER ELECTRODE

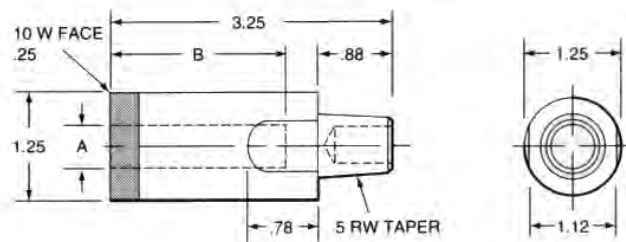
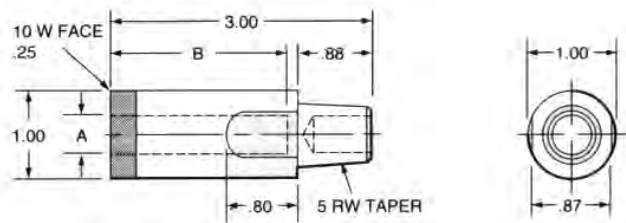
Description	Part Number	A ID	B OAL	C Dia.	D Taper
TNFD 16-M5-16-3	186-0101	5mm	2.36"	.625"	5RW
TNFD 20-M6-16-3	186-0102	6mm		.75"	
TNFD 20-M8-16-3	186-0103	7.5mm		.75"	
TNFD 20-M10-16-3	186-0104	10mm		.75"	
TNFD 20-M12-16-3	186-0105	12mm		.75"	



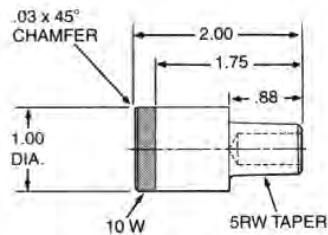
Tuffaloy 5 RW stud electrodes

These series of Stud electrodes are made from RWMA Class 2 material with TUFFALOYS' 10W (copper tungsten) on the weld face and wrench flats for easy removal from holders. The Insulator is made to withstand the constant friction that is applied as the stud is inserted and removed.

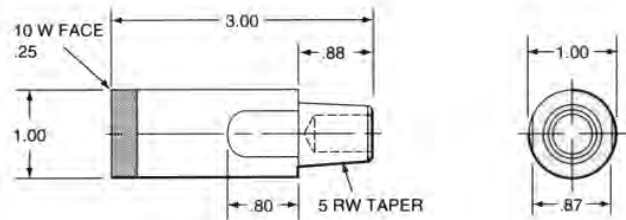
INSULATOR		Part Number
ID.	Length A B	
.218	1"	0316-4032
.243		0316-40062
.256		0316-4042
.319		0316-4052
.381		0316-4062
.400		0316-40102
.218	2"	0316-4031
.243		0316-4006
.256		0316-4041
.319		0316-4051
.381		0316-4061
.400		0316-4010
.444	1"	1313-4372
.479		1313-40122
.506		1313-4382
.569		1313-4392
.652		1313-4402
.694		1313-4412
.777	1313-4422	
.444	2"	1313-4371
.479		1313-4012
.506		1313-4381
.569		1313-4391
.652		1313-4401
.694		1313-4411
.777	1313-4421	



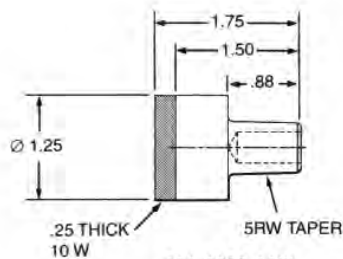
BACKUP ELECTRODES FOR UPPERS



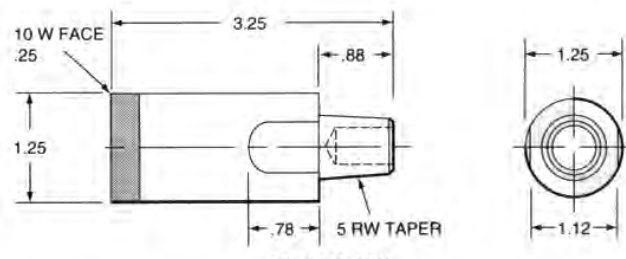
186-0311-10W



186-0316-10W



186-0313-10W

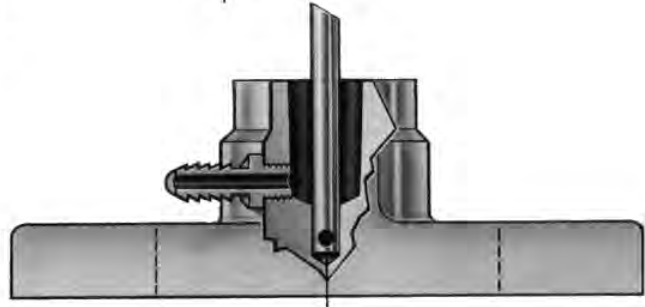
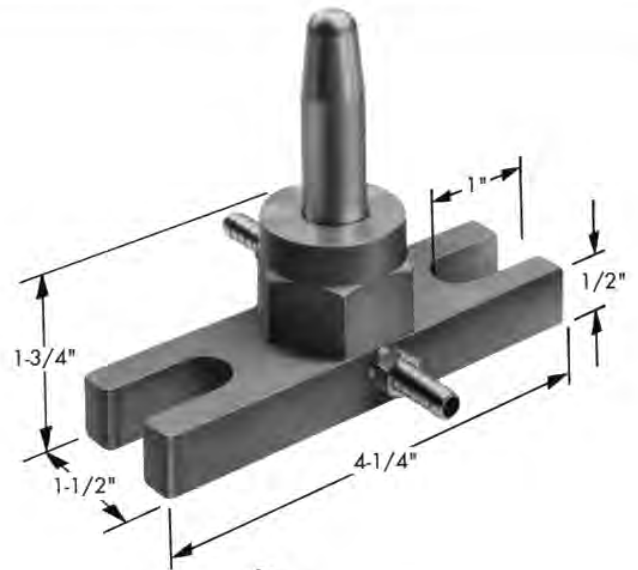


186-1313-10W

PLATEN-MOUNTED HOLDERS

TUFFALOY PM holders may be mounted directly to press-type welder platens, or they can be used as components of special weld fixturing. They come in two sizes, which match standard T-slot spacings (either of which can be furnished to hold any of the four standard tips: 4, 5, 6 or 7 RW). The smaller holder is for use on RWMA Size 1 welders, which have the 3-1/2" spacing. The larger one is for the Size 2 and 3 welders, which have the 5- and 6-inch spacing.

Big, half-inch mounting bolts may be used to assure good conductivity. The holders may be used one-to-one or in multiples closely bunched. PM holders make special fixture building easy. They can be bolted to a fixture or back-up base as easily as to a platen. They are compact and have self-contained coolant systems.



STANDARD TIP PM HOLDERS

RW Tip Socket	Size 1 (Small)		Size 2 (Large)	
	Description	Item No.	Description	Item No.
4	4560	350-4560	4570	350-4570
5	4561	350-4561	4571	350-4571
6	4562	350-4562 *	4572	350-4572 *
7	4563	350-4563	4573	350-4573

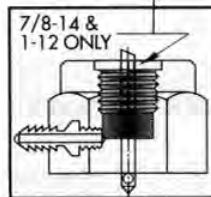
*Item not normally stocked

THREADED PM HOLDERS

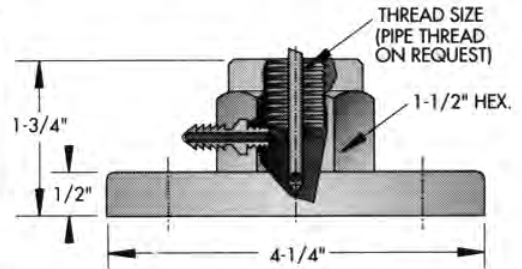
Thread Size	Size 1	Size 2
5/8-11	350-4580	350-4590
3/4-10	350-4581	350-4591
7/8-14	350-4582	350-4592
1-12	350-4583	350-4593

See adapters page 18

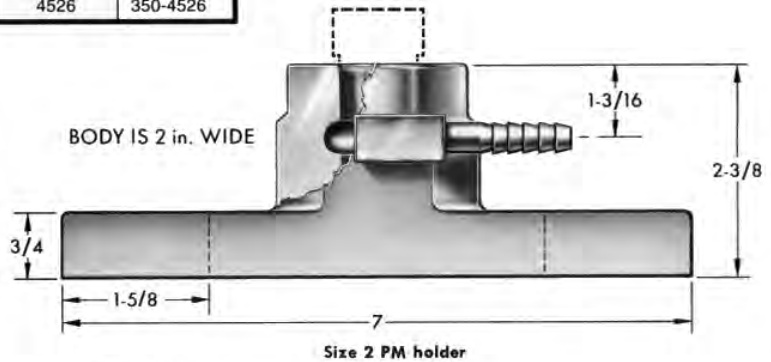
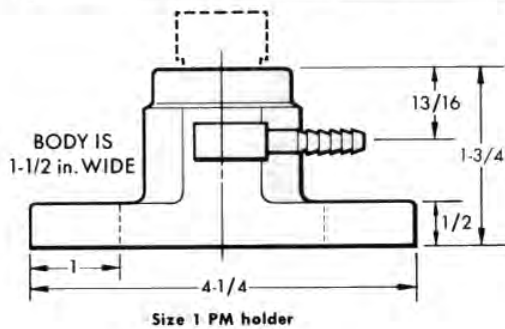
This Style Only.



Size 2 PM holder (3/4-in. mounting bolts)



PM Holders T-Slot Spacing	Holder Size	For 1" Dia. Electrodes		For 1-1/2" Dia. Electrodes	
		Description	Item No.	Description	Item No.
3-1/2	1PM	4515	350-4515		
5 & 6	2PM	4525	350-4525	4526	350-4526



Tuffaloy nut and stud welding

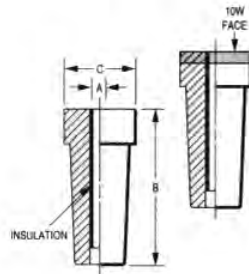


The various types and sizes of TUFFALOY stud-and-nut welding electrodes and holders are described below and on page 33. For excessive wear applications any of these electrodes may be ordered with refractory metal facings, such as TUFFALOY 10W.

ELECTRODES

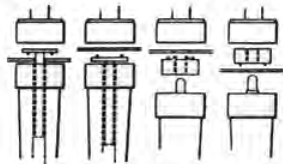
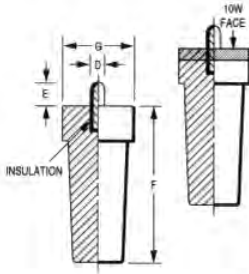
Stud Electrodes—

Tuffaloy stud electrode tips are for projection-welding screws, bolts or pins, whether they pass through the sheet or are to be attached directly to its face.



Nut Electrodes—

Tuffaloy projection weld nut electrodes are designed for either self-piloted or non-piloted nuts. The pilots of the non-piloted-nut electrodes are spring-loaded so they can't interfere with the contacting of nut and sheet under welding pressure.

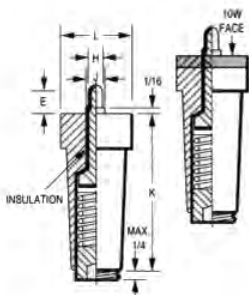


Welding a stud through a hole in sheet metal.

Welding a stud directly to face of sheet metal.

Self-piloted nut aligns itself with the hole in sheet.

Non-piloted-nut is guided by specially designed electrode.



STUD ELECTRODES

A	B	C	Description	Item Number	With 10W Face Refractory - Item Number
.150	2-1/4	1	400	175-4001	175-4001-10W
.164			401	175-4011	175-4011-10W
.190			402	175-4021	175-4021-10W
.216			403	175-4031	175-4031-10W
1/4			404	175-4041	175-4041-10W
5/16			405	175-4051	175-4051-10W
3/8			406	175-4061	175-4061-10W
6mm			506	175-5061	175-5061-10W
7mm			507	175-5071	175-5071-10W
9mm			509	175-5091	175-5091-10W
10mm	510	175-5101	175-5101-10W		
3/8	2-3/4	1-1/2	436	175-4361	175-4361-10W
7/16			437	175-4371	175-4371-10W
1/2			438	175-4381	175-4381-10W
9/16			439	175-4391	175-4391-10W
5/8			440	175-4401	175-4401-10W
11/16			441	175-4411	175-4411-10W
3/4			442	175-4421	175-4421-10W
10mm			510-2	175-5102	175-5102-10W
12mm			512-2	175-5122	175-5122-10W

SELF-PILOTED-NUT ELECTRODES

D For Nut Diameter	E Pin Length	F Electrode Length	G Electrode Diameter	Description	Item Number	With 10W Face Refractory - Item Number
.164	3/16	2-1/4	1	411	175-4111	175-4111-10W
.190	3/16			412	175-4121	175-4121-10W
.216	1/4			413	175-4131	175-4131-10W
1/4	5/16			414	175-4141	175-4141-10W
5/16	5/16			415	175-4151	175-4151-10W
3/8	3/8			416	175-4161	175-4161-10W
6mm	1/4			606	175-6061	175-6061-10W
7mm	5/16			607	175-6071	175-6071-10W
9mm	3/8			609	175-6091	175-6091-10W
10mm	3/8			610	175-6101	175-6101-10W
3/8	3/8	2-3/4	1-1/2	456	175-4561	175-4561-10W
7/16	3/8			457	175-4571	175-4571-10W
1/2	7/16			458	175-4581	175-4581-10W
9/16	7/16			459	175-4591	175-4591-10W
5/8	1/2			460	175-4601	175-4601-10W
11/16	1/2			461	175-4611	175-4611-10W
3/4	5/8			462	175-4621	175-4621-10W
10mm	3/8			610-2	175-6102	175-6102-10W
12mm	7/16			612-2	175-6122	175-6122-10W

NON-PILOTED-NUT ELECTRODES

H For Nut Diameter	J Pilot Diameter	K Electrode Length	L Electrode Diameter	Description	Item Number	With 10W Face Refractory - Item Number
.164	0.18	2-1/4	1	421	175-4211	175-4211-10W
.190	0.215			422	175-4221	175-4221-10W
.216	0.24			423	175-4231	175-4231-10W
1/4	0.275			424	175-4241	175-4241-10W
5/16	0.345			425	175-4251	175-4251-10W
3/8	0.405			426	175-4261	175-4261-10W
6mm	0.261			706	175-7061	175-7061-10W
7mm	0.3			707	175-7071	175-7071-10W
9mm	0.385			709	175-7091	175-7091-10W
10mm	0.425			710	175-7101	175-7101-10W
3/8	0.437	2-3/4	1-1/2	476	175-4761	175-4761-10W
7/16	0.562			477	175-4771	175-4771-10W
1/2	0.625			478	175-4781	175-4781-10W
9/16	0.687			479	175-4791	175-4791-10W
5/8	0.75			480	175-4801	175-4801-10W
10mm	0.453			710-2	175-7102	175-7102-10W
12mm	0.595			712-2	175-7122	175-7122-10W

ELECTRODE HOLDERS

U.S. Pat. No. 3,504,159 Canada Pat. No. 858,060

Several standard electrode holders are manufactured by Tuffaloy to accommodate all the Tuffaloy stud-and-nut electrode tips. These holders are available in three basic types:

Straight Holders — Tuffaloy straight nut-and-stud-electrode holders are of the same high quality as the standard straight holders made for spot welder arm mounting. Coolant is brought to the tip and circulated around it. Holders are available in three barrel diameters.

Straight Holders Barrel Diameter	A Dia.	B Length	For 1" Dia. Electrodes		For 1-1/2" Dia. Electrodes	
			Descrip- tion	Item No.	Descrip- tion	Item No.
1	1-3/4	5-3/8	4530	350-4530		
1-1/4	1-3/4	5-3/8	4531	350-4531		
1-1/2	1-3/4	5-3/8	4532	350-4532		
1	2	5-3/4			4535	350-4535
1-1/4	2	5-3/4			4536	350-4536
1-1/2	2	5-3/4			4537	350-4537

Offset Holders — To fit the special geometry of odd-shaped parts, Tuffaloy has 2-inch offset nut-and-stud electrode holders, made in three shank sizes.

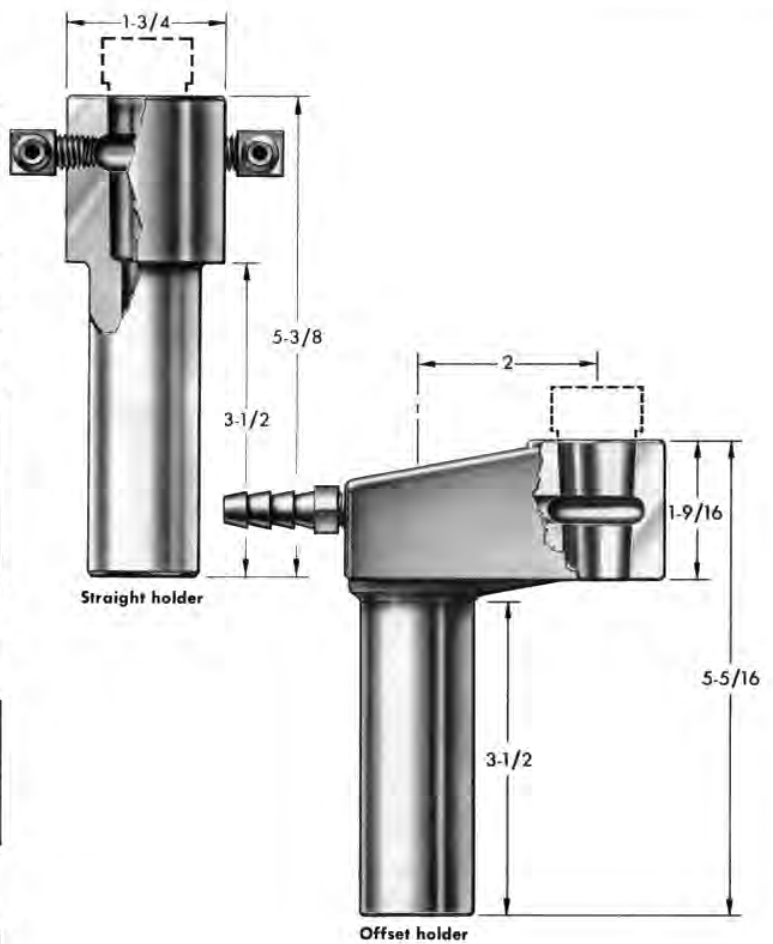
Offset Holders Shank Diameter	For 1" Dia. Electrodes		For 1-1/2" Dia. Electrodes	
	Descrip- tion	Item No.	Descrip- tion	Item No.
1		4540	350-4540	
1-1/4		4541	350-4541	4546
1-1/2		4542	350-4542	4547
				350-4546
				350-4547

ARCTIC STUD ELECTRODES

A For Stud Diameter	B Electrode Length	C Electrode Diameter	Descrip- tion	Item Number- Shank Size
0.150	3	1-1/4	115	175-1151-X
0.164			116	175-1161-X
0.190			119	175-1191-X
0.216			122	175-1221-X
1/4			125	175-1252-X
5/16			131	175-1312-X
3/8			138	175-1382-X
7/16			144	175-1442-X
6mm			106	175-1061-X
7mm			107	175-1072-X
9mm	109	175-1092-X		
10mm	110	175-1102-X		
1/2	3	1-1/2	150	175-1503-X
9/16			156	175-1563-X
5/8			163	175-1633-X
11/16			169	175-1693-X
12mm			112	175-1123-X

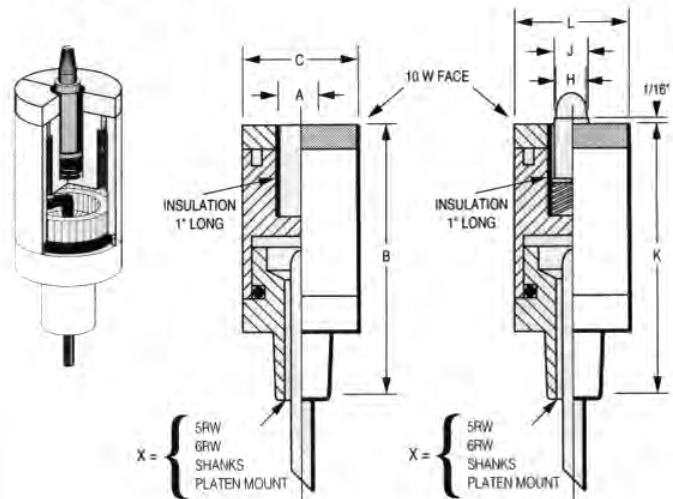
ARCTIC NON-PILOTED-NUT ELECTRODES

H For Nut Diameter	J Pilot Diameter	K Electrode Length	L Electrode Diameter	Descrip- tion	Item Number - Shank Size
0.164	0.180	4	1-1/4	216	175-2162-X
0.190	0.215			219	175-2192-X
0.216	0.240			222	175-2222-X
1/4	0.275			225	175-2252-X
5/16	0.345			231	175-2312-X
3/8	0.405			238	175-2382-X
6mm	0.261			206	175-2062-X
7mm	0.300			207	175-2072-X
9mm	0.385			209	175-2092-X
10mm	0.425			210	175-2102-X
7/16	0.562	4	1-1/2	244	175-2443-X
1/2	0.625			250	175-2503-X
9/16	0.687			256	175-2563-X
5/8	0.750			262	175-2623-X
12mm	0.595			212	175-2123-X



Arctic Electrodes—The Arctic system is a compact stud-and-nut electrode with internal water cooling. Also available with optional air expulsion and platen mounts.

Patent Pending



Tuffaloy multiple welding

QUICKEST WAY TO CUT WELDING COSTS

Increased productivity without capital investment or increased labor costs just has to spell PROFIT. Hundreds of resistance welding users are profiting from the TUFFALOY methods of multiple welding, to produce almost any assembly requiring closely spaced welds.

The key is to "think multiple!" Whenever the welding machine goes through a cycle, have it do more than one weld at a time. It's easy and practical with one of the TUFFALOY multiple welding devices: The Teeter-Tip dual tip adapter, the Equatip dual tip holder, the Equa-Press dual tip holder, or the Tri-Spacer.

They're ready to go to work, cutting costs and increasing production efficiency for you.

Study the multiple welding holders and adapters in this section. Learn their capabilities, "think multiple," and you'll probably see many ways in which TUFFALOY multiple welding can improve your operation. Remember that TUFFALOY is prepared to provide any special fixturing you need. Show our engineers what you require, and they'll design a set-up to do it.

TEETER-TIP Dual Tip Adapters

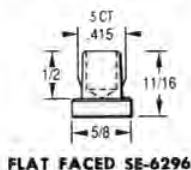
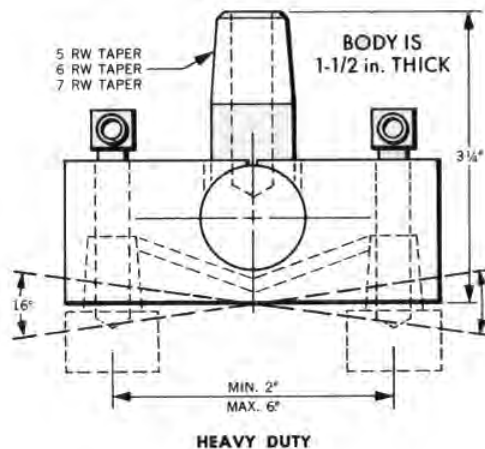
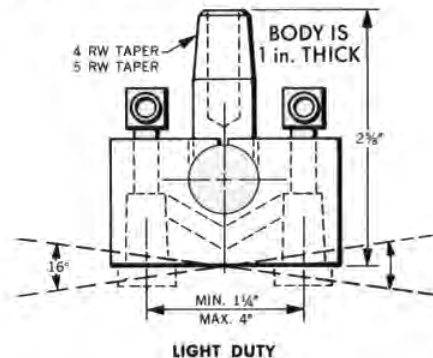
U. S. Pat. 3,356,821

You can spot or projection weld in half the time by doubling the number of welds per machine stroke. Use Teeter-Tip dual tip adapters, which come with water-coolant fittings to beat high heat build-up. These adapters transmit total pressures of 1000 lbs., and deliver equal current and pressure to each tip. They compensate for normal electrode wear, imperfect tip dressing, and work variations up to .060".

LIGHT-DUTY adapters have no. 4 or 5 RW shanks, tip spacing to 4 inches, tip sockets for 1/2" or 5/8" diameter male Tuffcap caps, or 4 RW tips (5/8" cap sockets are standard).

HEAVY-DUTY adapters have shanks from 5 to 7 RW size, tip spacing to 6 inches, tip sockets for 1/2" or 5/8" diameter male Tuffcap caps, or 4 or 5 RW tips (4 RW sockets are standard). These adapters have a deeper, stronger body.

Two low-height 5/8" dia. cap-type tips are shown below. They are recommended for use in these adapters. Other standard caps, both 5/8" & 1/2" dia., are tabled on the next page. You must specify the size tip sockets you want, or the standard socket will be supplied.



Style	Shank Taper	Description*	Tip Spacing Range (inches)	Socket Taper
LIGHT Duty	4RW	TT-1408	1-1/4 to 2	4RW 4CT 5CT
	4RW	TT-1416	2 to 4	4RW 4CT 5CT
	5RW	TT-1508	1-1/2 to 2	4RW 4CT 5CT
	5RW	TT-1516	2 to 4	4RW 4CT 5CT
HEAVY Duty	5RW	TT-15516	2 to 4	4RW 5RW 4CT 5CT
	5RW	TT-15524	4 to 6	4RW 5RW 4CT 5CT
	6RW	TT-15616	2 to 4	4RW 5RW 4CT 5CT
	6RW	TT-15624	4 to 6	4RW 5RW 4CT 5CT
	7RW	TT-15716	2 to 4	4RW 5RW 4CT 5CT
	7RW	TT-15724	4 to 6	4RW 5RW 4CT 5CT

*When ordering, also state exact tip spacing and tip socket size. Example: TT - 1508 - 1-1/2 - 5CT. (5CT means 5/8" diameter cap. 4CT means 1/2" diameter cap.)

EQUATIP Dual Tip Holders

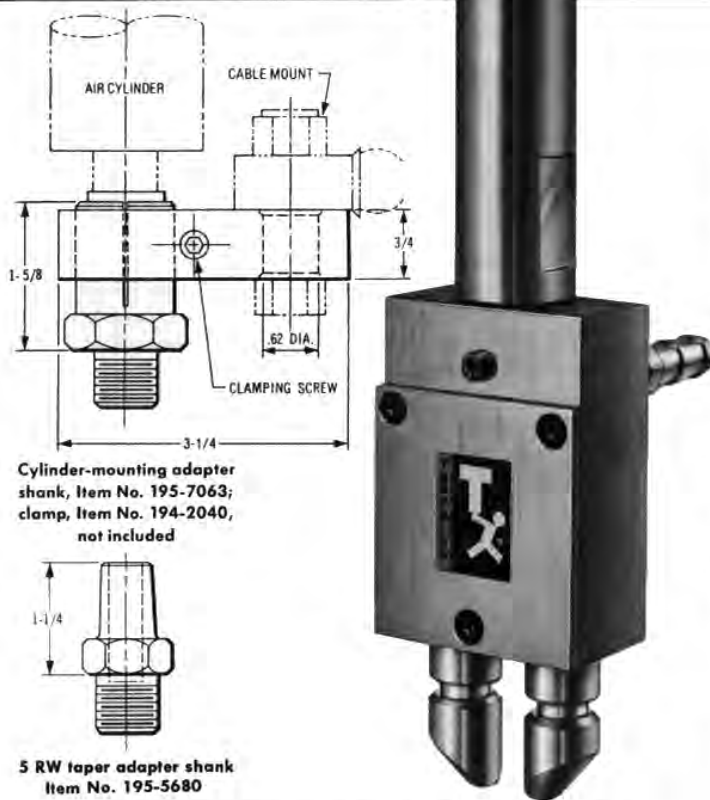
U.S. Pat. No. 3,558,847

The Equatip dual tip holder is a smaller version of the Equa-Press holder (on next page). It is more compact, and is more economical for those applications where it will work equally well. An even smaller device, the Equatip adapter (not water-cooled) is shown in box below.

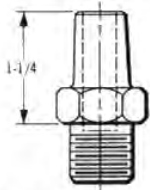
Using the Equatip holder, both tips contact the work squarely, because tip axes remain parallel to direction of force (unlike the Teeter-Tip adapters). An internal roller equalizes current and pressure between the two electrodes, and will compensate for work height variations up to $\frac{1}{16}$ ".

The holders are ordered with either 1" or 1½" spacing between barrels, and with tip sockets to accept either male Tuffcap caps ($\frac{5}{8}$ " dia.) or straight No. 4 RW electrodes. (Bent tips are not recommended.) The distance between welds can be varied by rotating offset-nose tips in the barrels.

Equatip holders can be supplied with straight shanks for arm mounting, a tapered adapter shank for holder mounting, or a cylinder adapter shank to be clamped to a cylinder rod.



Cylinder-mounting adapter shank, Item No. 195-7063; clamp, Item No. 194-2040, not included



5 RW taper adapter shank Item No. 195-5680

5/8-in. dia. Tuffcap caps (5 CT)

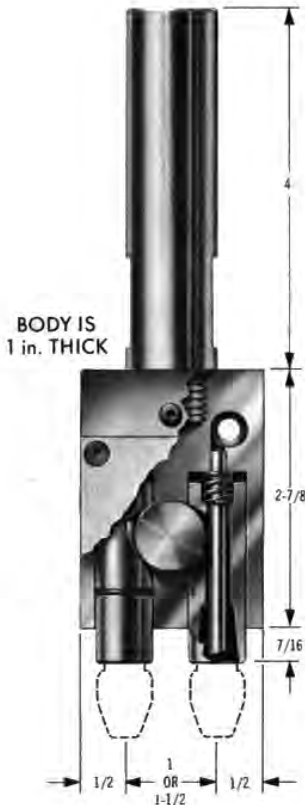
Nose Style	Alloy Class	Description	Item No.
Pointed	1	TA-15	111-0015
	2	TA-25	112-0025
Dome	1	TB-15	113-0015
	2	TB-25	114-0025
Flat	1	TC-15	115-0015
	2	TC-25	116-0025
Offset	1	TD-15	117-0015
	2	TD-25	118-0025

Those caps are fully dimensioned on page 6.

EQUATIP HOLDERS

Tip Spacing & Mounting Style	For 5/8" Dia. Tuffcap Caps		For No. 4 RW Tips	
	Description	Item No.	Description	Item No.
ONE-INCH SPACING:				
1-in. shank	4050	350-4050	4055	350-4055
1-1/4-in. shank	4051	350-4051	4056	350-4056
1-1/2-in. shank	4052	350-4052	4057	350-4057
5RW adapter	4053	350-4053	4058	350-4058
Cylinder adapter *	4054	350-4054	4059	350-4059
1-1/2-INCH SPACING:				
1-in. shank	4150	350-4150	4155	350-4155
1-1/4-in. shank	4151	350-4151	4156	350-4156
1-1/2-in. shank	4152	350-4152	4157	350-4157
5RW adapter	4153	350-4153	4158	350-4158
Cylinder adapter *	4154	350-4154	4159	350-4159

*Without clamp



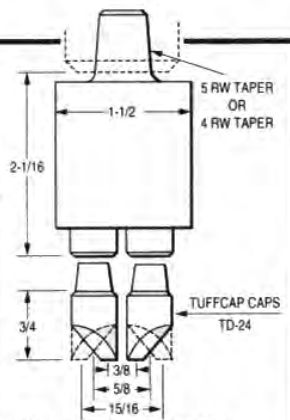
For light-duty welding— EQUATIP Adapter

The Equatip dual tip adapter works like the Equatip holder, but it is not water-cooled and is meant for less demanding jobs. It costs less, and is a little smaller, barrels being 5/8" apart. Its straight tips are TUFFCAP caps, 1/2" in diameter.

1/2-in. dia. Tuffcap caps (4 CT)

Nose Style	Alloy Class	Description	Item No.
Pointed	1	TA-14	111-0014
	2	TA-24	112-0024
Dome	1	TB-14	113-0014
	2	TB-24	114-0024
Flat	1	TC-14	115-0014
	2	TC-24	116-0024
Offset	1	TD-14	117-0014
	2	TD-24	118-0024

Those caps are fully dimensioned on page 6.



4045, Item No. 350-4045-5RW
4046, Item No. 350-4046-4RW



EQUA-PRESS* Dual Tip Holders

U. S. Pat. No. 2,979,599 Canada Pat. 637470

The Equa-Press Holder makes two identical welds at once. When it contacts the workpiece, the forging pressure is automatically equalized between the two electrodes, regardless of variations in work thickness or electrode wear (up to 3/16"). The two tip-holding barrels are sliding pistons, whose movements are controlled by a mechanical equalizing slide in the housing (see cutaway drawings). The spring's only function is to return the barrels to a fully extended position when there is no work contact. Maximum conductivity is maintained through sturdy copper-alloy working parts. Absolute fidelity of weld spacing is maintained. Spacing can vary up to 4 inches, using TUFFALOY bent offset tips in Equa-Press holders having the standard barrel spacing of two inches (shown).

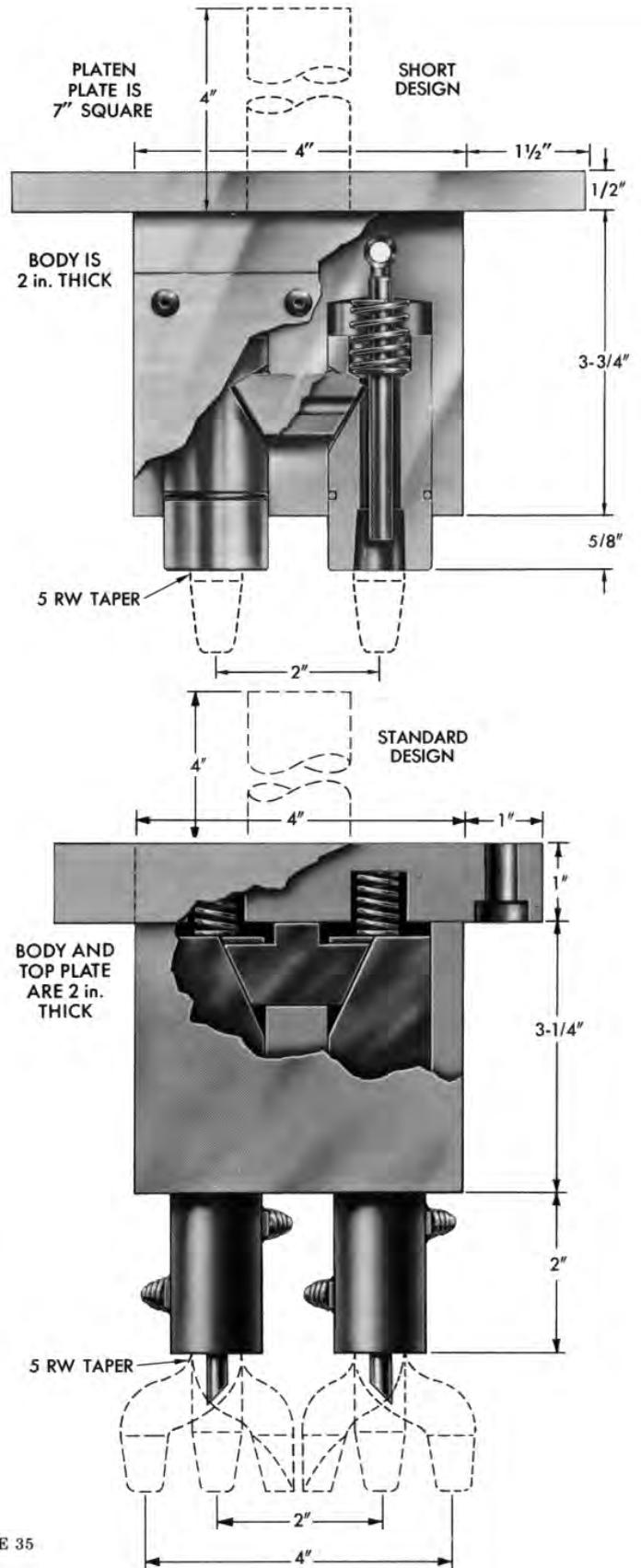
Barrel spacing up to six inches is available as semi-standard (see price list). These are drilled to order from stock components. To order you *must* give the barrel spacing desired, along with the Item number (from table). Example: 350-4012-3.25".

Equa-Press Holders are made in two mounting styles: platen models to mount directly to the platen on press-type welding machines, and shank models for rocker arm machines. All are available in two designs: the standard and the short (close-coupled) type. The short design is internally flood-cooled and takes up less space in the welder.

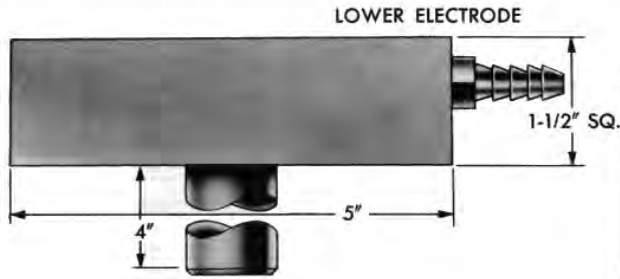
Mounting Style	Standard Design		Short Design	
	Description	Item No.	Description	Item No.
1-in. shank	4010	350-4010	4015	350-4015
1-1/4-in. shank	4011	350-4011	4016	350-4016
1-1/2-in. shank	4012	350-4012	4017	350-4017
Platen	4013	350-4013	4018	350-4018

Note: For best results, position the holder so that a line drawn through the electrode centers is at, or nearly at, right angles to the direction of the welder arms. Otherwise, the magnetic field between the arms can cause an excess of current to flow through the inboard electrode.

*Trademark



Tuffaloy multiple welding

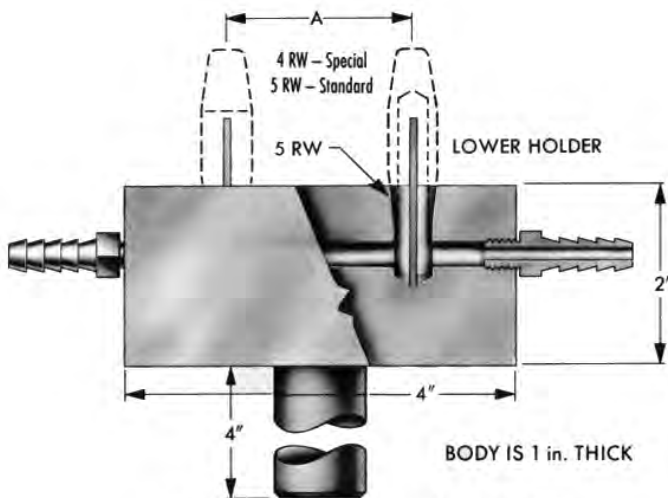


LOWER ELECTRODE

Shank Diameter	Description	Item No.
1	4020	350-4020
1-1/4	4021	350-4021
1-1/2	4022	350-4022

Lower holders and electrodes for use with Equa-Press Holder

A lower, fixed, dual tip holder is offered for use with Equa-Press Holders. Like the Equa-Press, it has a standard two-inch tip spacing and helps make two welds at once, precisely alike. The standard transverse bar electrode shown is used when work geometry doesn't require tips on the lower side. They are water-cooled.



STANDARD LOWER HOLDER - 2" SPACING 5 RW

Shank Diameter	Lower Holder	
	Description	Item No.
1	4030	350-4030
1-1/4	4031	350-4031
1-1/2	4032	350-4032

SPECIAL LOWER HOLDER

Style	Shank Diameter (inches)	Description*	A Tip Spacing Range (inches)
4" Body	1	4030	1 1/4 to 2 7/8
	1-1/4	4031	1 1/4 to 2 7/8
	1-1/2	4032	1 1/4 to 2 7/8
8" Body	1	8030	3 to 6
	1-1/4	8031	3 to 6
	1-1/2	8032	3 to 6

*When ordering specify center distance and either 4RW or 5RW sockets



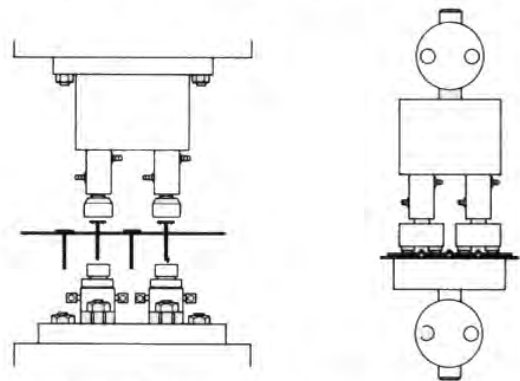
A Case History: Projection welding brackets to automotive frame assemblies is twice as fast with an Equa-Press dual tip holder. Lower welding fixture acts as an inspection device, so warped parts are discovered before welding. Inspection time and scrap loss are both reduced.



A Case History: Joining a piece of metal to itself is always tough. This job was done with an Equa-Press holder—two at a time. Lower clamp faces, carrying current, contact parts near the weld areas to avoid current bypassing weld projections. Two standard swivel tips make four welds, two per part.



A Case History: Dual spot welding of panelled wall sections reduced welding costs enough to justify buying welding machine to do the job in-plant. Equa-Press holder with 5-inch spacing, and special (but simple) tooling to provide two offset tip adapters and matching holders were used. Electrodes are standard TUFFCAP caps.



In this drawing, two studs are projection welded in each welder stroke, using an Equa-Press dual holder over a pair of stud-welding electrodes held in PM-style holders.

Here, four spot welds are made simultaneously on a corrugated part. An Equa-Press dual holder is used to hold two Teeter-Tip dual tip adapters.

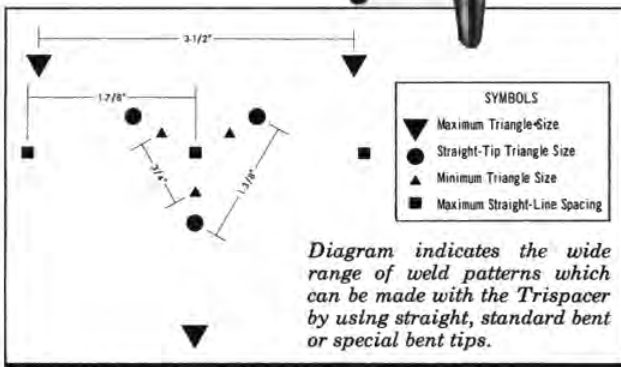
Tuffaloy multiple welding

TRISPACER* Triple Tip Holder

U.S. Pat. No. 3,558,848

TRISPACER HOLDER

Mounting Style	Description	Item No.
1-in. shank	4040	350-4040
1-1/4-in. shank	4041	350-4041
1-1/2-in. shank	4042	350-4042
Platen	4043	350-4043

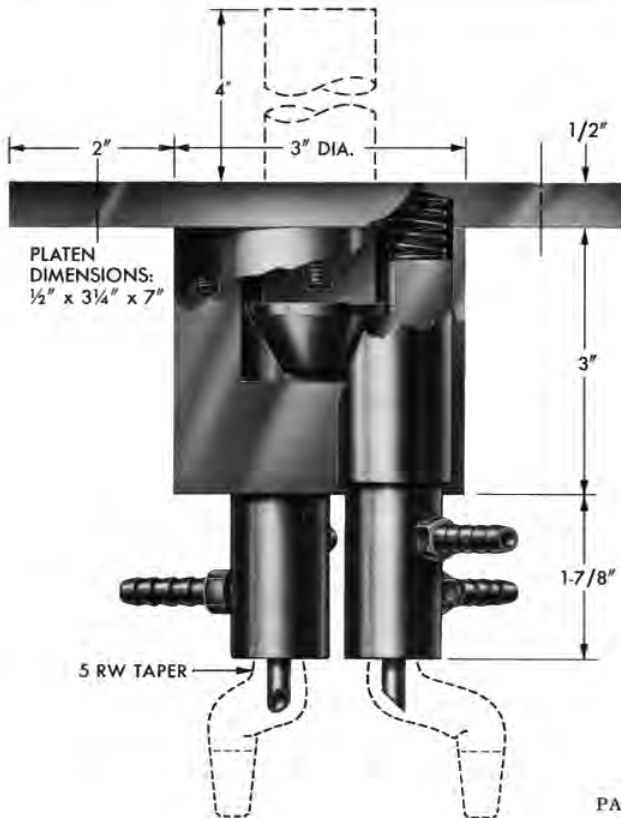


The Trispacer tip holder will make three spot welds at one time, automatically splitting the current and the pressure equally between the three tips. In doing so, it compensates for variations in work thicknesses and electrode wear—up to 3/16-in.

The three tip-holding barrels are equidistant from one another, all falling on a 1-5/8-in. diameter circle (in the standard model shown). Using straight tips the weld pattern would form an equilateral triangle. However, the weld pattern can be widely varied by using standard or special bent tips. In fact, the three welds can be made in a straight line.

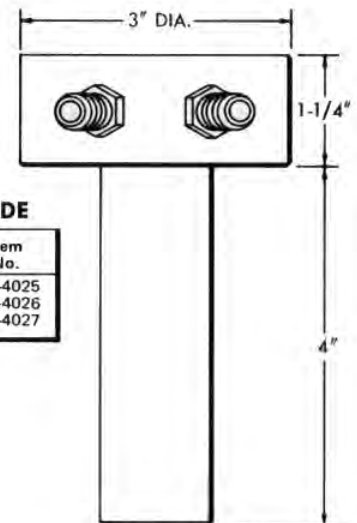
The Trispacer Holder works in the same simple, mechanical way as the Equa-Press Holder: The tip-holding barrels have a limited up-and-down movement, to accommodate work conditions, and are adjusted to deliver equal pressure by the cone-shaped equalizing device in the housing. All current-carrying parts are made of RWMA copper alloys. It is made in two styles: to mount directly to the platen of press-type welders, and with shanks to fit in welder arms.

*Trademark



Lower electrode

A simple, water-cooled lower electrode is made for use with the Trispacer holder. Its three-inch-diameter face makes it usable with any weld pattern that may be developed for the Trispacer. It comes in three shank diameter models.



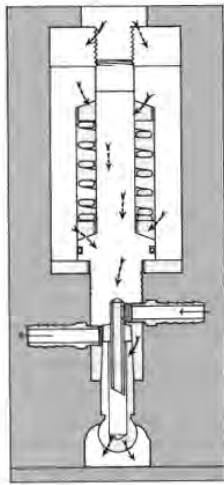
LOWER ELECTRODE

Shank Dia.	Description	Item No.
1	4025	350-4025
1-1/4	4026	350-4026
1-1/2	4027	350-4027

Tuffaloy fast-follow-up holders

U.S. Pat. No. 3,632,958

Canada Pat. No. 902,189



Current flow follows dashed arrow through the outer body, two split contact rings, tapered tip socket, and to the electrode.

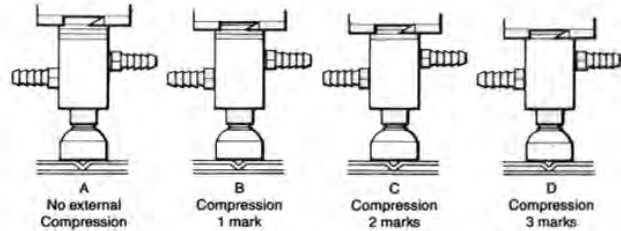
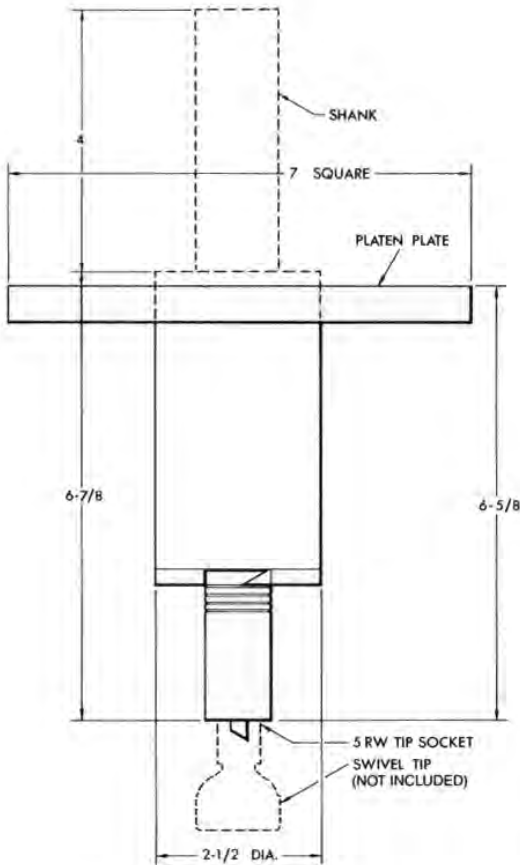
TUFFALOY fast-follow-up (low inertia) holders solve the problem of maintaining adequate weld pressure on rapidly collapsing projection welds—with fewer set-up problems and reduced maintenance.

These holders can be set to deliver fast-follow-up forces of from 140 to 1300 pounds, a range covering 90% of all projection welding operations. They are compact, water cooled, and easy to maintain.

Plus features of the TUFFALOY fast-follow-up holder include: (1) wider range of pressures than any competitive make (2) no flexible shunt—a common cause of holder failure (3) use of standard, unmodified die springs, so if you need a spring of different strength, it's easily available (4) spring forces available are clearly indicated, so it's easy to set up for a specific force (5) three shank sizes, or it can be platen-mounted—the only fast-follow-up holder that can (6) extremely low height permits use where larger units can't be used.

When used where no low-inertia holder had been used, these holders permit higher production rates with lower current consumption. Multiple welding set-ups are possible through use of a T-Bar clamp. Distance between holders is infinitely variable.

TUFFALOY fast-follow-up holders can be used to limit the weld pressure of any spot welding machine regardless of cylinder size or air pressure. This is better than reducing air pressure, which slows the return stroke and retards production.



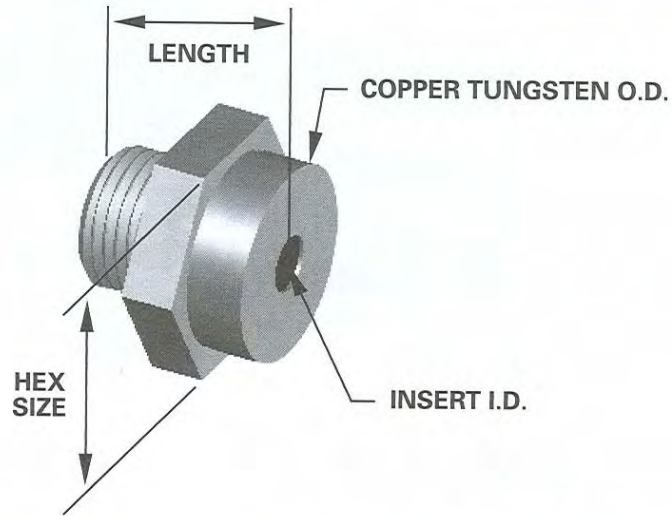
For every one-eighth of an inch that a fast-follow-up is compressed when setting up, a known amount of force is provided, to quickly follow up any reduction in work thickness. Example: at position B, a type MH spring would deliver 310 lb, at C, 440 lb, etc.

FAST-FOLLOW-UP FORCE CHART (LBS.)

Spring Type	1/8-in. Compression	1/4-in. Compression	3/8-in. Compression	1/2-in. Compression
M (300 lbs. max.)	140	200	250	300
MH (680 lbs. max.)	310	440	560	680
H (1300 lbs. max.)	600	840	1070	1300

Mounting Style	300 LBS. MAX. (M SPRING)		680 LBS. MAX. (MH SPRING)		1300 LBS. MAX. (H SPRING)	
	Description	Item No.	Description	Item No.	Description	Item No.
1" Shank	4620	350-4620	4621	350-4621	4622	350-4622
1-1/4" Shank	4623	350-4623	4624	350-4624	4625	350-4625
1-1/2" Shank	4626	350-4626	4627	350-4627	4628	350-4628
Platen-Mtd.	4629	350-4629	4630	350-4630	4631	350-4631

GH SERIES NUT WELDING HEADS



	175-GH-2 Series	175-GH-3 Series	175-GH-4 Series	Insert I.D.	175-GH-2 Series	175-GH-3 Series	175-GH-4 Series	Insert I.D.
Length	0.875	1.000	1.125		0.875	1.000	1.125	
Tungsten OD	0.875	1.250	1.500		0.875	1.250	1.500	
Hex Size	1.000	1.375	1.500		1.000	1.375	1.500	
	175-GH-2-188	175-GH-3-188		0.188	175-GH-2-372	175-GH-3-372		0.372
	175-GH-2-193	175-GH-3-193		0.193		175-GH-3-392		0.392
	175-GH-2-197			0.197		175-GH-3-397		10mm 0.397
		175-GH-3-200		0.200		175-GH-3-412		0.412
	175-GH-2-212			0.212		175-GH-3-417		0.417
	175-GH-2-218			0.218		175-GH-3-423		0.423
	175-GH-2-239			0.239		175-GH-3-425		0.425
	175-GH-2-240			0.240		175-GH-3-427		0.427
	175-GH-2-242	175-GH-3-242		6mm 0.242		175-GH-3-430		0.430
	175-GH-2-245	175-GH-3-245		0.245		175-GH-3-432		0.432
		175-GH-3-247		0.247		175-GH-3-437		0.437
	175-GH-2-250			0.250		175-GH-3-445		0.445
		175-GH-3-251		0.251		175-GH-3-447		0.447
	175-GH-2-252			0.252		175-GH-3-452		0.452
		175-GH-3-254		0.254		175-GH-3-465		0.465
	175-GH-2-258			0.258		175-GH-3-467		0.467
		175-GH-3-262		0.262		175-GH-3-470		0.470
	175-GH-2-263			0.263		175-GH-3-472		0.472
		175-GH-3-264		0.264		175-GH-3-480		12mm 0.480
	175-GH-2-272	175-GH-3-272		0.272		175-GH-3-504		0.504
	175-GH-2-273	175-GH-3-273		0.273		175-GH-3-507		0.507
	175-GH-2-277			0.277		175-GH-3-508		0.508
	175-GH-2-280			0.280			175-GH-4-509	0.509
	175-GH-2-282			0.282		175-GH-3-512		0.512
	175-GH-2-287			0.287		175-GH-3-517		0.517
	175-GH-2-312	175-GH-3-312		0.312		175-GH-3-522		0.522
		175-GH-3-317		8mm 0.317		175-GH-3-538		0.538
	175-GH-2-322	175-GH-3-322		0.322		175-GH-3-542		0.542
			175-GH-4-325	0.325		175-GH-3-547		0.547
		175-GH-3-326		0.326		175-GH-3-548		0.548
	175-GH-2-332	175-GH-3-332		0.332		175-GH-3-552		0.552
		175-GH-3-337		0.337		175-GH-3-557		0.557
	175-GH-2-342			0.342		175-GH-3-587		0.587
	175-GH-2-347	175-GH-3-347		0.347		175-GH-3-592		0.592
		175-GH-3-351	175-GH-4-351	0.351		175-GH-3-632		0.632
	175-GH-2-352	175-GH-3-352		0.352		175-GH-3-656		0.656
	175-GH-2-357	175-GH-3-357		0.357			175-GH-4-667	0.667
	175-GH-2-359			0.359			175-GH-4-677	0.677

Tuffaloy weld force gauges



Large force gauge with maximum reading of 10,000 lb. Item No. 601-8100



Digital-Hydraulic force gauge with maximum reading of 3000 lb. Item No. 601-3000D.

2000-lb force gauge with 12-in. flexible extension. Item No. 601-8020-12.

Resistance welding set-up and troubleshooting will be a lot easier with one of TUFFALOY'S weld force gauges. They let you know what weld pressure you're getting at any time. Pressure is one of the three variables (along with heat and time) that must be correct if good welds are to be made.

Force gauges eliminate the shortcomings of computing weld pressure. Figuring from a standard air gauge reading can be inaccurate because weld cables or water hoses can impede strokes, or the air gauge itself may be incorrect. And when using lever-action rocker-arm welding equipment, determining weld pressure involves more complex computations to allow for the ratios present.

These are compact, direct-reading instruments. They operate on a closed and sealed hydraulic system, and require no maintenance.

The 5000- and 10,000-lb gauges are not insulated; weld current must be turned off. The 2000- and 5000-lb gauges are available in models with a flexible metal connecting hose between sensor and gauge. This makes gauge reading easier in hard-to-see locations.



HIGH PRECISION GAUGE

This is the most precise force gauge available anywhere. It is accurate to within 1/2 of one percent of actual reading, and it is permanently calibrated. Maximum reading is 3000 lb, in 20-lb increments. (Other capacities available on special order.) Flexible extension model, too.

High precision digital gauges are available in both metric and English units.

STANDARD GAUGE DESCRIPTION

Maximum Reading	Increment Every	Opening Required	Extension Length	Item No.
2000 lb (900 kg)	50 lb (20 kg)	5/8 in. (16 mm)	—	601-8020*
2000 lb (900 kg)	50 lb (20 kg)	5/8 in. (16 mm)	12 in. (309 mm)	601-8020-12
5000 lb	100 lb	1 in.	—	601-5000
5000 lb	100 lb	1 in.	18 in.	601-5000-18
10000 lb	200 lb	1 in.	—	601-8100
5000 kg	100 kg	25.4 mm	—	601-8101
3000 lb	1 lb	11/16 in.	—	601-3000D

PRECISION GAUGE DESCRIPTION

3000 lb	20 lb	5/8 in.	—	601-8030
3000 lb	20 lb	5/8 in.	12 in.	601-8030-12

SPECIAL GAUGE SIZES

250 lb	Consult Factory			
500 lb				
1000 lb				
20,000 lb				

*A molded plastic carrying case is available Item No. 601-8019

Tuffaloy accessories



TIP SOCKET REAMERS

Hole in reamer center permits water tube entry; no need to dismantle holder. 4 RW; Item No. 601-0004; 5 RW, Item No. 601-0005; 6 RW, Item No. 601-0006; 7 RW, Item No. 601-0007.



TIP DRESSING TOOL

To remove mushroomed nose material on a pair of tips of 4 or 5 RW size, having pointed or dome noses. Other nose design dressers on special order. Dresser, Item No. 601-0102; Dresser cutter, Item No. 601-0103.



RADIUS TIP FILE

To restore original contours of welding tips use this two-inch radius file. Item No. 601-0120.

WELDING TIP EXTRACTORS



No. 4 RW, EX-1, Item No. 601-0201
No. 5 RW, EX-2, Item No. 601-0202



No. 4 RW and 5 RW at opposite ends,
EX-3, Item No. 601-0203



Large: EX-10-A, Item No. 601-0231

TUFFCAP SOCKET REAMERS

To ream or dress sockets to hold male caps. 4 RW, Item No. 601-0014; 5 RW, Item No. 601-0015; 6 RW, Item No. 601-0016.

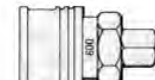


QUICK-CONNECT COUPLINGS with automatic shut-off

Use these couplings to make up efficient, trouble-free coolant systems. Any plug shown will mate with any socket shown. Always put the socket on the upstream side of a connection. Its built-in valve will automatically close upon disconnection.



1/4" NPT female plug
Item No. 601-0300



1/4" NPT female socket
Item No. 601-0314



1/4" NPT male plug
Item No. 601-0301



1/4" NPT male socket
Item No. 601-0315



1/4" NPT female plug
Item No. 601-0302



1/4" NPT female socket
Item No. 601-0316



1/4" NPT male plug
Item No. 601-0303



1/4" NPT male socket
Item No. 601-0317



3/8" hose plug
Item No. 601-0309



3/8" hose socket
Item No. 601-0320

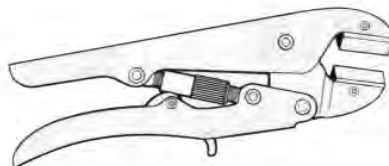
TUFFCAP EXTRACTORS (Shown on pg. 5)

Male caps, 4 & 5 RW, EX-4, Item No. 601-0210
Male caps, 4 & 5 RW, EX-45, Item No. 601-0240
Male caps, 5 & 6 RW, EX-56, Item No. 601-0242

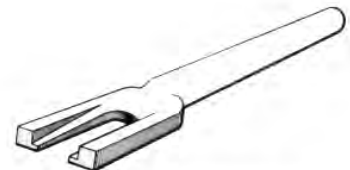
Female caps, 4 RW, EX-4F, Item No. 601-0220
Female caps, 5 RW, EX-5F, Item No. 601-0221
Female caps, 6 RW, EX-6F, Item No. 601-0222



Male cap extractor has long-lever handles for easier cap removal. In two dual-size models: EX-45 and EX-56.



Toggle-type male cap extractor, model EX-4 adjusts to handle size 4 & 5 RW shanks and caps.



Female cap extractors are made for three Tuffcap shank sizes: Models EX-4F, EX-5F, and EX-6F.