



Electrode catalogue

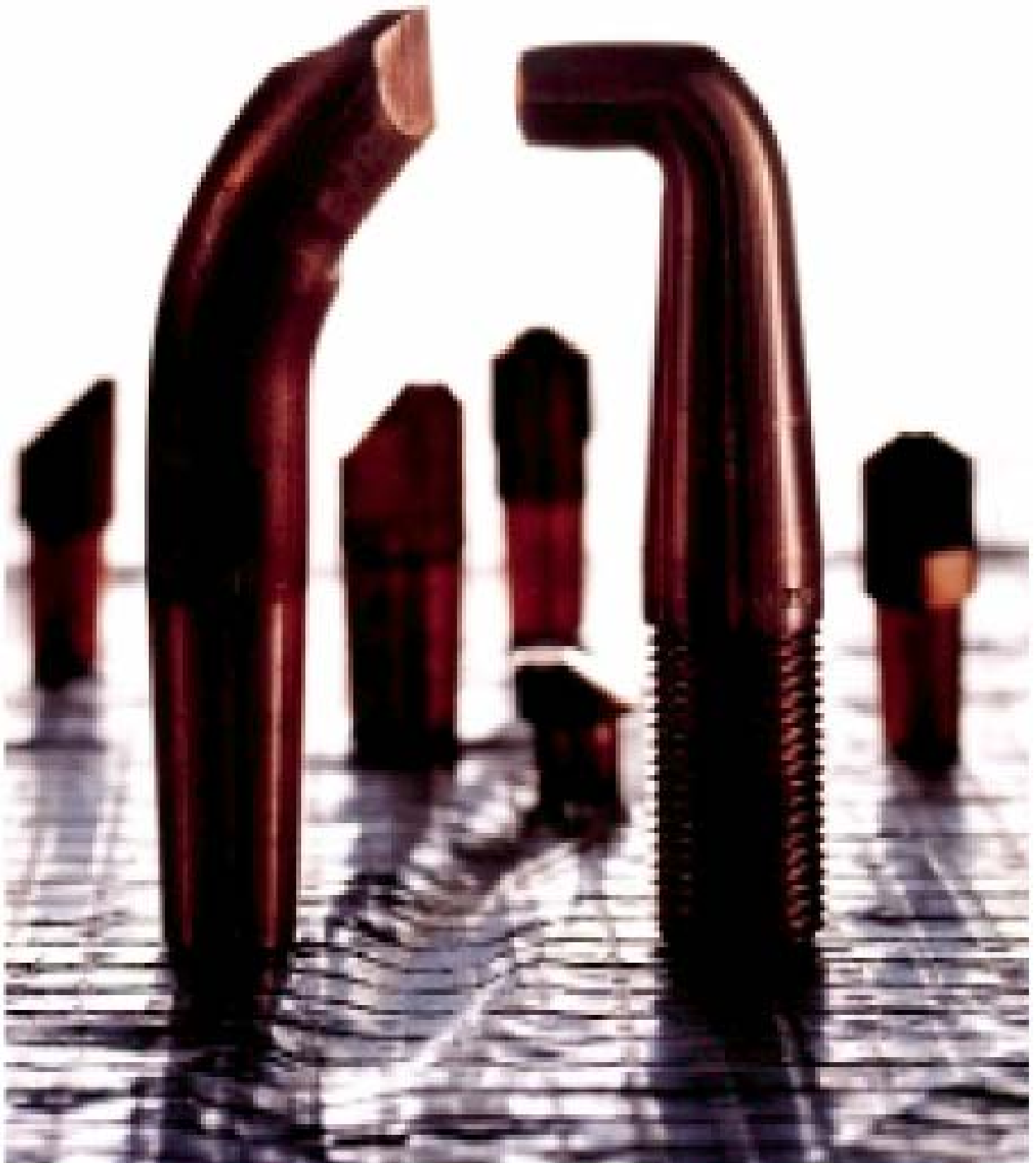


TABLE OF CONTENTS

DEFINITIONS	3
SPOT WELDING ELECTRODES	4
Taper 1:10, max. diameter 19 mm (3/4")	4
Taper 1:10, max. diameter 19 mm (3/4")	5
Taper 1:10, max. diameter 19 mm (3/4")	6
Taper 5°, max. diameter 19 mm (3/4")	7
Taper 5°, max. diameter 19 mm (3/4")	8
Taper 5°, max. diameter 19 mm (3/4")	9
M328, taper 5°, max. diameter 19 mm (3/4") with ball joint	10
Taper 5°, max. diameter 12.7 mm (1/2")	11
M328, taper 5°, max. diameter 12.7 mm (1/2")	12
SPOT WELDING ELECTRODES FROM TECNA'S PRODUCT RANGE	13
M328, taper 5°, max. diameter 11 mm	13
M328, taper 5°, max. diameter 12.7 mm	14
M328, taper 5°, max. diameter 14.8 mm	15
M328, taper 5°, max. diameter 18 mm	16
M328, taper 5°, max. diameter 19 mm	17
Other electrodes from TECNA'S product range	18
SPECIAL SPOT WELDING ELECTRODES	19
SPOT WELDING ELECTRODES WITH TUNGSTEN INSERT	20
Taper 1:10, max. diameter 19 mm (3/4")	20
Taper 5°, max. diameter 19 mm (3/4")	20
Taper 5°, max. diameter 12.7 mm (1/2")	20
ELECTRODE SHANKS AND ELECTRODE CAPS	21
Electrode shank M328, taper 1:10, max. diameter 19 mm (3/4")	21
Electrode shank M328, taper 5°, max. diameter 19 mm (3/4")	21
Electrode caps M328 (for electrode shank 0322710- and 0322711-)	22
Electrode shank M328, taper 5°, max. diameter 12.7 mm (1/2")	23
Electrode caps M328, max. diameter 12.7 mm (1/2") (for electrode shank 0322709-)	23
BUSHINGS	24
REAMERS	25
ELECTRODE HOLDERS	26
ELECTRODE HOLDERS FROM TECNA'S PRODUCT RANGE	27
SPECIAL ELECTRODE HOLDERS	28
For 19 mm (3/4") spot welding electrodes with taper 5°	29
For 19 mm (3/4") spot welding electrodes with taper 5°	30
SPECIAL ELECTRODE HOLDERS AND ELECTRODES	31
Electrode M328 with 1/2" BSP thread for electrode holder 0322652001	32
Examples on the use of special electrode holders and electrodes	33
SEAM WELDING ELECTRODES	34
Blanks for seam welding electrodes	34
Definition of electrodes for seam welding machines	35
Machined electrodes of M3 for seam welding machines and their applications	36
Machined electrodes of M3 for seam welding machines and their applications	37
ELECTRODE MATERIAL	38
Sintered material 20W3	39
Choice of electrode material for spot welding	40
Recommendation table for choice of electrode material	41
Treatment of electrode material	42
Bending and heat treatment of electrode material	43

DEFINITIONS

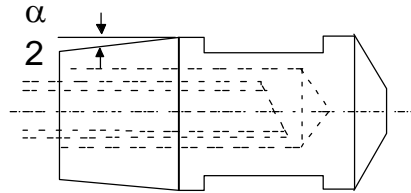
Designation

The following designations are used in this catalogue:

M3	Mallory 3 or equivalent
M328	Mallory 328 or equivalent
M100	Mallory 100 or equivalent
Sintered material	Elkonite or equivalent

Taper

Spot welding electrodes in this catalogue are available with cone angle $\alpha=5^\circ$ or taper 1:10 (cone angle $\alpha=5^\circ.724$).



Material quality

Thanks to its high electrical and thermal conductivity copper is the principle part in all electrode material for resistance welding. However, pure copper is soft and can get harder only through cold working, which, to some extent, reduces the electrical conductivity. Due to the heat, that is generated in the weld spot, even cold worked copper softens very quickly and to obtain a long electrode life various copper alloys are used.

M3

This electrode material is a chrome/copper alloy with outstanding properties, suitable for spot and seam welding of carbon steel.

M328

Electrode material developed from M3 by adding zirconium. It is especially suitable for welding of sheet tin plate and other metal coated sheet steel as well as non-coated carbon steel. M328 can also be used for aluminium, brass and stainless steel.

M100

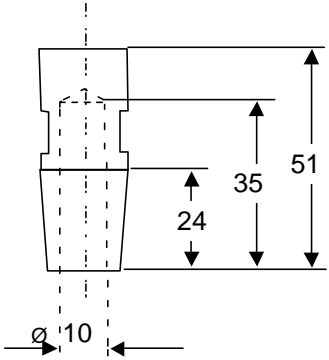
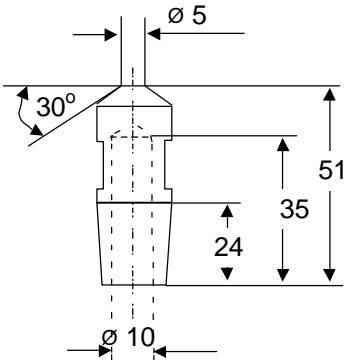
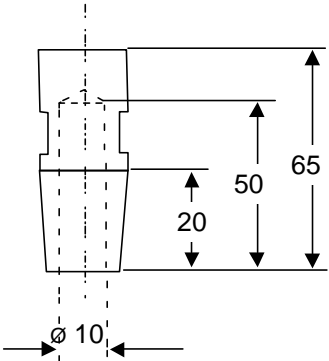
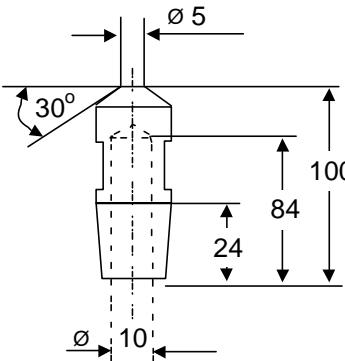
In this material copper has been alloyed with beryllium and cobalt, which gives the material very high hardness and moderate electrical conductivity. It is particularly suitable for welding of stainless and heat resistant steel. It is also used for dies in projection welding machines, butt welding and flash butt welding machines.

Sintered material 20W3

Sintered material consists mainly of copper and tungsten. It is used as inserts in dies for projection welding, flash butt and butt welding. The high contact resistance between electrode and work piece makes the sintered material suitable as electrodes for hot riveting, hot upsetting and spot welding of copper. Its high softening temperature is a great advantage.

SPOT WELDING ELECTRODES

Taper 1:10, max. diameter 19 mm (3/4").

			
Part no.	Material	Part no.	Material
0322641001	M3	0322642001	M3
0322641002	M328	0322642002	M328
0322641003	M100	0322642003	M100
			
Part no.	Material	Part no.	Material
0322641006	M3	0322642006	M3
0322641007	M328	0322642007	M328
0322641008	M100	0322642008	M100

SPOT WELDING ELECTRODES

Taper 1:10, max. diameter 19 mm (3/4").

Part no.	Material	Part no.	Material
0322643001	M3	0322644001	M3
0322643002	M328	0322644002	M328
0322643003	M100	0322644003	M100
Part no.	Material	Part no.	Material
0322644006	M3	0322644011	M3
0322644007	M328	0322644012	M328
0322644008	M100	0322644013	M100

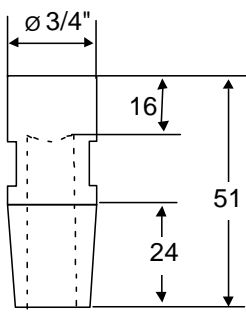
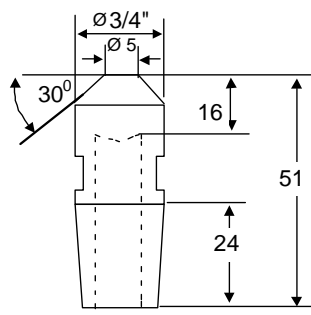
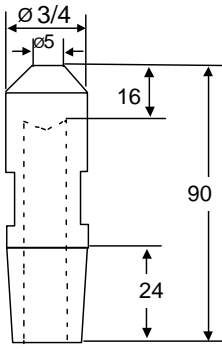
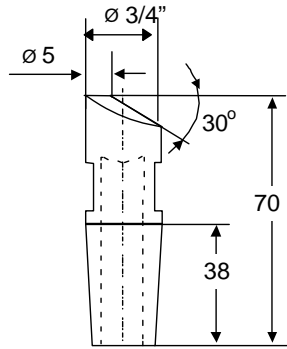
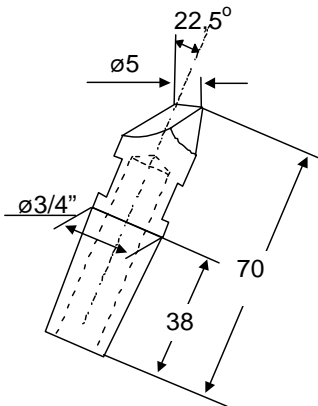
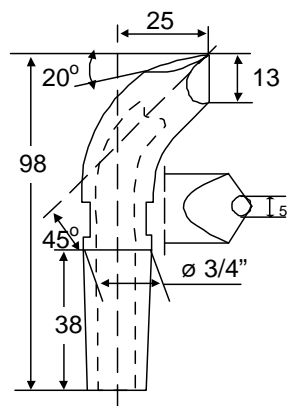
SPOT WELDING ELECTRODES

Taper 1:10, max. diameter 19 mm (3/4").

Part no.	Material	Part no.	Material
0322645880	M3	0322646880	M3
0322645881	M328	0322646881	M328

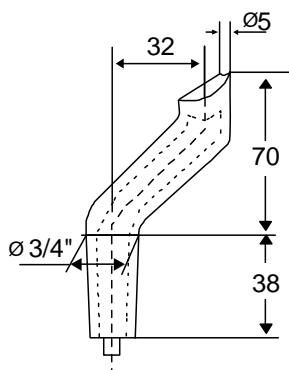
SPOT WELDING ELECTRODES

Taper 5°, max. diameter 19 mm (3/4").

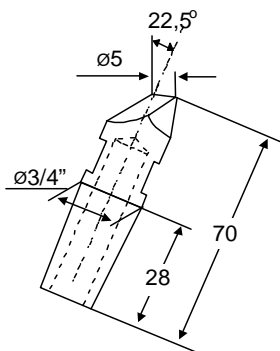
			
Part no.	Material	Part no.	Material
0138307006	M3	0138307007	M3
0138307020	M328	0138307008	M328
			
Part no.	Material	Part no.	Material
0138307009	M3	0138307011	M3
0138307010	M328	0138307021	M328
			
Part no.	Material	Part no.	Material
0138307013	M3	0138307015	M3
0138307014	M328	0138307022	M328

SPOT WELDING ELECTRODES

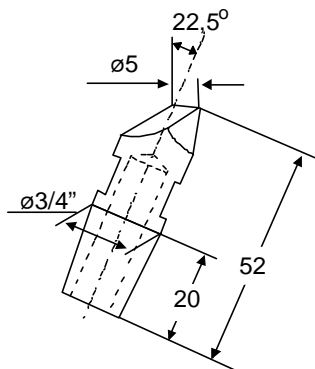
Taper 5°, max. diameter 19 mm (3/4").



Part no.	Material
0138307016	M3
0138307023	M328



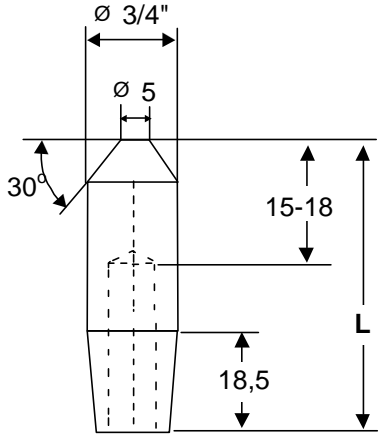
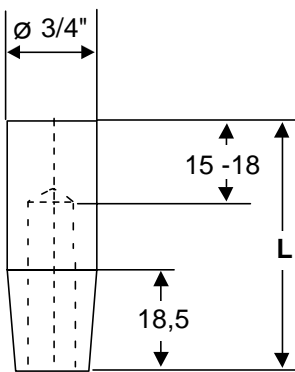
Part no.	Material
0138307019	M3
0138307024	M328



Part no.	Material
0012699201	M3
0012699202	M328

SPOT WELDING ELECTRODES

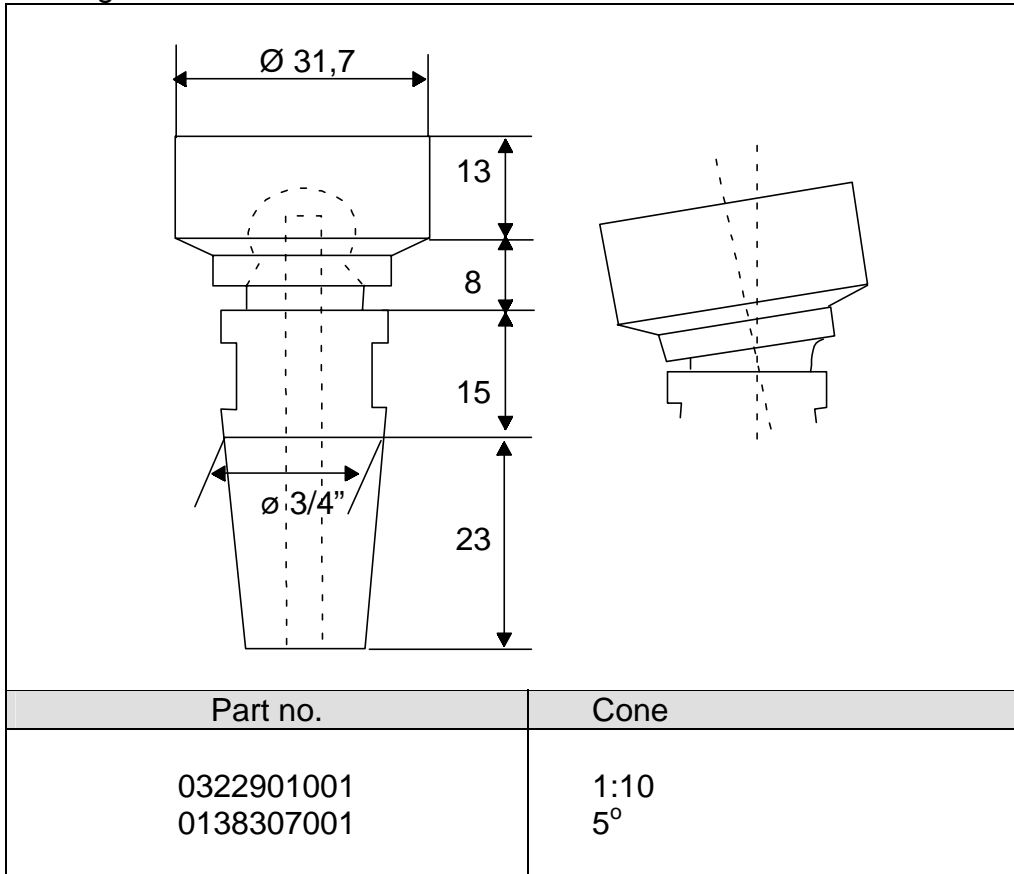
Taper 5°, max. diameter 19 mm (3/4").

	M3		M328		M100	
	Part no.	L mm	Part no.	L mm	Part no.	L mm
	0010725501	40	0011720501	40	0011720401	40
	0010725502	45	0011720502	45	0011720402	45
	0010725503	50	0011720503	50	0011720403	50
	0010725504	55	0011720504	55	0011720404	55
	0010725505	60	0011720505	60	0011720405	60
	0010725506	65	0011720506	65	0011720406	65
	0010725507	70	0011720507	70	0011720407	70
	0010725508	75	0011720508	75	0011720408	75
	0010725509	80	0011720509	80	0011720409	80
	0010725510	85	0011720510	85	0011720410	85
	0010725511	90	0011720511	90	0011720411	90
	0010725512	95	0011720512	95	0011720412	95
	0010725513	100	0011720513	100	0011720413	100
	M3		M328		M100	
	Part no.	L mm	Part no.	L mm	Part no.	L mm
	0136730001	35	0011720801	35	0011720701	35
	0136730002	40	0011720802	40	0011720702	40
	0136730003	45	0011720803	45	0011720703	45
	0136730004	50	0011720804	50	0011720704	50
	0136730005	55	0011720805	55	0011720705	55
	0136730006	60	0011720806	60	0011720706	60
	0136730007	65	0011720807	65	0011720707	65
	0136730008	70	0011720808	70	0011720708	70
	0136730009	75	0011720809	75	0011720709	75
	0136730010	80	0011720810	80	0011720710	80
	0136730011	85	0011720811	85	0011720711	85
	0136730012	90	0011720812	90	0011720712	90
	0136730013	95	0011720813	95	0011720713	95
	0136730014	100	0011720814	100	0011720714	100

SPOT WELDING ELECTRODES

M328, taper 5°, max. diameter 19 mm (3/4") with ball joint.

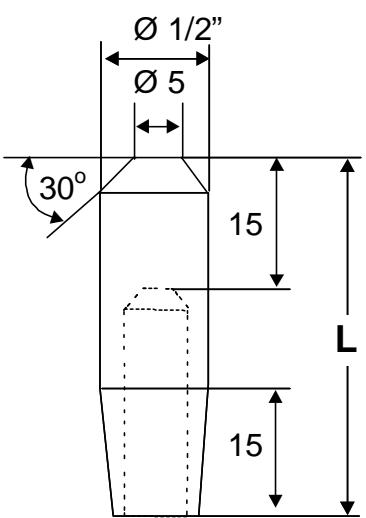
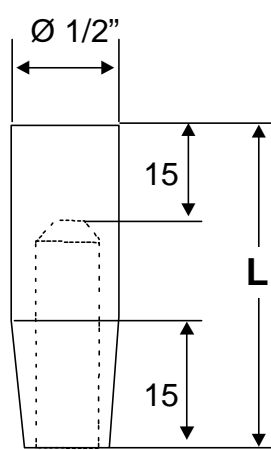
The upper part of the spot welding electrode is movable on the lower part, the top of which is ball-shaped. Therefore the upper part adjusts itself automatically to the work piece, which makes this spot welding electrode suitable for welding, where one wishes to avoid electrode marks on one side of the work piece. The electrode is also suitable for projection welding in rocker-arm spot welding machines.



SPOT WELDING ELECTRODES

Taper 5°, max. diameter 12.7 mm (1/2").

If a bushing (part No.0135758001) is used, these electrodes can be used also in spot welding machines, which are equipped for electrodes with 5° taper and max. diameter 19 mm (3/4").

	M3		M328		M100	
	Part no.	L mm	Part no.	L mm	Part no.	L mm
	0010670201	35	0011721101	35	0011721001	35
	0010670202	40	0011721102	40	0011721002	40
	0010670203	45	0011721103	45	0011721003	45
	0010670204	50	0011721104	50	0011721004	50
	0010670205	55	0011721105	55	0011721005	55
	0010670206	60	0011721106	60	0011721006	60
	0010670207	65	0011721107	65	0011721007	65
	0010670208	70	0011721108	70	0011721008	70
	0010670209	75	0011721109	75	0011721009	75
	0010670210	80	0011721110	80	0011721010	80
	0010670211	85	0011721111	85	0011721011	85
	0010670212	90	0011721112	90	0011721012	90
	0010670213	95	0011721113	95	0011721013	95
0010670214	100	0011721114	100	0011721014	100	
	M3		M328		M100	
	Part no.	L mm	Part no.	L mm	Part no.	L mm
	0010753801	25	0011721501	25	0011721401	25
	0010753802	30	0011721502	30	0011721402	30
	0010753803	35	0011721503	35	0011721403	35
	0010753804	40	0011721504	40	0011721404	40
	0010753805	45	0011721505	45	0011721405	45
	0010753806	50	0011721506	50	0011721406	50
	0010753807	55	0011721507	55	0011721407	55
	0010753808	60	0011721508	60	0011721408	60
	0010753809	65	0011721509	65	0011721409	65
	0010753810	70	0011721510	70	0011721410	70
	0010753811	75	0011721511	75	0011721411	75
	0010753812	80	0011721512	80	0011721412	80
	0010753813	85	0011721513	85	0011721413	85
	0010753814	90	0011721514	90	0011721414	90
	0010753815	95	0011721515	95	0011721415	95
0010753816	100	0011721516	100	0011721416	100	

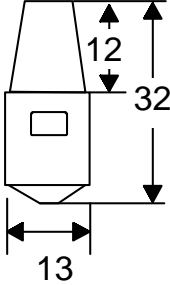
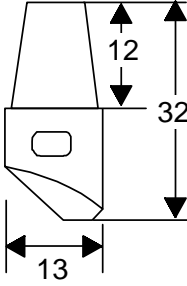
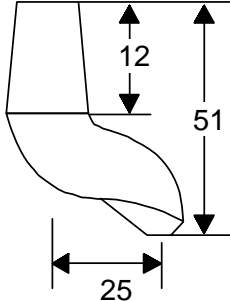
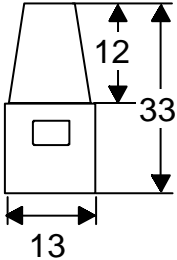
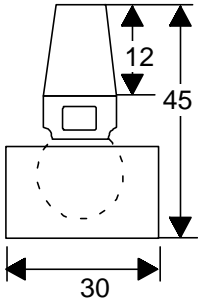
SPOT WELDING ELECTRODES

M328, taper 5°, max. diameter 12.7 mm (1/2").

<p>Part no.</p>	<p>Part no.</p>
<p>0138307002</p>	<p>0138307003</p>
<p>Part no.</p>	<p>Part no.</p>
<p>0138307004</p>	<p>0138307005</p>

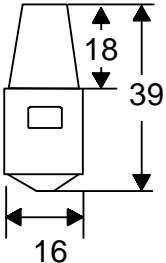
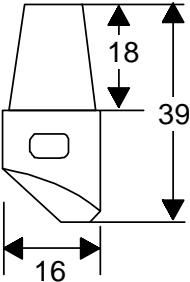
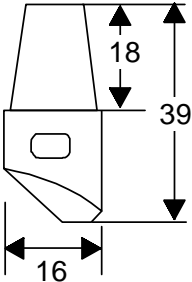
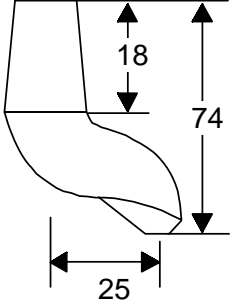
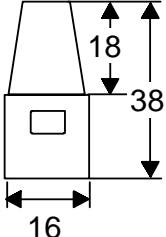
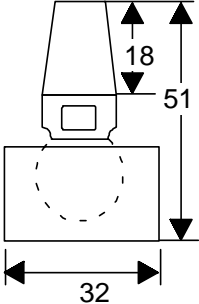
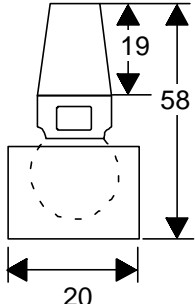
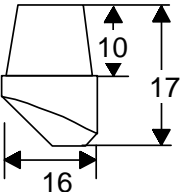
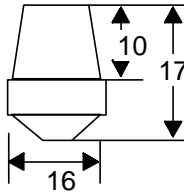
SPOT WELDING ELECTRODES FROM TECNA'S PRODUCT RANGE

M328, taper 5°, max. diameter 11 mm.

<p style="text-align: center;">3830 Standard</p> 	<p style="text-align: center;">3831 Electrode with offset contact</p> 	<p style="text-align: center;">3833</p> 
Part no.	Part no.	Part no.
0388288880	0388288881	0388288882
<p style="text-align: center;">3834 Plane electrode</p> 	<p style="text-align: center;">3835</p> 	
Part no.	Part no.	
0388288883	0388288884	
<p style="text-align: center;">3820 Special electrode for strip moulding</p>	<p style="text-align: center;">3821 Extended plane electrode for spotter to be used together with electrode 3822</p>	<p style="text-align: center;">3822 Extended electrode for welding of nails with spotter</p>
Part no.	Part no.	Part no.
0388288885	0388288886	0388288887

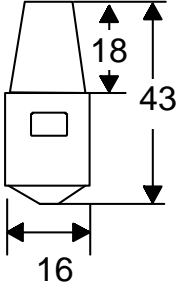
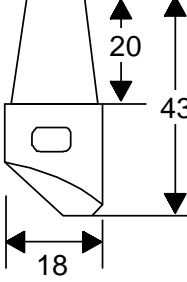
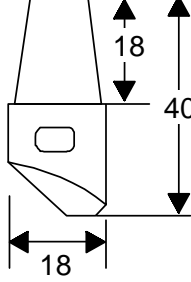
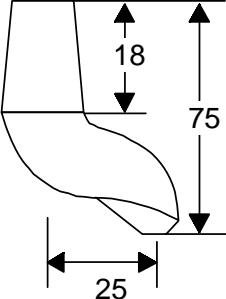
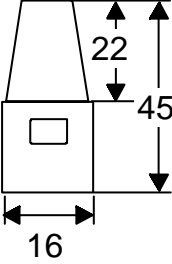
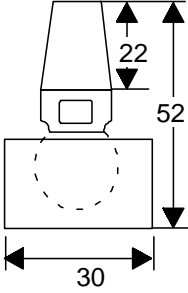
SPOT WELDING ELECTRODES FROM TECNA'S PRODUCT RANGE

M328 taper 5°, max. diameter 12,7 mm.

<p style="text-align: center;">3720</p> 	<p style="text-align: center;">3721</p> 	<p style="text-align: center;">3722</p> 
<p style="text-align: center;">Part no. 0388033001</p>	<p style="text-align: center;">Part no. 0388324881</p>	<p style="text-align: center;">Part no. 0388324882</p>
<p style="text-align: center;">3723</p> 	<p style="text-align: center;">3724</p> 	<p style="text-align: center;">3725</p> 
<p style="text-align: center;">Part no. 0388324883</p>	<p style="text-align: center;">Part no. 0388324884</p>	<p style="text-align: center;">Part no. 0388324885</p>
<p style="text-align: center;">PW20646</p> 	<p style="text-align: center;">4727</p> 	<p style="text-align: center;">4729</p> 
<p style="text-align: center;">Part no. 0388324886</p>	<p style="text-align: center;">Part no. 0388033002</p>	<p style="text-align: center;">Part no. 0388033004</p>

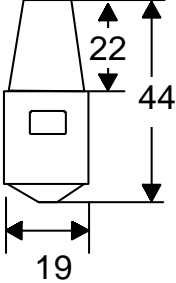
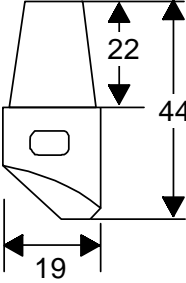
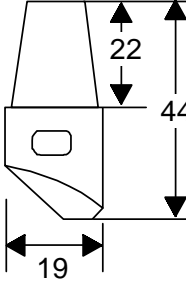
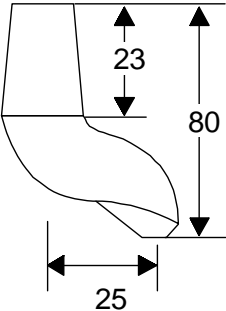
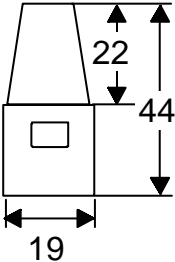
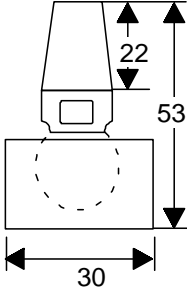
SPOT WELDING ELECTRODES FROM TECNA'S PRODUCT RANGE

M328 taper 5°, max. diameter 14,8 mm.

<p style="text-align: center;">3620</p> 	<p style="text-align: center;">3621</p> 	<p style="text-align: center;">3622</p> 
Part no.	Part no.	Part no.
0388289880	0388289881	0388289882
<p style="text-align: center;">3623</p> 	<p style="text-align: center;">3624</p> 	<p style="text-align: center;">3625</p> 
Part no.	Part no.	Part no.
0388289883	0388289884	0388289885

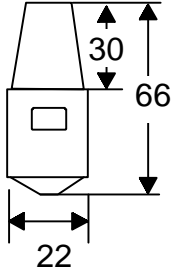
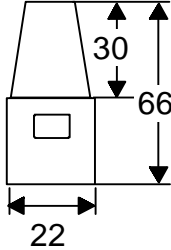
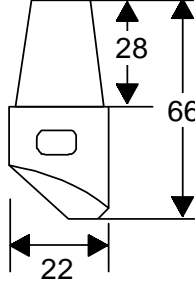
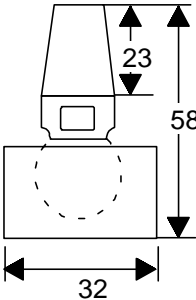
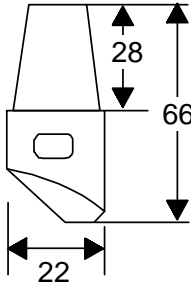
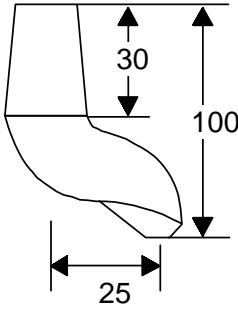
SPOT WELDING ELECTRODES FROM TECNA'S PRODUCT RANGE

M328 taper 5°, max. diameter 18 mm.

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<p style="text-align: center;">Part no.</p>	<p style="text-align: center;">Part no.</p>	<p style="text-align: center;">Part no.</p>
<p style="text-align: center;">0388033005</p>	<p style="text-align: center;">0388033007</p>	<p style="text-align: center;">0388033008</p>
<p style="text-align: center;">4723</p> 	<p style="text-align: center;">4724</p> 	<p style="text-align: center;">4725</p> 
<p style="text-align: center;">Part no.</p>	<p style="text-align: center;">Part no.</p>	<p style="text-align: center;">Part no.</p>
<p style="text-align: center;">0388033006</p>	<p style="text-align: center;">0388033009</p>	<p style="text-align: center;">0388033010</p>

SPOT WELDING ELECTRODES FROM TECNA'S PRODUCT RANGE

M328 taper 5°, max. diameter 19 mm.

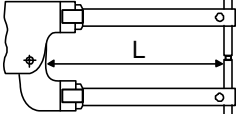
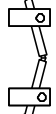
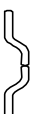
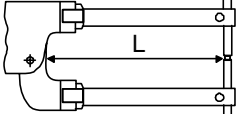


<p style="text-align: center;">8701</p> 	<p style="text-align: center;">8702</p> 	<p style="text-align: center;">8703</p> 
<p style="text-align: center;">Part no.</p>	<p style="text-align: center;">Part no.</p>	<p style="text-align: center;">Part no.</p>
<p style="text-align: center;">0388294880</p>	<p style="text-align: center;">0388294881</p>	<p style="text-align: center;">0388294882</p>
<p style="text-align: center;">8704</p> 	<p style="text-align: center;">8705</p> 	<p style="text-align: center;">8706</p> 
<p style="text-align: center;">Part no.</p>	<p style="text-align: center;">Part no.</p>	<p style="text-align: center;">Part no.</p>
<p style="text-align: center;">0388294883</p>	<p style="text-align: center;">0388294884</p>	<p style="text-align: center;">0388294885</p>

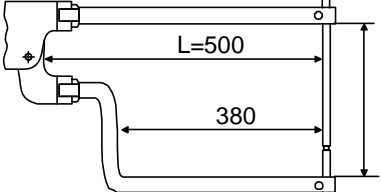
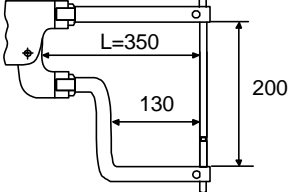
SPOT WELDING ELECTRODES FROM TECNA'S PRODUCT RANGE

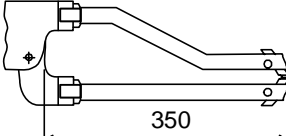
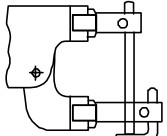
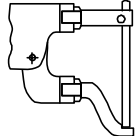
Other electrodes from TECNA'S product range

7521	7522	7523
Part no.	Part no.	Part no.
0388285880	0388285881	0388285882
7524	7525	7526
Part no.	Part no.	Part no.
0388285883	0388285884	0388285885
7527	7533	7451
Part no.	Part no.	Part no.
0388285886	0388285887	0388287880
7452	7453	7454
Part no.	Part no.	Part no.
0388287881	0388287882	0388287883

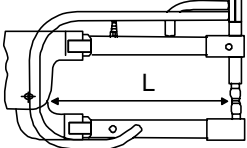


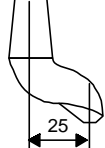

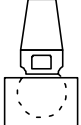
Arms and electrodes for welding gun 5132 - 5132B - 5148 - 5148B

					
Arms / Art. Nr.	Length	Part no.	Arms / Part no.	Length	Part no.
7501	125 mm	7526 \varnothing 10 Δ	7401	125 mm	7452 \varnothing 12 Δ
7502	250 mm		7402	250 mm	
7503	350 mm		7403	350 mm	
7504	500 mm		7404	500 mm	
7521 \varnothing 10			7451 \varnothing 12		
Δ Only electrodes			Δ Electrodes		

	Arms / Part no.	Length		Arms / Part no.	Length
	7518	500 mm		7519	250 mm
	7523 \varnothing 10			7523 \varnothing 10	
	Δ Electrodes			Δ Electrodes	

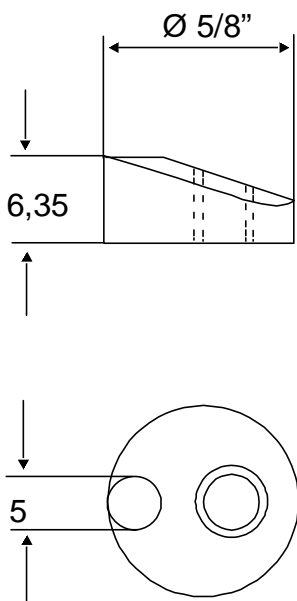
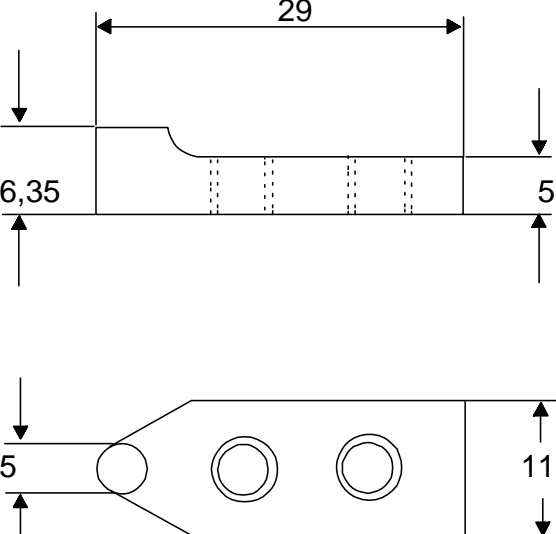
	Arms / Part no.		Arms / Part no.		Arms / Part no.
	7507		7510		7516
	7524 \varnothing 10		7533		7523 \varnothing 10
	Δ Electrodes		Δ Electrodes		Δ Electrodes

Water cooled arms and electrodes for welding gun 7913

	Arms / Part no.					
	7512					
	7513					
	7514					
	7515					
	3830 Δ Electrodes					
Δ Electrode pair		3830	3831	3833	3834	3835

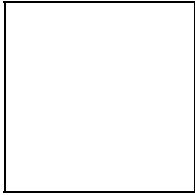
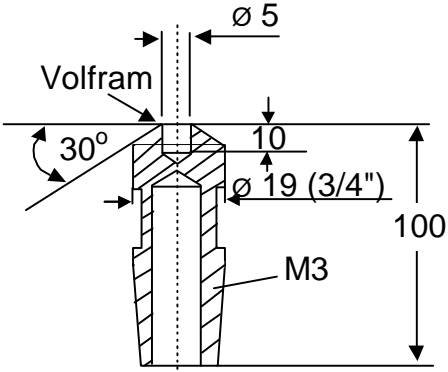
SPECIAL SPOT WELDING ELECTRODES

These electrodes are used for special electrode holders.

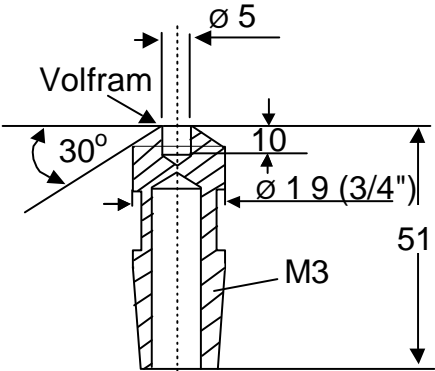
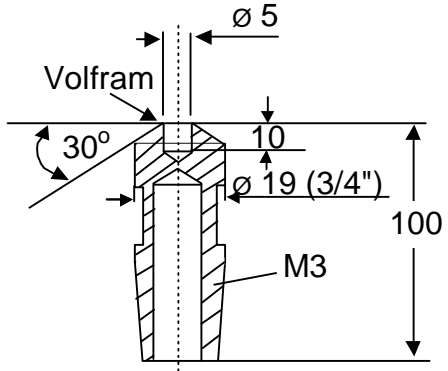
<p style="text-align: center;">M328</p> 	<p style="text-align: center;">M100</p> 
Part no.	Part no.
0138310002	0138310001

SPOT WELDING ELECTRODES WITH TUNGSTEN INSERTS

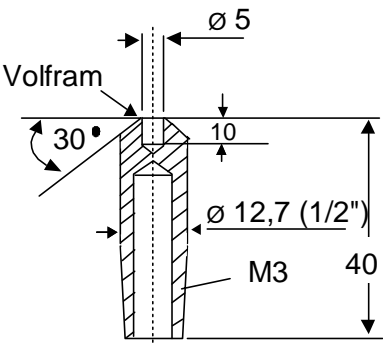
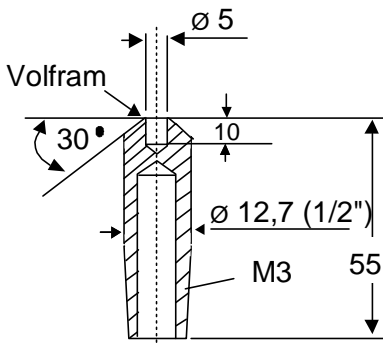
Taper 1:10, max. diameter 19 mm (3/4").

	
<p>Part no.</p>	<p>Part no.</p>
<p>0323545880</p>	<p>0323545881</p>

Taper 5°, max. diameter 19 mm (3/4").

	
<p>Part no.</p>	<p>Part no.</p>
<p>0323546880</p>	<p>0323546881</p>

Taper 5°, max. diameter 12,7 mm (1/2").

	
<p>Part no.</p>	<p>Part no.</p>
<p>0323547880</p>	<p>0323576881</p>

ELECTRODE SHANKS AND ELECTRODE CAPS

Electrode cap M328 (for electrode shank 0322710- and 0322711-).

<p>Part no. 0322651001</p>	<p>Part no. 0322651002</p>	<p>Part no. 0322651003</p>	<p>Part no. 0322651004</p>
<p>Part no. 0322651005</p>	<p>Part no. 0322651006</p>	<p>Part no. 0322651007</p>	<p>Part no. 0322651008</p>
<p>Part no. 0322651009</p>	<p>Part no. 0322651010</p>	<p>Part no. 0322651011</p>	

ELECTRODE SHANKS AND ELECTRODE CAPS

Electrode shank M328, taper 5°, max. diameter 12,7 mm (1/2").

<p>Taper 1:10</p> <p>Taper 5°</p> <p>5</p> <p>12</p> <p>12,5</p> <p>8,5</p> <p>A</p> <p>B</p> <p>∅10</p> <p>∅11,8</p> <p>∅7</p>	Part no.		Length	
	A	B		
	0322709001	40	38	
	0322709002	50	48	
	0322709003	60	58	
	0322709004	70	68	
	0322709005	80	78	
	0322709006	90	88	
0322709007	100	98		

Electrode cap M328, max. diameter 12,7mm (1/2") (for electrode shank 0322709-)

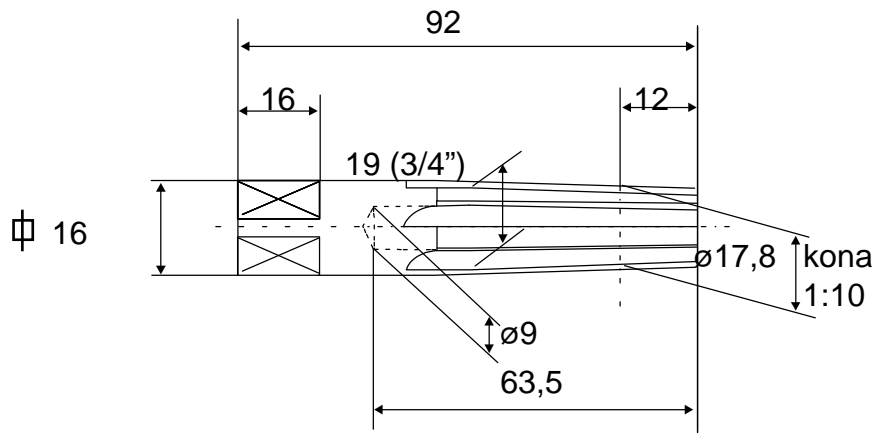
<p>∅12,5</p> <p>∅5</p> <p>18</p> <p>8</p> <p>5</p> <p>6</p> <p>∅9,5</p> <p>1:10</p>	<p>∅6</p> <p>45°</p> <p>R 32</p>	<p>19°</p> <p>R 5</p>	<p>R 25</p>
Part no.	Part no.	Part no.	Part no.
0322650001	0322650002	0322650003	0322650004
<p>R 6,25</p>	<p>∅6</p> <p>5°</p> <p>R 32</p>	<p>∅6</p> <p>5°</p>	<p>∅6</p> <p>R 6,5</p>
Part no.	Part no.	Part no.	Part no.
0322650005	0322650006	0322650007	0322650008
<p>1x45°</p>	<p>∅6</p> <p>17°</p>	<p>∅6</p> <p>45°</p>	<p>∅5</p> <p>45°</p> <p>28</p> <p>10</p>
Part no.	Part no.	Part no.	Part no.
0322650009	0322650010	0322650011	0322650012

BUSHINGS

Part no.		Part no.		
0322648001		0135758001		
Part no.	Part no.	Part no.	Part no.	D
0321724001	0389081001	0011404501	0011476401 0011476402	1/2" 3/4"

REAMERS

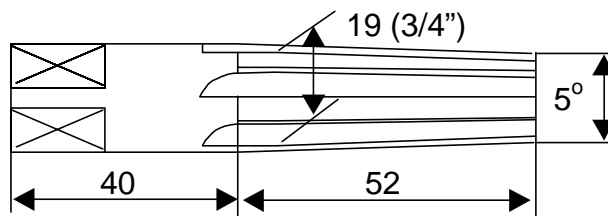
For electrode holders made to suit spot welding electrodes with taper 1:10.



Part no.

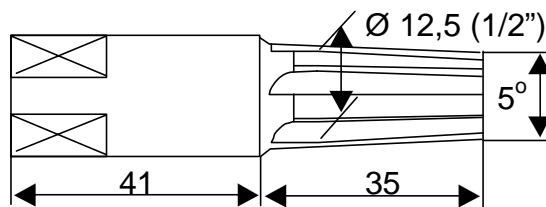
0322649001

For electrode holders made to suit spot welding electrodes with taper 5°.



Part no.

0138306002

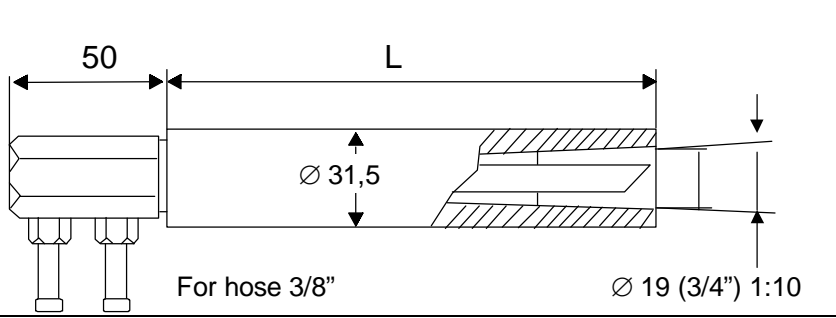
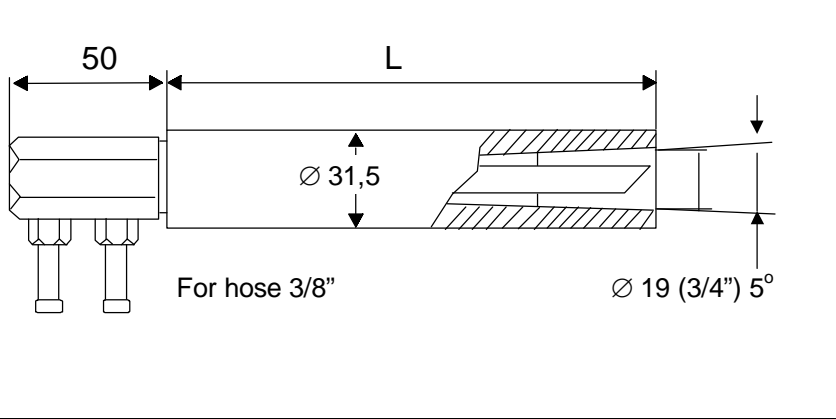
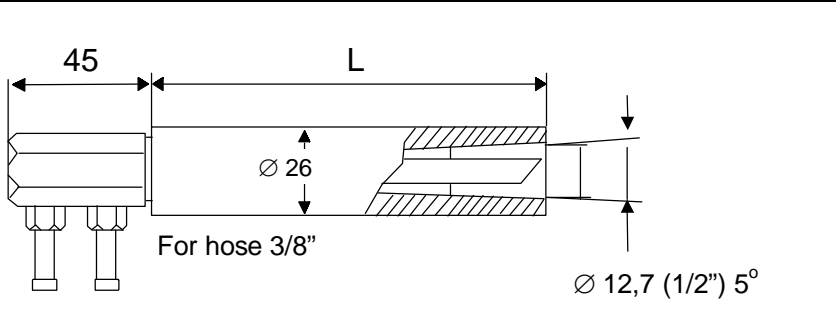


Part no.

0138306001

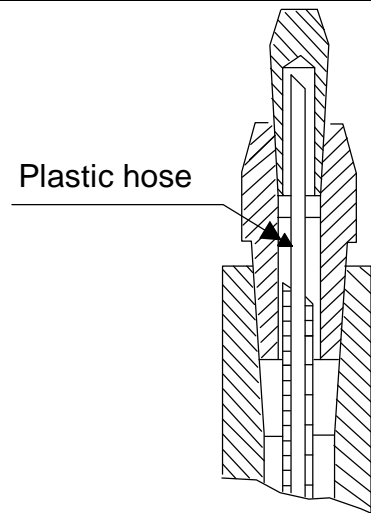
ELEKTRODE HOLDERS

There are electrode holders with diameter 26 mm or 31.5 mm. 31.5 mm diameter electrode holders can successfully be used also for older types of machines made for 31.7 mm holders.

 <p>For hose 3/8" Ø 19 (3/4") 1:10</p>	<table border="1"> <thead> <tr> <th>Part no.</th> <th>L mm</th> </tr> </thead> <tbody> <tr> <td>0321728883</td> <td>180</td> </tr> <tr> <td>0321728884</td> <td>250</td> </tr> </tbody> </table>	Part no.	L mm	0321728883	180	0321728884	250													
Part no.	L mm																			
0321728883	180																			
0321728884	250																			
 <p>For hose 3/8" Ø 19 (3/4") 5°</p>	<table border="1"> <thead> <tr> <th>Part no.</th> <th>L mm</th> </tr> </thead> <tbody> <tr> <td>0136961881</td> <td>70</td> </tr> <tr> <td>0136961880</td> <td>180</td> </tr> <tr> <td>0136961885</td> <td>210</td> </tr> <tr> <td>0136961886</td> <td>250</td> </tr> <tr> <td>0136961887</td> <td>300</td> </tr> <tr> <td>0136961882</td> <td>400</td> </tr> <tr> <td>0136961884</td> <td>560</td> </tr> <tr> <td>0136961883</td> <td>740</td> </tr> </tbody> </table>	Part no.	L mm	0136961881	70	0136961880	180	0136961885	210	0136961886	250	0136961887	300	0136961882	400	0136961884	560	0136961883	740	
Part no.	L mm																			
0136961881	70																			
0136961880	180																			
0136961885	210																			
0136961886	250																			
0136961887	300																			
0136961882	400																			
0136961884	560																			
0136961883	740																			
 <p>For hose 3/8" Ø 12,7 (1/2") 5°</p>	<table border="1"> <thead> <tr> <th>Part no.</th> <th>L mm</th> </tr> </thead> <tbody> <tr> <td>0170711880</td> <td>220</td> </tr> </tbody> </table>	Part no.	L mm	0170711880	220															
Part no.	L mm																			
0170711880	220																			

To achieve efficient water cooling of the spot welding electrodes it is sometimes advisable to extend the water tube of the electrode holder. The sketch to the right illustrates how a plastic hose can be used for this purpose.

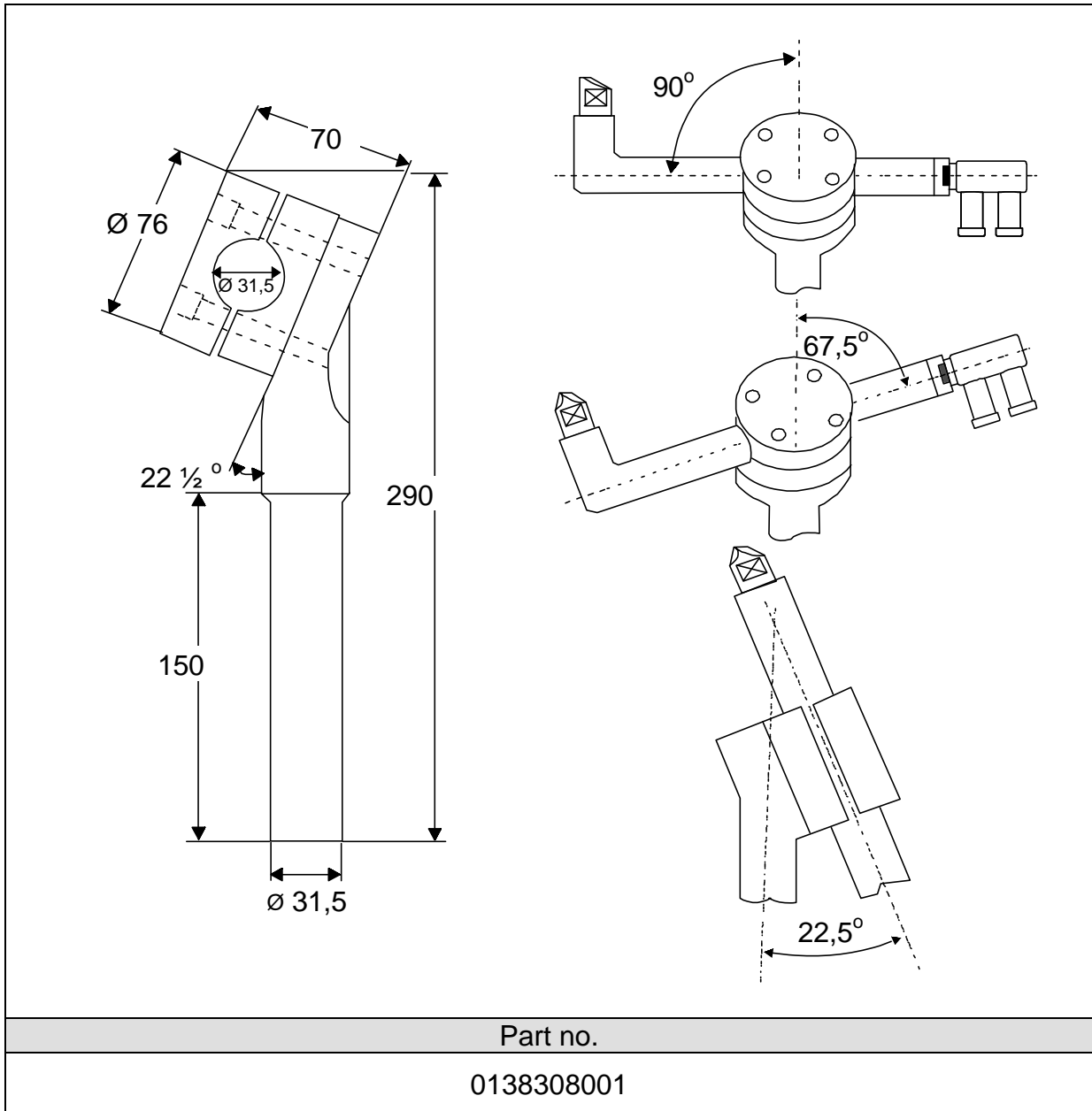
Such hose may be supplied by ESAB.



ELECTRODE HOLDERS FROM TECNA'S PRODUCT RANGE

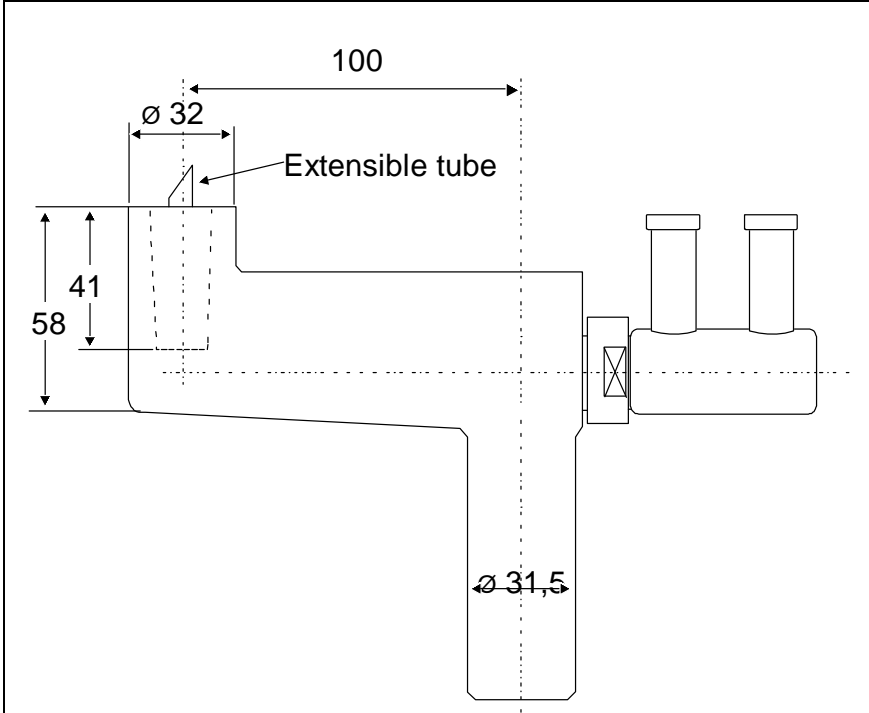
Part no.	L mm
0388078005	145
0388078002	260
Part no.	L mm
0388036001	150
0388036002	230
<p>4731</p>	
Part no.	
0389066880	
<p>4727</p>	<p>4729</p>
Part no.	Part no.
0388033002	0388033004

SPECIAL ELECTRODE HOLDERS



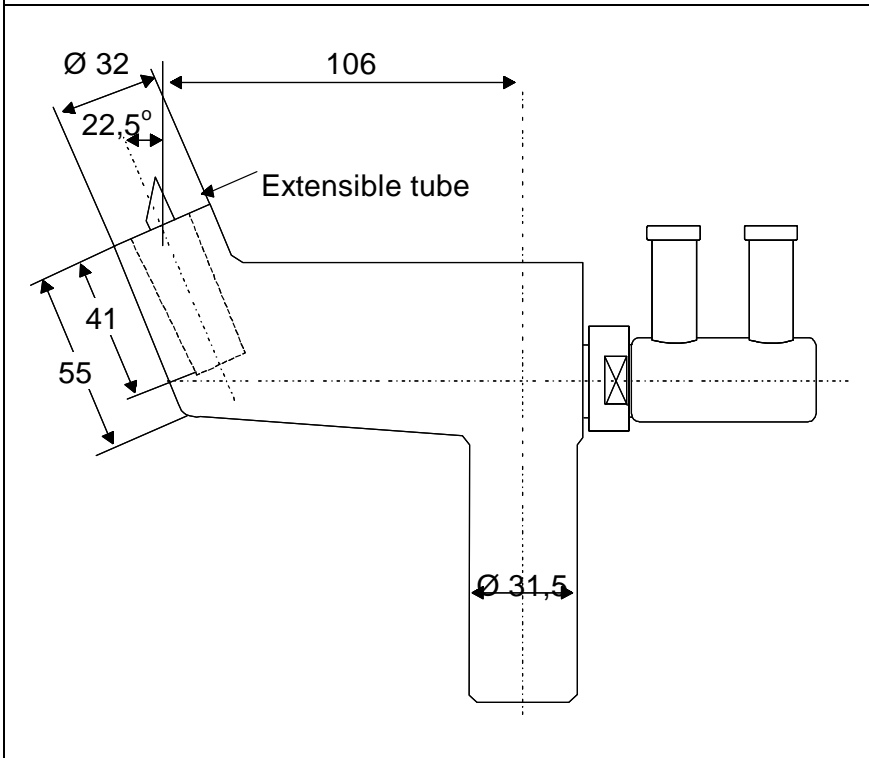
SPECIAL ELECTRODE HOLDERS

For 19 mm (3/4") spot welding electrodes with taper 5°.



Part no.

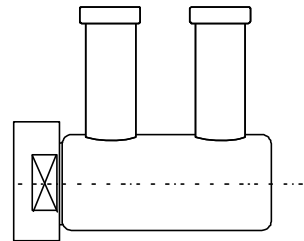
0138308005



Part no.

0138308006

Nipple assembly for water inlet and outlet. The assembly can after some modification also be used for older types of electrode holders.

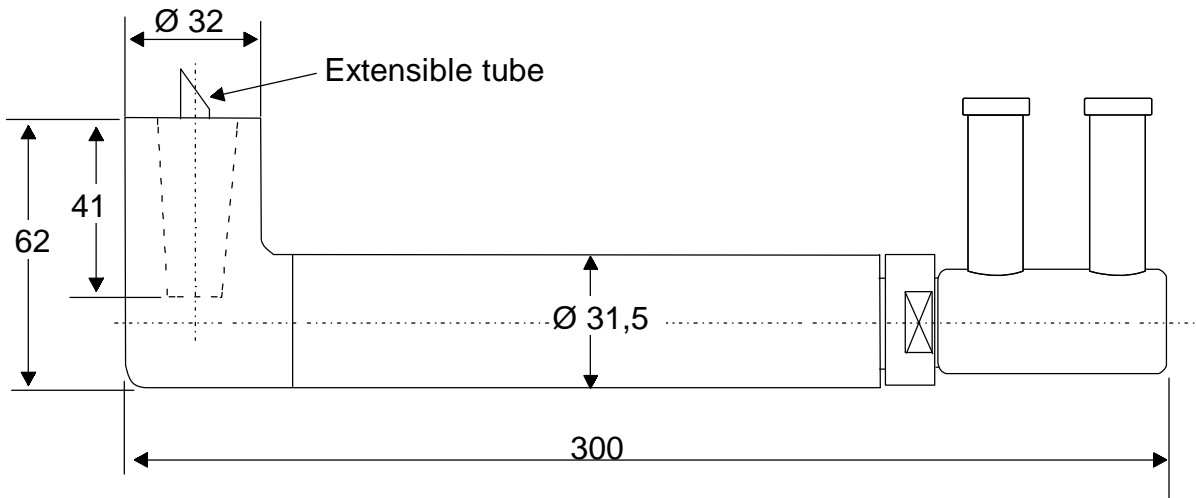


Part no.

0138309001

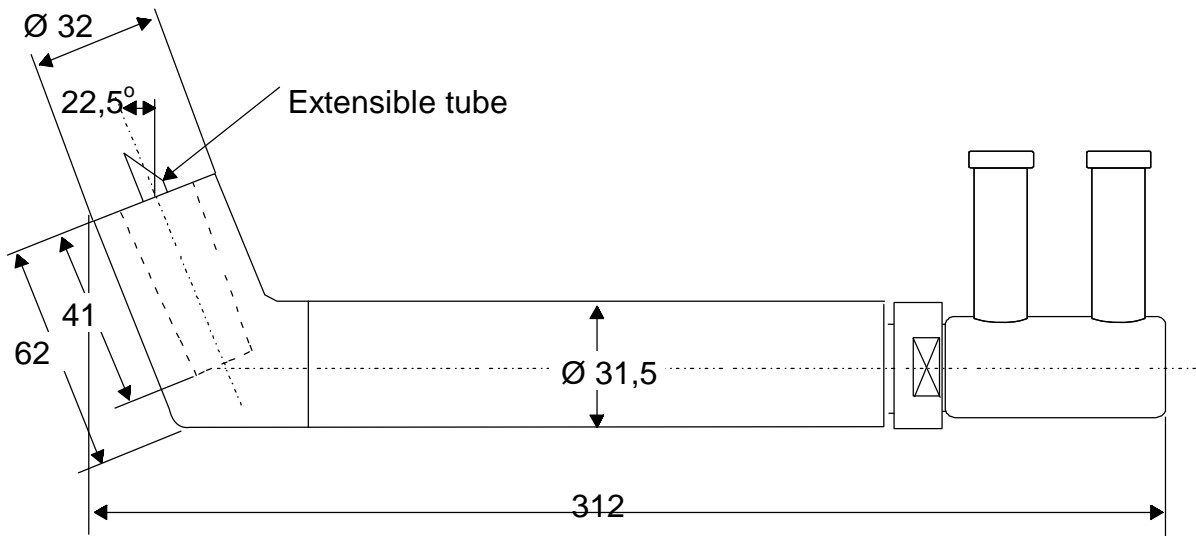
SPECIAL ELECTRODE HOLDERS

For 19 mm (3/4") spot welding electrodes with taper 5°



Part no.

0138308007

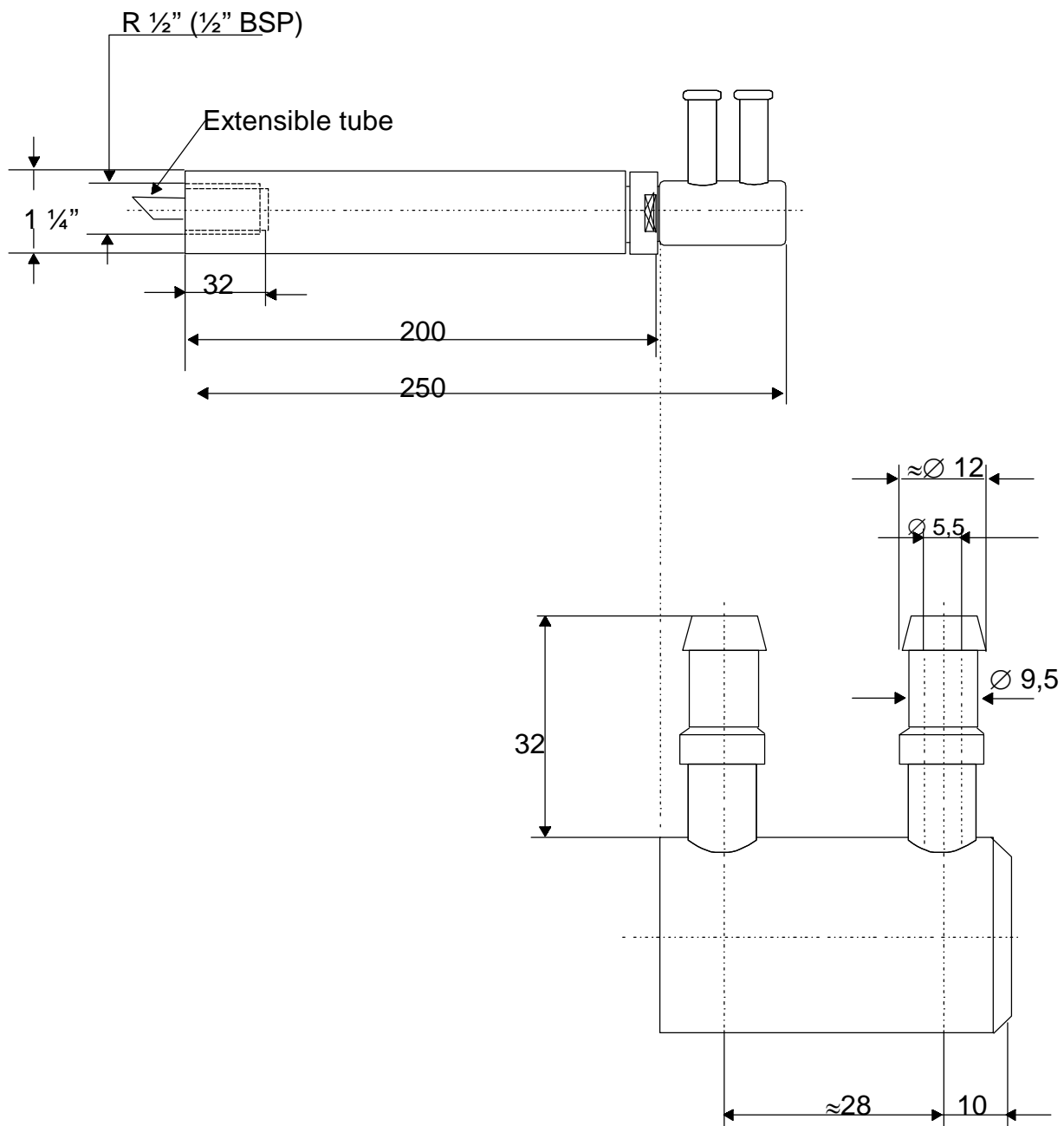


Part no.

0138308008

SPECIAL ELECTRODE HOLDERS AND ELECTRODES

Electrode holders

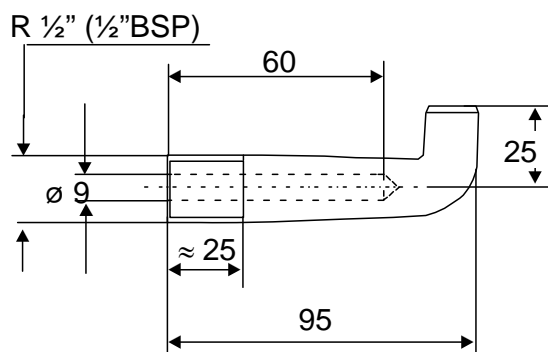


Part no.

0322652001

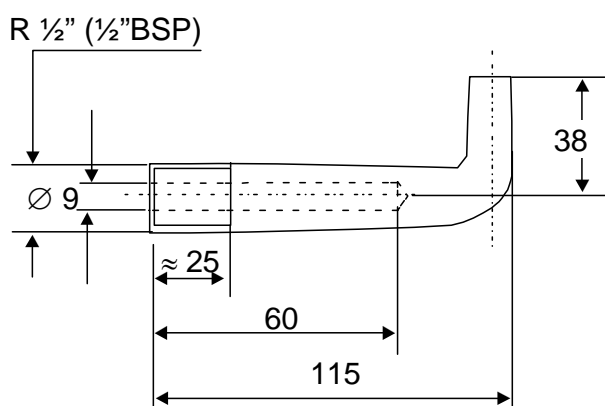
SPECIAL ELECTRODE HOLDERS AND ELECTRODES

Electrode M328 with 1/2" BSP thread for electrode holder 0322652001



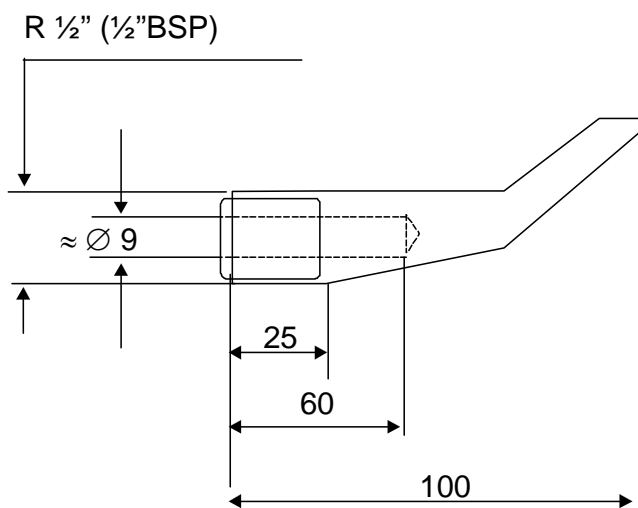
Part no.

0322706001



Part no.

0322707001

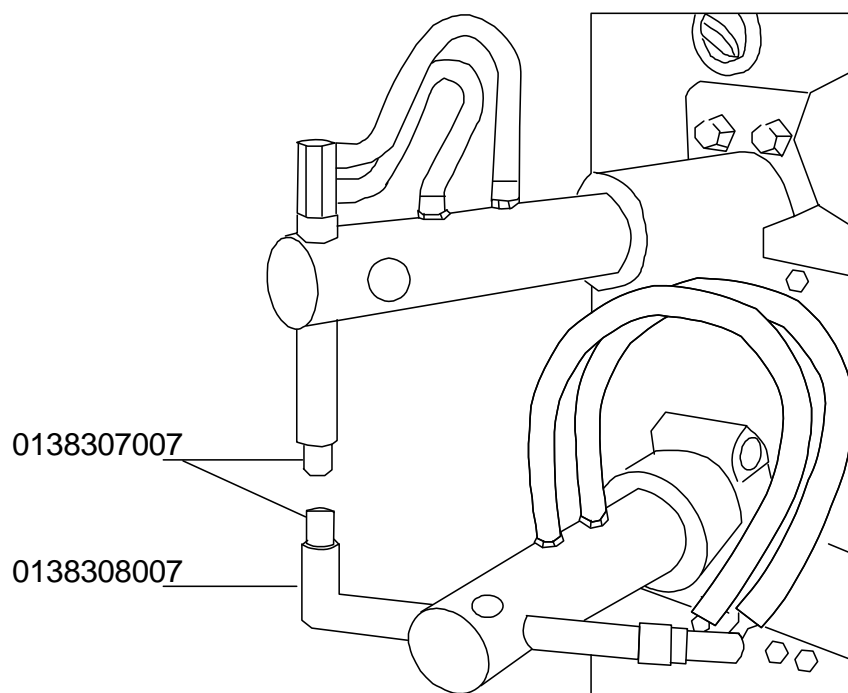
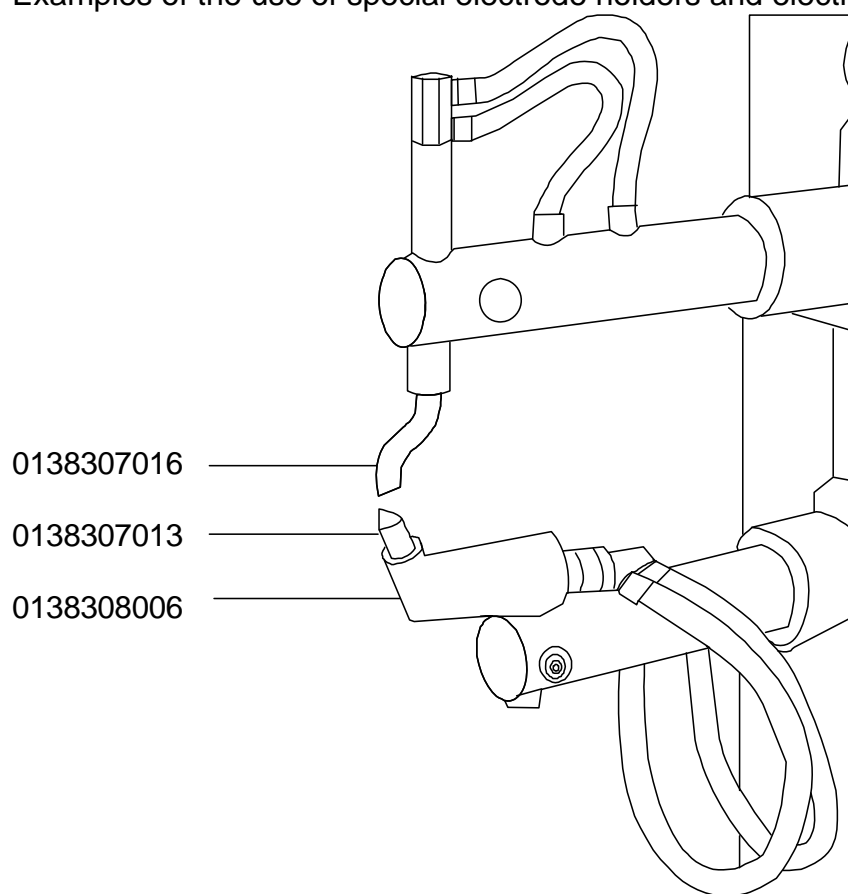


Part no.

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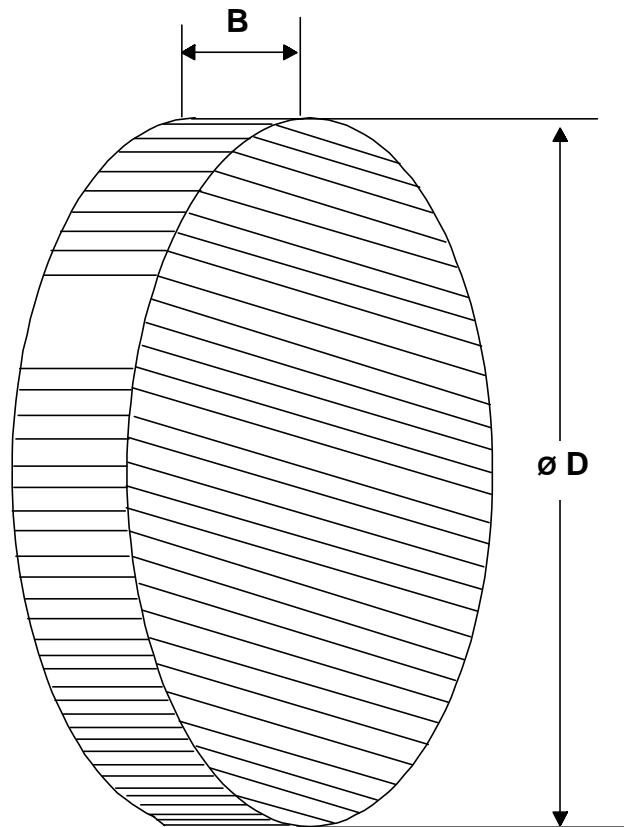
SPECIAL ELECTRODE HOLDERS AND ELECTRODES

Examples of the use of special electrode holders and electrodes.



SEAM WELDING ELECTRODES

Blanks for seam welding electrodes

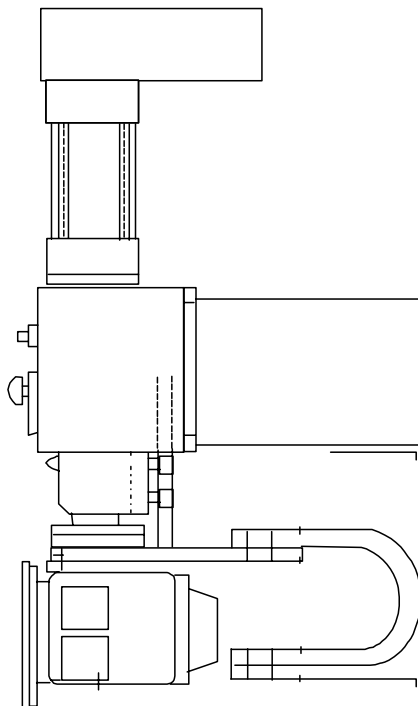


M3		M328		M100	
Part no.	DxB	Part no.	DxB	Part no.	DxB
0190401101	4" x 3/8"	0190402108	5 1/2" x 5/8"	0190403107	4" x 5/8"
0190401102	5" x 3/8"	0190402109	7" x 5/8"	0190403108	5 1/2" x 5/8"
0190401103	5 1/2" x 3/8"	0190402110	8" x 5/8"	0190403109	7" x 5/8"
0190401104	6" x 3/8"	0190402111	9" x 5/8"	0190403110	8" x 5/8"
0190401105	7" x 3/8"	0190402112	10" x 5/8"	0190403112	10" x 5/8"
0190401106	3 1/2" x 5/8"	0148018001	7" x 3/4"	0190403113	12" x 5/8"
0190401107	4" x 5/8"			0190403114	14" x 5/8"
0190401108	5 1/2" x 5/8"				
0190401109	7" x 5/8"				
0190401110	8" x 5/8"				
0190401111	9" x 5/8"				
0190401112	10" x 5/8"				
0190401113	12" x 5/8"				
0148017001	7" x 3/4"				

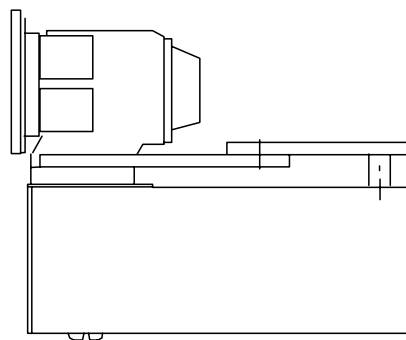
SEAM WELDING ELECTRODES

Defenition of electrodes for seam weldning machines.

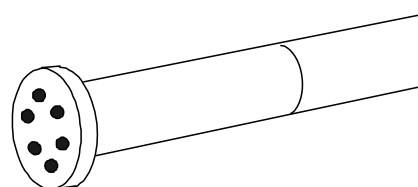
Upper welding head



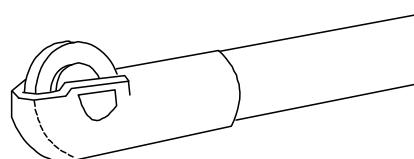
Lower universal welding head



Lower transversal welding head



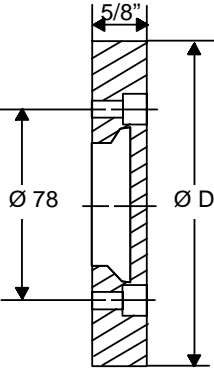
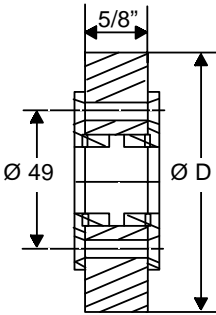
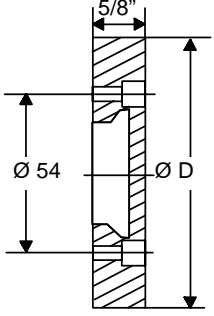
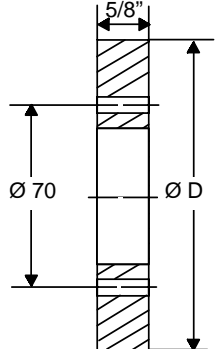
Lower longitudinal welding head



SEAM WELDING ELECTRODES

Machined electrodes of M3 for seam welding machines and their applications

Upon request we supply machined seam welding electrodes made of M100 or M328.

<p>Application: Upper welding head SVS 3..-6.. Lower universal welding head SVS 3..-6.. Lower crosswelding head SVS 6., ZSDB and ZSF</p> 	<p>Application: Lower longitudinal welding head SVS 3..-5..</p> 																		
<table border="1"> <thead> <tr> <th>Part no.</th> <th>D</th> </tr> </thead> <tbody> <tr> <td>0011741201</td> <td>4"</td> </tr> <tr> <td>0011741202</td> <td>5 1/2"</td> </tr> <tr> <td>0011741203</td> <td>8"</td> </tr> <tr> <td>0011741204</td> <td>9"</td> </tr> <tr> <td>0011741205</td> <td>12"</td> </tr> </tbody> </table>	Part no.	D	0011741201	4"	0011741202	5 1/2"	0011741203	8"	0011741204	9"	0011741205	12"	<table border="1"> <thead> <tr> <th>Part no.</th> <th>D</th> </tr> </thead> <tbody> <tr> <td>0141715880, complete</td> <td>3 1/2"</td> </tr> <tr> <td>0141715001, wheel</td> <td>3 1/2"</td> </tr> </tbody> </table>	Part no.	D	0141715880, complete	3 1/2"	0141715001, wheel	3 1/2"
Part no.	D																		
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Part no.	D																		
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0141715001, wheel	3 1/2"																		
<p>Application: Lower transversal welding head SVS 3..-5</p> 	<p>Application: Lower longitudinal welding head SVS6..ZSDB and ZSF</p> 																		
<table border="1"> <thead> <tr> <th>Part no.</th> <th>D</th> </tr> </thead> <tbody> <tr> <td>0011741301</td> <td>4"</td> </tr> <tr> <td>0011741302</td> <td>5 1/2"</td> </tr> <tr> <td>0011741303</td> <td>8"</td> </tr> <tr> <td>0011741304</td> <td>9"</td> </tr> <tr> <td>0011741305</td> <td>12"</td> </tr> </tbody> </table>	Part no.	D	0011741301	4"	0011741302	5 1/2"	0011741303	8"	0011741304	9"	0011741305	12"	<table border="1"> <thead> <tr> <th>Part no.</th> <th>D</th> </tr> </thead> <tbody> <tr> <td>0011453003</td> <td>5 1/2"</td> </tr> </tbody> </table>	Part no.	D	0011453003	5 1/2"		
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0011741303	8"																		
0011741304	9"																		
0011741305	12"																		
Part no.	D																		
0011453003	5 1/2"																		

SEAM WELDING ELECTRODES

Machined electrodes of M3 for seam welding machines and their applications

Upon request we supply machined seam welding electrodes made of M100 or M328

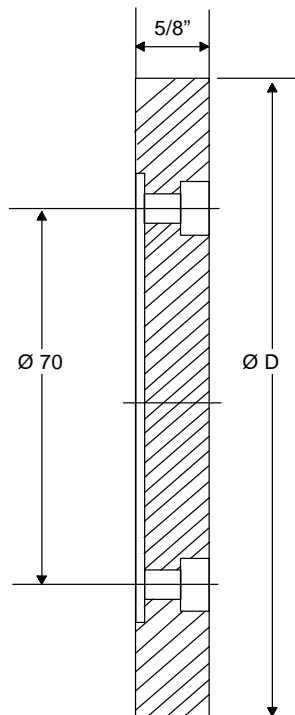
Application:

Upper welding head

ZSDB and ZSF

Lower universal welding head

ZSDB and ZSF



Part no.

D

0142723002

8"

0142723003

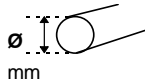
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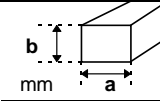
0142723004

12"

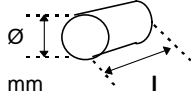
ELECTRODE MATERIAL

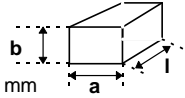
Electrode material is normally kept in stock for immediate delivery, subject unsold.

	Part no.		Kg/m
M3			
6	0190382249	ca.	0,3
9,5	0190382285		0,7
12,7	0190382302		1,13
16	0190382315		1,79
19	0190382324		2,52
22	0190382332		3,38
25	0190382340		4,36
32	0190382349		7,15
38	0190382360		10,1
50	0190382380		17,5
60	0190383395		30
85	0190383427		57
90	0190383431		64
130	0190383453		137
140	0190383459		152
M328			
12,7	0190384302	ca.	1,1
16	0190384315		1,79
19	0190384324		2,52
M100			
5	0190385219	ca.	0,158
6	0190385249		0,3
8	0190385267		0,5
12,7	0190385302		1,1
16	0190385315		1,79
19	0190385324		2,51
25	0190385340		4,36
50	0190385380		17,5
60	0190386395		30
65	0190386403		36
90	0190386431		64
120	0190386448		116

	Part no.		Kg/m
M3			
12,7 x 12,7	0190379302	ca.	1,43
25 x 12,7	0190375122		2,90
25 x 25	0190379340		5,70
28 x 28	0190379345		7,30
32 x 32	0190379349		9
40 x 12,7	0190375137		4,30
40 x 40	0190379360		12,90
50 x 12,7	0190375156		5,70
50 x 25	0190375160		11,50
50 x 50	0190379380		22,90
90 x 55	0190376801		50
90 x 70	0190376596		65
130 x 130	0190380453		160
140 x 75	0190376802		100
150 x 30	0190376782		50
M328			
1½"x1"	0191257141	ca.	8,60
2"x1"	0191257160		11,50
M100			
25x20	0190377123	ca.	3,60
25x25	0190381340		5,70
50x25	0190377160		11,50
50x50	0190381380		22,90
90x55	0190378801		50
120x45	0190378678		55
140x75	0190378802		100
150x30	0190378782		50
150x80	0190378792		114

ELCTRODE MATERIAL
Sintered material 20W3

			Part no.
Ø	l		
20W3			
6,4	x	200	0190388249
9,5	x	200	0190388285
12,7	x	200	0190388302
19,0	x	200	0190388324
25,4	x	200	0190388340

			Part no.	
a	b	l		
20W3				
12,7	x	12,7	-200	0190390302
6,4	x	25,4	-200	0190389119
15,9	x	25,4	-200	0190389123
19,1	x	31,8	-200	0190389131
6,4	x	38,1	-200	0190389134

ELECTRODE MATERIAL

Choice of electrode material for spot welding

Welding Property (U, G, D, O)	Electrode material (1 – 5) against	Nickel alloys	Nickel	Phosphorous bronze	Silicon bronze	Nickelsilver	Brass, 25-40% Zn	Brass, 10-25% Zn	Copper	Aluminium	Stainless steel	Steel with low carbon content					
												Other types of coatings	Galvanized, lead coated	With mill scale	Bright, pickled		
Electrode material (1 – 5) against	Remarks (a – h)																
Steel with low carbon content	Bright, pickled	D 1 1 h	D 1 1 h	D 1 1 h	D 1 1 h	D 1 1 h	D 1 1 fh	O 1 1 fh	O 4 1 fh	D 5 1 fh	G 3 1 e	D 2 1 cd	G 2 1 cd	D 1 1 b	U 1 1 a		
	With mill scale			O 1 1 bh	O 1 1 bh	O 1 1 bh				O 5 1 bfh	O 3 1 b	O 2 1 bcd	O 2 1 bcd	D 1 1 b			
	Galvanized, lead coated	D 2 2 hcd	D 2 2 cd	D 2 2 cd	D 2 2 cd	D 2 2 cd	2 2 fcd	O 2 2	O 4 2	O 5 2	G 3 2 cd	D 2 2 cd	G 2 2 cd				
	Other types of coatings	O 2 2 hcd	O 2 2 cd	O 2 2	O 2 2	O 2 2	O 2 2	O 2 2	O 4 2	O 5 2	O 3 2	D 2 2 cd					
Stainless steel	D 1 3	D 1 3	D 1 3	D 1 3	D 1 3	O 1 3	O 1 3	O 4 3	O 5 3	U 3 e							
Aluminium	O 1 5	O 1 5	D 1 5 eg	D 1 5 eg		1 5 eg	O 1 5	O 4 5	G 5 5 eg								
Copper	O 1 4	O 1 4	D 1 4 hfg	D 1 4 hfg	D 1 4 hfg	1 4 hfg	O 1 4	O 4 4 hfg									
Brass, 10-25% Zn	O 1 1	O 1 1	O 1 1	O 1 1	O 1 1	O 1 1	D 1 1										
Brass, 25-40% Zn	D 1 1 eg	D 1 1 eg	D 1 1 eg	D 1 1 eg	D 1 1 eg	1 1 eg											
Nickelsilver	G 1 1	G 1 1	D 1 1	D 1 1	G 1 1												
Silicon bronze	D 1 1	D 1 1	D 1 1	G 1 1													
Phosphorous bronze	D 1 1	D 1 1	G 1 1														
Nickel	G 1 1	G 1 1															
Nickel alloy	G 1 1																

Electrode material	Welding property
1 M3 or M328	U. Excellent
2 M328	G. Good
3 M100 or M328	D. Poor
4 Sintered material 20W3	O. Unsatisfactory
5 Copper	

Remarks

- Setting of welding parameters within wide tolerances
- Poor strength and quality
- The thickness of the coating should be even
- Electrode surface to be kept free of coating
- High current and short weld time recommended
- Thin sheets can be welded under special circumstances
- Welding is to be carefully controlled
- Low weld strength

See recommendation table for choice of best electrode material

ELECTRODE MATERIAL

Recommendation table for choice of electrode material

Please note! The stated values are approximate

Material	Hardness Brinell, max.	Softening temperature, °C	Conductivity in % of electrolytic copper	Application
Cold drawn copper	95	150	98	Electrodes for spot welding of aluminium
M3	150	500	80	Electrodes for spot welding and seam welding of carbon steel and brass. Electrode dies for butt welding, flash butt welding and projection welding.
M328	150	500	80	Electrodes for spot welding and seam welding of carbon steel, aluminium and brass. The material is particularly suitable for the welding of coated sheet metal. Electrode dies for butt welding, flash butt welding and projection welding.
M100	258	500	50	Electrodes for spot welding and seam welding of stainless steel and Nimonic. Electrode dies for butt welding, flash butt welding and projection welding.
Sintered material 20W3	245	1000	30	Die inserts for projection welding and flash butt welding machines. Inserts for spot welding electrodes used for soldering in spot welding machines.
Tungsten	450	800	30	Inserts for spot welding electrodes used for the welding of copper alloys with high electrical conductivity and also for soldering in spot welding machines.

ELECTRODE MATERIAL

Treatment of electrode material

Electrode material is made up of copper with different alloying elements in order to increase the hardness and wear resistance. Greater material hardness is also achieved through heat treatment. The electrode material has good electric conductivity and the hardness is practically unaffected as long as the softening temperature is not exceeded, (see recommendation table).

If the material is subjected to temperatures above the softening temperature the hardness is reduced and can be restored only through renewed heat treatment, which is an extensive procedure, that requires a temperature controlled furnace.

In order to obtain maximum electrode life the material should be treated so as not to exceed its softening temperature. This is partly achieved by giving the electrodes generous dimensions so as to carry away the heat generated as quickly as possible and partly through adequate water cooling. It is therefore a general rule to use spot welding electrodes made of $\frac{3}{4}$ " rather than $\frac{1}{2}$ " diameter material, as the risk of exceeding the softening temperature is less for larger diameter electrodes. In addition the shape of the electrodes is of vital importance to their life span.

Electrodes according to figures A and B have a considerably longer life than electrodes according to figure C due to the fact that the A- and B-types have more material near the point of contact, which improves the heat dissipation and therefore reduces the risk of exceeding the softening temperature.

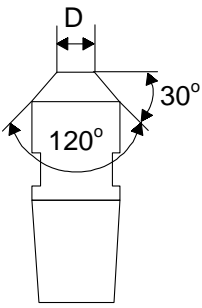
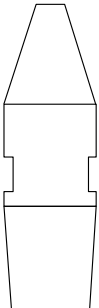
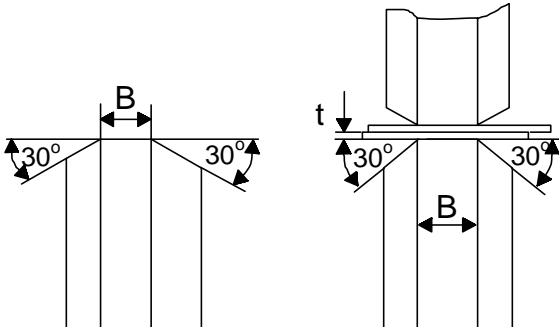
Fig. A	Fig. C
 <p>Recommended shape of spot welding electrode</p> <p>$D = 5\sqrt{t}$ for $t \leq 3$ mm $D = 2t + 2.5$ for $t > 3$ mm t = single sheet thickness, mm</p>	 <p>Less suitable shape of spot welding electrode</p> <p>The electrode resists considerably lower load than that of the A-type</p>

Fig. B
 <p>Recommended shape of seam welding electrode</p> <p>$B = 5\sqrt{t}$ t = single sheet thickness, mm</p>

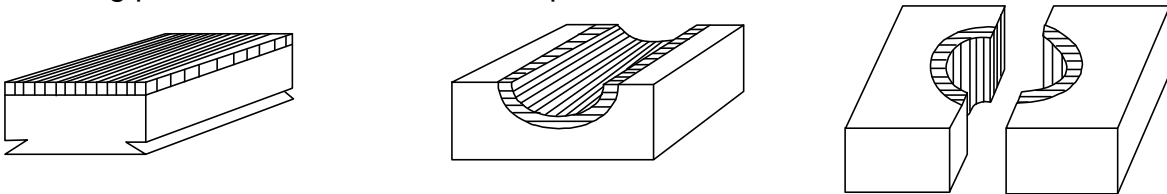
ELECTRODE MATERIAL

Bending and heat treatment of electrode material

Bending of electrode material should preferably be made in cold condition. This is possible, if a sufficiently large radius is acceptable. In case of smaller radii it will be necessary to first soft-anneal the material in order to avoid cracking. Soft-annealing means heating the material to 970°C for M3 and 950°C for M100 for 10-15 minutes and then quickly quench in water. The heating should preferably be made in a salt bath, such as barium chloride. The material hardness is then reduced by about 50%, which facilitates the bending. To restore the hardness the material must be heated up to 450°C and kept at that temperature for 16 hours. The stated temperatures should be observed, which requires a temperature controlled furnace. All heat treatment should be preceded by soft-annealing.

Soldering of sintered material

Sintered material is wear resistant, has high softening temperature and is soldered to electrode dies for projection welding machines and similar electrodes, which are subject to severe wear. The following pictures illustrate some examples of such electrodes.

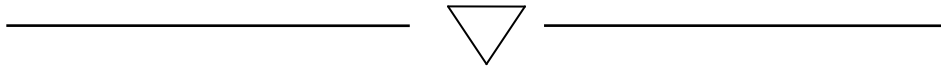


Sintered material has poorer conductivity than other electrode materials and it therefore gets heated up easier. For this reason sintered components should be thin, about 6 mm. The dies, on which the sintered material is soldered, should be adequately water-cooled. Possible cooling channels should be located close to the transition zone.

The material of the basic die can be M100, M3 or copper depending upon the pressure, which will be applied in service. The application of the sintered component is done in the following manner:

1. The surfaces should be thoroughly cleaned by grinding or polishing with emery cloth. Possible grease is to be removed with suitable solvent. The fit-up between the die and the sintered component should be good.
2. The fluxing agent "Easy to flux" is mixed with water and stirred into a paste. Leave it to settle for 15 minutes. After that the fluxing agent is spread onto the surface of the sintered component. A piece of foil of silver solder "Easy flo No.3" is put on the coated surface. The foil should be cut to cover 2/3 of the surface. The component is heated up using a reducing gas flame until the silver solder melts. Avoid directing the gas flame directly towards the soldering surface. It may be necessary to use a piece of steel wire to help spreading the molten solder metal. The flame may be removed, when the solder metal covers the entire surface.
3. The fluxing paste is spread onto the die and the sintered component is put into place. After that the assembly is heated up until the solder metal melts. Add some silver solder if necessary. Maintain the melting temperature for 15-90 seconds. The melting temperature is 634-656°C.
4. Remove the gas flame when the solder metal has flowed out. Apply a pressure of approximately 1.5 kp/cm² onto the sintered component until the solder metal has solidified.

5. The soldered parts are left to cool off in air to approx. 250°C for smaller and to 150°C for larger parts and after that cooled in water.
6. In order to avoid softening of the basic dies the soldering should be performed at the lowest possible temperature and as quickly as possible. The die should be heated only near the soldering joint. Material far from the joint can be cooled in water.
7. Dies, which are subjected to repeated soldering will loose their hardness and should therefore be heat treated again.



TECH Products Sweden AB



www.techproducts.se
info@techproducts.se