



ADVANCED CERAMICS

IN WELDING AND METALFORMING





Centring



Positioning

DOCERAM Advanced Ceramic Solutions develops and supplies products and components for car manufacturers and suppliers in the sectors of

- Welding technology
- Fixture construction
- Body-in-white

The third generation of our in-house developed high-performance ceramics extends our materials range with CERAZUR, VOLCERA and Z-101.

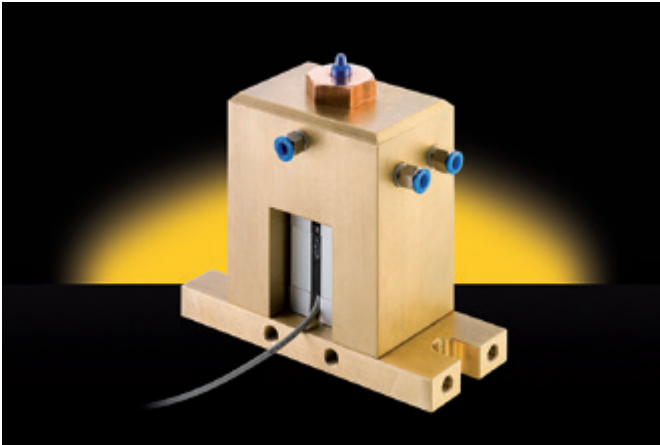
Their superior physical and chemical properties as well as extreme stress tolerance extend the possible range of applications in production engineering.

This leads to high speeds and high cycle rates, safe sequences and high-precision processes with many times more than the usual service life.

The deployment analysis is an important part of our work. Our vast experience and comprehensive knowledge of application technology result in the perfect product. Apart from our broad standard range, we are also your ideal partner with regard to the time scheduling and implementation of individual solutions.

Standardised sequences ensure trust and safety.

Secured production sequences that are based on state-of-the-art machinery and our highly qualified manufacturing team guarantee durable products for tough operating conditions.



Complete welding devices



MIG/MAG welding

➔ For car manufacturers and suppliers

the use of high-performance ceramics are exemplary for the solution of application engineering problems: hardness, precision, wear resistance, temperature resistance, impact strength, abrasion resistance, anti-adhesion with regard to weld spatter, perfect fit and a long service life with tolerances of 0.01 mm.

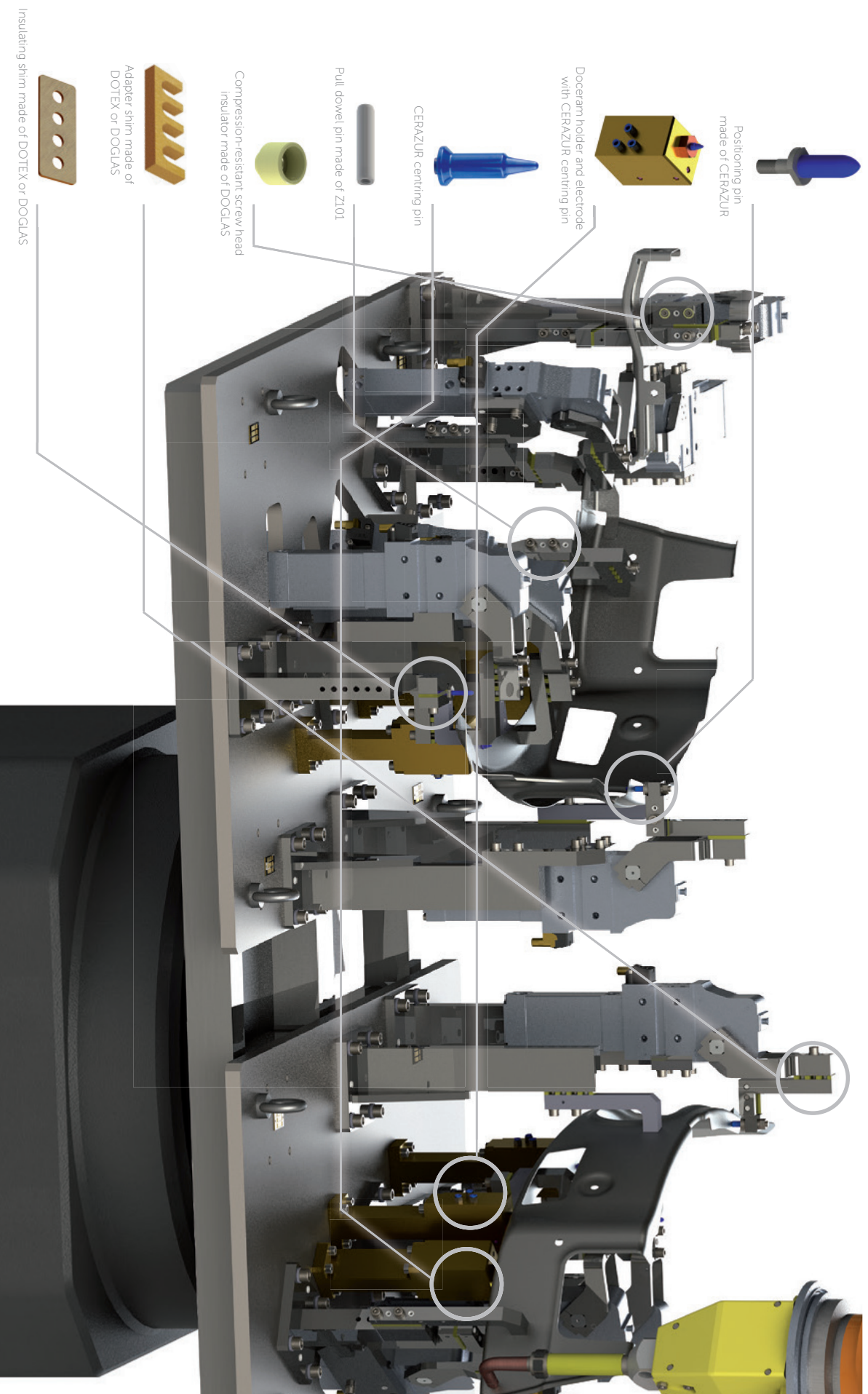
➔ In general mechanical and plant engineering

the exceptional physical and chemical properties of our ceramics extend the full range of possible applications, for example for forming and test technology. As a result, you get high-precision sequences and processes with many times more than the usual service life subject to the most stringent dimensional tolerances.

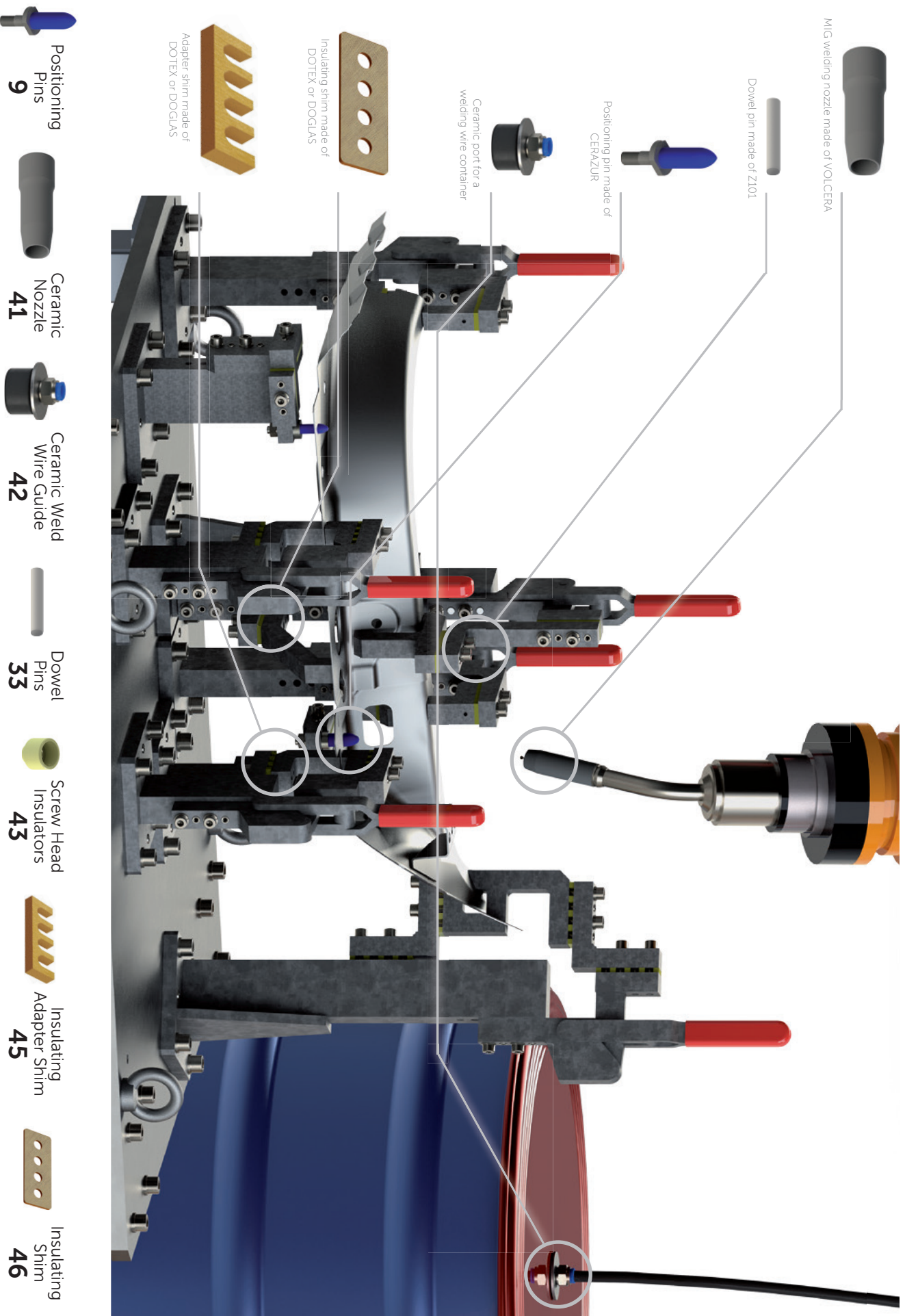
➔ In the metal-processing industry

high-performance ceramics are used for machining processes such as milling, punching and drilling of hard materials at high speeds because of their extraordinary hardness.

Doceram® Ceramics in Resistance Welding



Doceram® Ceramics in MIG and TIG welding



Doceram® Ceramics Material Specifications and Comparison



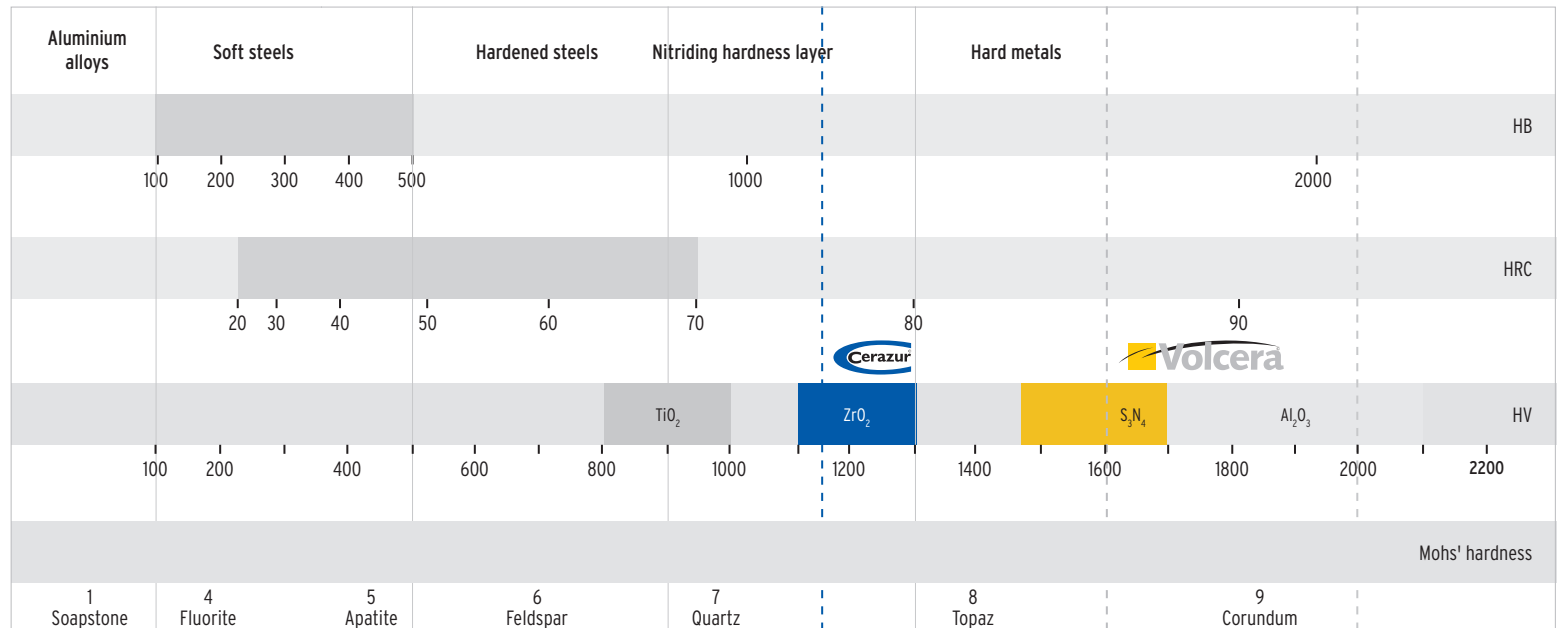
Centring pin: CERZAUR with 40 times the service life compared to steel



Gas nozzle: VOLCERA after 100 shifts in continuous operation and copper after 1 shift



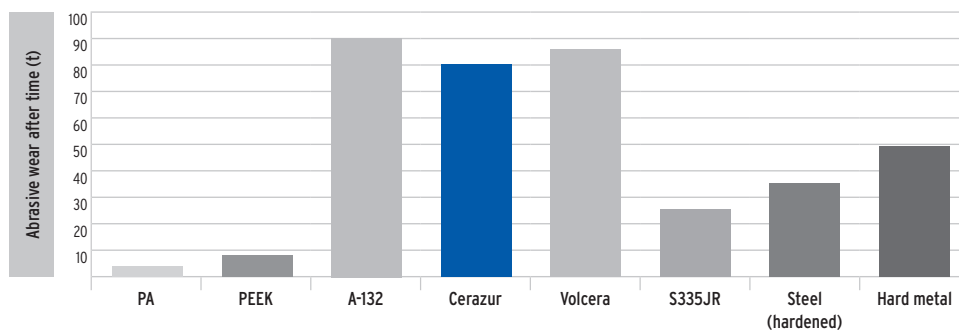
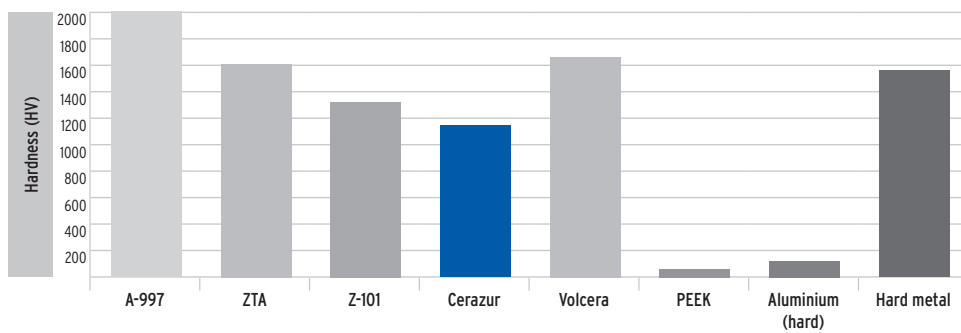
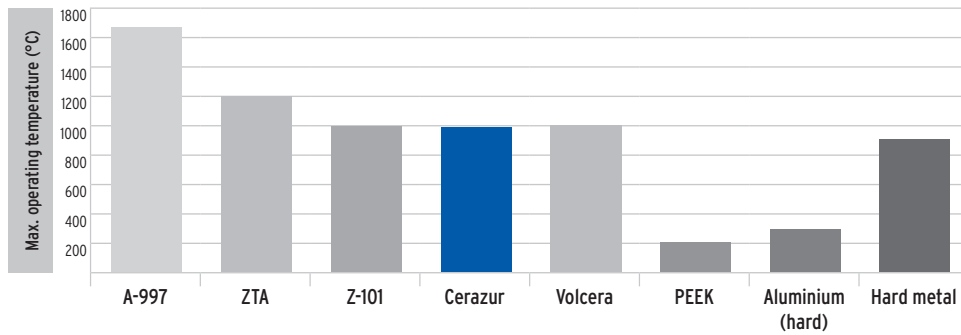
Material property	Unit	A-997	ZTA	Z-101	Cerazur	Volcera
		Al_2O_3 >99.796	$\text{Al}_2\text{O}_3 + \text{ZrO}_2$	ZrO_2 Y-PSZ	ZrO_2 Y-PSZ	Si_3N_4
Colour		ivory	white	white	blue	grey
Density	(g/cm³)	3.9	4.1	6.0	6.0	3.2
Bending strength	(MPa)	390	600	1000	1300	750
Compressive strength	(MPa)	3900	3600	3000	3000	2500
E-modulus	(Gpa)	390	350	205	205	320
Impact strength	(Mpa ml/2)	5.2	7.5	8.0	12.0	6.7
Weibull modulus		12	18	22	25	15
Vickers hardness	(HV 0.5)	2000	1600	1300	1150	1650
Thermal expansion	(10⁻⁶K⁻¹)	5.5 - 8.4	6.0 - 8.6	10.0	10.0	3.4
Thermal conductivity	(W/mK)	28	18	<2	<2	22
Thermal shock resistance	(~T°C)	280	320	270	280	550
Max. operating temperature	(°C)	1700	1000	1000	1000	1000
Specific resistance at 20°C	(1 cm)	>10¹⁵	>10¹³	>10¹⁰	>10¹⁰	>10¹¹
Dielectric strength	(kV/mm)	30	-	-	-	20





Centring pin: CERZAUR with 40 times the service life compared to steel

Gas nozzle: VOLCERA after 100 shifts in continuous operation and copper after 1 shift



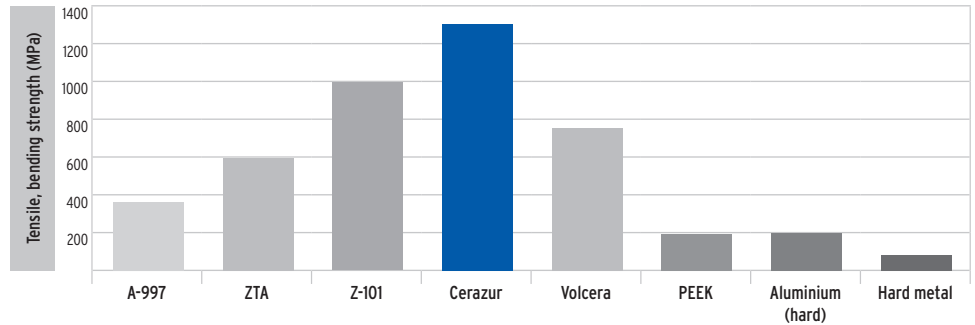
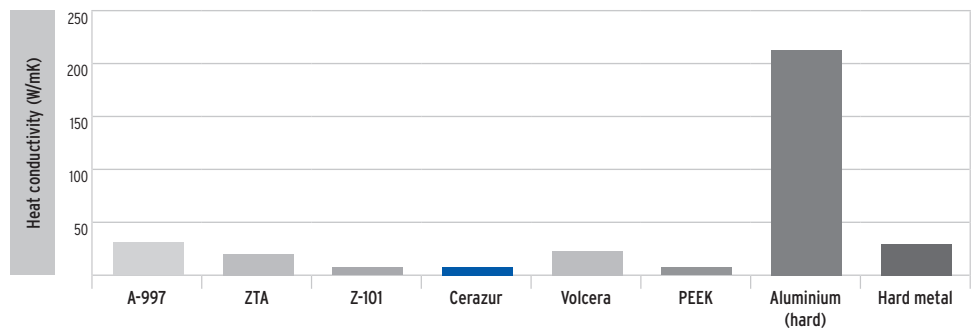
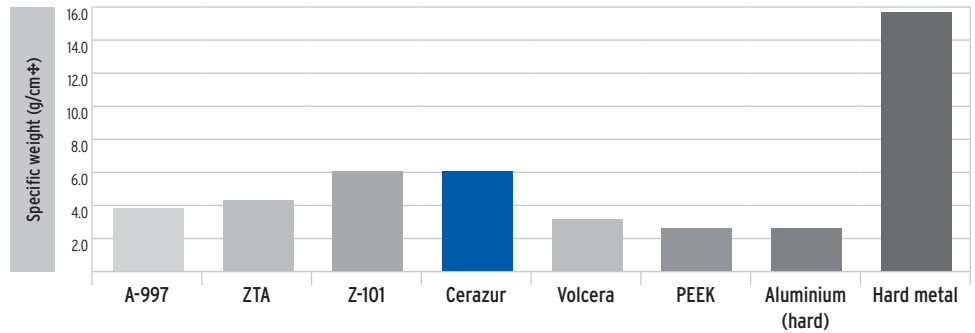
COMPARISON OF MATERIAL BENEFITS

Benefits of high-performance ceramics in direct contact with the material

- > Extremely high abrasion resistance
- > Dimensional stability
- > Anti-adhesion effect
- > Electrical insulation
- > Extremely high operating temperature

Benefits of high-performance ceramics for high-temperature applications

- > Dimensional stability at maximum temperatures
- > Anti-adhesion effect
- > Thermal shock resistance
- > Electrical insulation
- > Very high heat resistance



EXAMPLES FOR WEAR OF STANDARD MATERIALS



Hardened steel



Hard metal insert



Centring pin made hardened steel



Standard gas nozzle made of nickel-plated copper

CONFIGURABLE POSITIONING PINS

PROVEN STANDARD QUALITIES

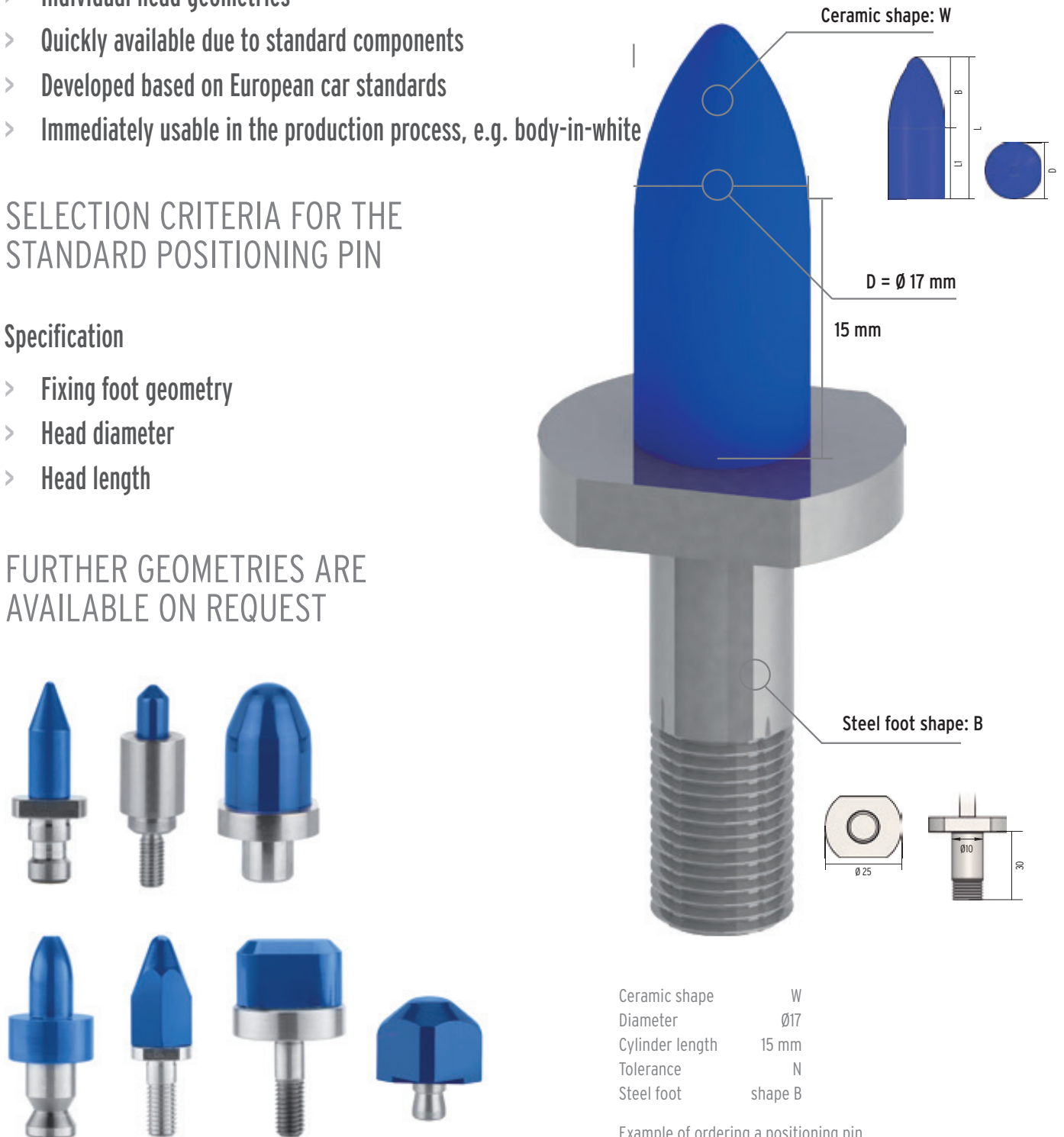
- > Flexible modular system
- > Individual head geometries
- > Quickly available due to standard components
- > Developed based on European car standards
- > Immediately usable in the production process, e.g. body-in-white

SELECTION CRITERIA FOR THE STANDARD POSITIONING PIN

Specification

- > Fixing foot geometry
- > Head diameter
- > Head length

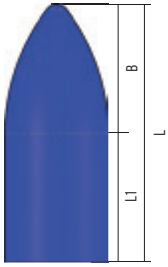
FURTHER GEOMETRIES ARE AVAILABLE ON REQUEST



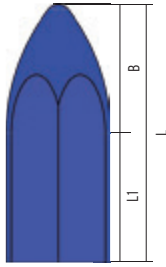
CONFIGURABLE POSITIONING PINS

Ceramic shapes

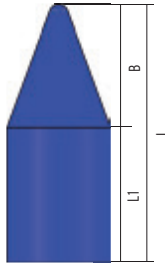
Shape W



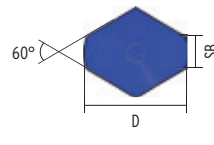
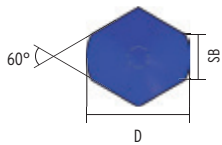
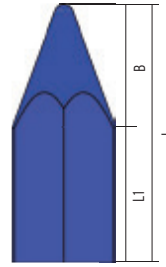
Shape X



Shape Y



Shape Z



D = diameter, L1 = cylinder length, L = overall length of the ceramic (L1 + B),
B = length of the transition (D x 1.25), SB = tip width

Diameter of the ceramic (D)

Diameter can be selected in steps of 0.1 mm								
8-10	10-12	12-15	15-20	20-25	25-30	30-35	35-40	>40

Tip width (SB)

Tip width (SB)								
3.0	3.5	4.0	4.5	5.0	7.0	7.5	8.0	9.0

Selection of the cylinder length (L1)

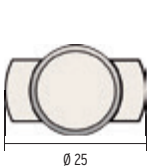
Cylinder length can be selected in steps of 0.1 mm								
--	--	--	--	--	--	--	--	--

Selection of tolerances

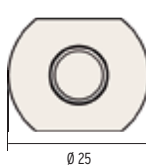
M	N	O	P	Q	R	S
0 / -0.05	0 / -0.1	-0.1 / -0.15	-0.1 / -0.2	-0.15 / -0.2	-0.2 / -0.3	-0.25 / -0.3

Steel feet

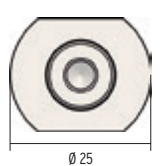
Shape A



Shape B



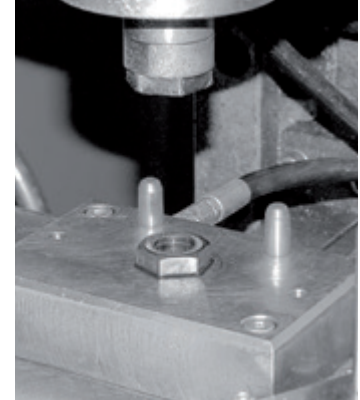
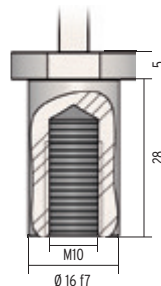
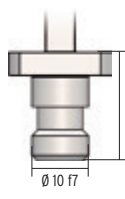
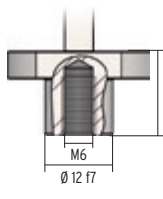
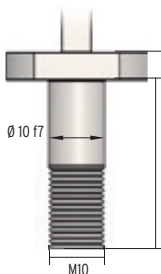
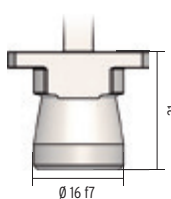
Shape C



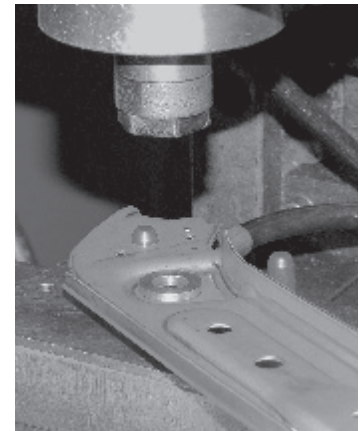
Shape D



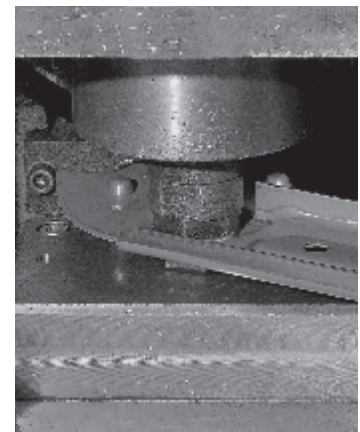
Shape E



Dimensionally precise positioning



High abrasive resistance



Dimensional stability

PROJECTION WELD NUT M4

AIR-COOLED

Item number example
for a complete electrode



for sheet hole diameter
> 5.4 mm



Change electrode SW 19
> 1111-ZK-10009



Centring pin long, Cerazur
> 8228-ZK-10009



Spring for BE (stud insert) up to 30 mm
> 1112-ZK-12205

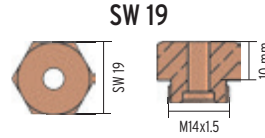


Base electrode standard Ø 18,
30 mm length
> 1111-ZK-10500



O-ring
> 1123-ZK-16434

Change electrodes

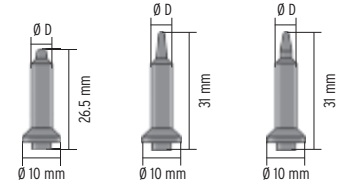
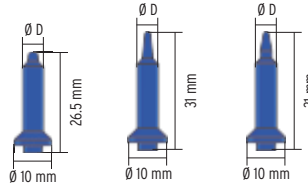


Ø sheet hole (mm)	SW 19	
	Item No.	1111-ZK-
	4.5	10000
	4.6	10001
	4.7	10002
	4.8	10003
	4.9	10004
	5.0	10005
	5.1	10006

SW 19	
1111-ZK-	
5.2	10007
5.3	10008
5.4	10009
5.5	10010
5.6	10011
5.7	10012
5.8	10013

SW 19	
1111-ZK-	
5.9	10014
6.0	10015
6.1	10016
6.2	10017
6.3	10018
6.4	10019
6.5	10020

Centring pins



Ø sheet hole (mm)	Short		Long		With collar	
	Item No.	8228-ZK-	8228-ZK-	8228-ZK-	8228-ZK-	8228-ZK-
	4.5	11000	10000	10000	10300	10300
	4.6	11001	10001	10001	10301	10301
	4.7	11002	10002	10002	10302	10302
	4.8	11003	10003	10003	10303	10303
	4.9	11004	10004	10004	10304	10304
	5.0	11005	10005	10005	10305	10305
	5.1	11006	10006	10006	10306	10306
	5.2	11007	10007	10007	10307	10307
	5.3	11008	10008	10008	10308	10308
	5.4	11009	10009	10009	10309	10309
	5.5	11010	10010	10010	10310	10310
	5.6	11011	10011	10011	10311	10311
	5.7	11012	10012	10012	10312	10312
	5.8	11013	10013	10013	10313	10313
	5.9	11014	10014	10014	10314	10314
	6.0	11015	10015	10015	10315	10315

Ø sheet hole (mm)	Short		Long		With collar	
	Item No.	8440-ZK-	8440-ZK-	8440-ZK-	8440-ZK-	8440-ZK-
	4.5	11000	10000	10000	10300	10300
	4.6	11001	10001	10001	10301	10301
	4.7	11002	10002	10002	10302	10302
	4.8	11003	10003	10003	10303	10303
	4.9	11004	10004	10004	10304	10304
	5.0	11005	10005	10005	10305	10305
	5.1	11006	10006	10006	10306	10306
	5.2	11007	10007	10007	10307	10307
	5.3	11008	10008	10008	10308	10308
	5.4	11009	10009	10009	10309	10309
	5.5	11010	10010	10010	10310	10310
	5.6	11011	10011	10011	10311	10311
	5.7	11012	10012	10012	10312	10312
	5.8	11013	10013	10013	10313	10313
	5.9	11014	10014	10014	10314	10314
	6.0	11015	10015	10015	10315	10315

Accessories for base electrodes

Springs

For base electrodes up to 30 mm



Springs

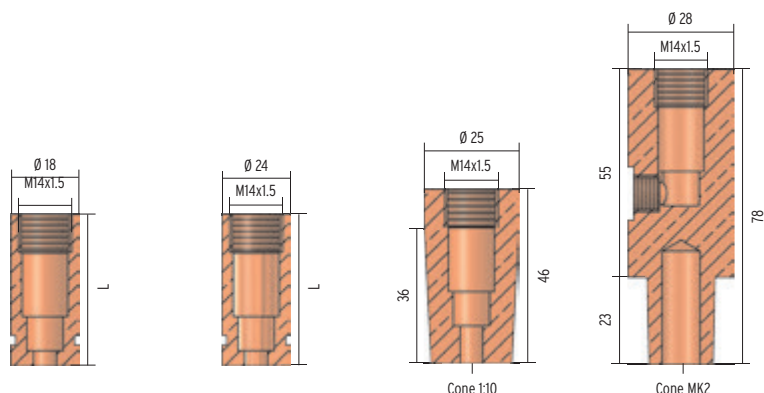
For base electrodes from 40 mm



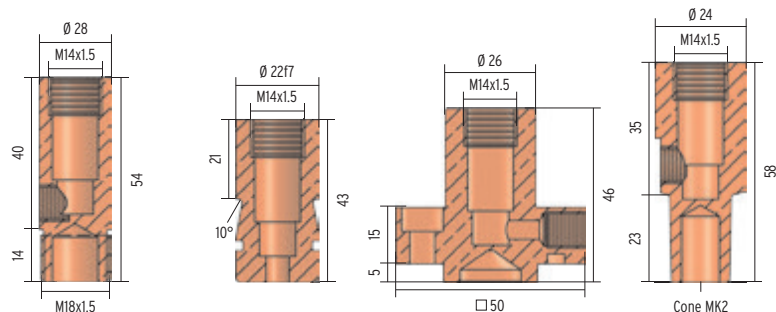
Spring M4		
Length	Item No.	1112-ZK-
30 mm		12205

Spring M4		
Length	Item No.	1112-ZK-
40 mm		12204

BASE ELECTRODES



	Standard Ø 18	Standard Ø 24	Cone 1:10	Cone MK2
Length (L in mm)				
Item No.	1111-ZK-	1111-ZK-	1111-ZK-	1111-ZK-
30	10500	10506	-	-
40	10501	10507	-	-
50	10502	10508	-	-
	-	-	10580	10540



	Thread M18x1.5	S-type	R-type	T-type
Item No.	1111-ZK-	1111-ZK-	1111-ZK-	1111-ZK-
	10560	10680	10608	10640

O-rings

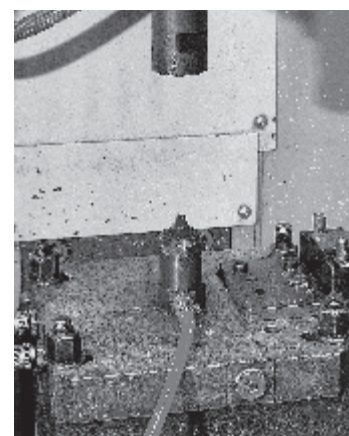


	O-rings M4
Item No.	1123-ZK-
18	16434
24	16435
S-type	58440

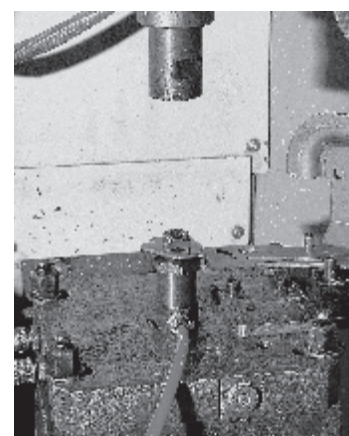
Compressed air connector



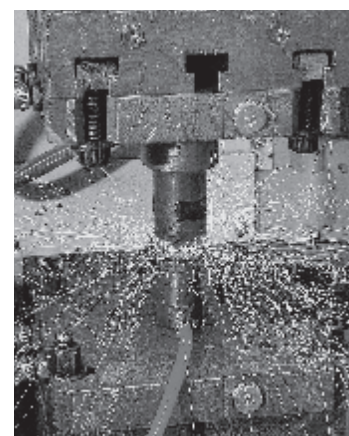
	Compressed air connector 1/8-6
Item No.	1116-ZK-
	12353



Centring pin made of CERAZUR
in a complete electrode



Precise centring of sheet
and projection weld nut



Welding process

PROJECTION WELD NUT M5

AIR-COOLED

Item number example
for a complete electrode



for sheet hole diameter
> 6.2 mm



Change electrode SW 19
> 1111-ZK-10017



Centring pin long, Cerazur
> 8228-ZK-10023



Spring for BE up to 40 mm
> 1112-ZK-12204



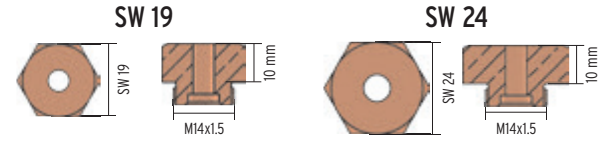
Base electrode standard Ø 18,
40 mm length
> 1111-ZK-10501



O-ring
> 1123-ZK-16434

Change electrodes

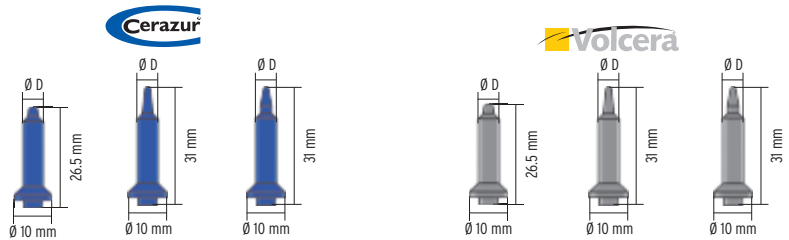
	SW 19		SW 24	
	Item No.	1111-ZK-	Item No.	1111-ZK-
Ø sheet hole (mm)	5.5	10010	10057	
	5.6	10011	10058	
	5.7	10012	10059	
	5.8	10013	10060	
	5.9	10014	10061	
	6.0	10015	10062	
	6.1	10016	10063	



	SW 19		SW 24	
	Item No.	1111-ZK-	Item No.	1111-ZK-
Ø sheet hole (mm)	6.2	10017	10064	
	6.3	10018	10065	
	6.4	10019	10066	
	6.5	10020	10067	
	6.6	10021	10068	
	6.7	10022	10069	
	6.8	10023	10070	

	SW 19		SW 24	
	Item No.	1111-ZK-	Item No.	1111-ZK-
Ø sheet hole (mm)	6.9	10024	10071	
	7.0	10025	10072	
	7.1	10026	10073	
	7.2	10027	10074	
	7.3	10028	10075	
	7.4	10029	10076	
	7.5	10030	10077	

Centring pins



	Short		Long		With collar	
	Item No.	8228-ZK-	Item No.	8228-ZK-	Item No.	8228-ZK-
Ø sheet hole (mm)	5.5	11016	10016	10316		
	5.6	11017	10017	10317		
	5.7	11018	10018	10318		
	5.8	11019	10019	10319		
	5.9	11020	10020	10320		
	6.0	11021	10021	10321		
	6.1	11022	10022	10322		
	6.2	11023	10023	10323		
	6.3	11024	10024	10324		
	6.4	11025	10025	10325		
	6.5	11026	10026	10326		
	6.6	11027	10027	10327		
	6.7	11028	10028	10328		
	6.8	11029	10029	10329		

	Short		Long		With collar	
	Item No.	8440-ZK-	Item No.	8440-ZK-	Item No.	8440-ZK-
Ø sheet hole (mm)	5.5	11016	10016	10316		
	5.6	11017	10017	10317		
	5.7	11018	10018	10318		
	5.8	11019	10019	10319		
	5.9	11020	10020	10320		
	6.0	11021	10021	10321		
	6.1	11022	10022	10322		
	6.2	11023	10023	10323		
	6.3	11024	10024	10324		
	6.4	11025	10025	10325		
	6.5	11026	10026	10326		
	6.6	11027	10027	10327		
	6.7	11028	10028	10328		
	6.8	11029	10029	10329		

Accessories for base electrodes

Springs

For base electrodes up to 30 mm

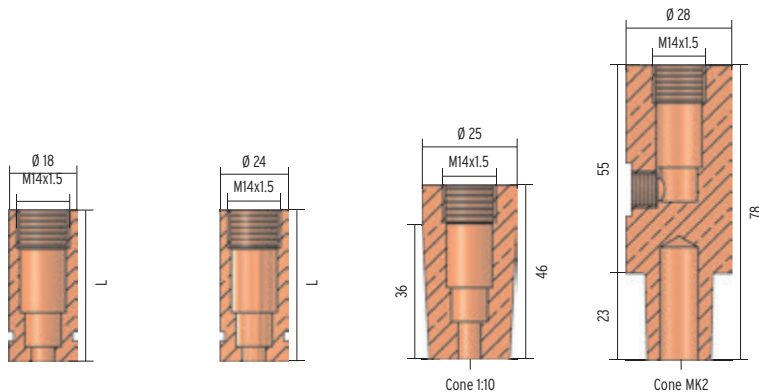
Spring M5		
Length	Item No.	1112-ZK-
30 mm		12205

Springs

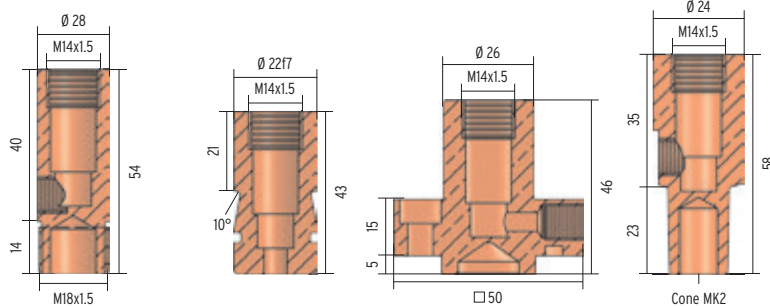
For base electrodes from 40 mm

Spring M5		
Length	Item No.	1112-ZK-
40 mm		12204

BASE ELECTRODES



	Standard Ø 18	Standard Ø 24	Cone 1:10	Cone MK2
Length (L in mm)				
Item No.	1111-ZK-	1111-ZK-	1111-ZK-	1111-ZK-
30	10500	10506	-	-
40	10501	10507	-	-
50	10502	10508	-	-
	-	-	10580	10540



	Thread M18x1.5	S-type	R-type	T-type
Item No.	1111-ZK-	1111-ZK-	1111-ZK-	1111-ZK-
	10560	10680	10608	10640

O-rings



	O-rings M5
Item No.	1123-ZK-
18	16434
24	16435
S-type	58440

Compressed air connector



	Compressed air connector 1/8-6
Item No.	1116-ZK-
	12353



Change electrode

Centring pin made of CERAZUR

Spring

Base electrode



Compressed air connector

Air-cooled complete electrode for projection nut welding

PROJECTION WELD NUT M6

AIR-COOLED

Item number example
for a complete electrode



for sheet hole diameter
> 7.8 mm



Change electrode SW 19
> 1111-ZK-10044



Centring pin long, Cerazur
> 8228-ZK-10045



Spring for BE up to 40 mm
> 1112-ZK-12206



Base electrode standard Ø 18,
40 mm length
> 1111-ZK-10504

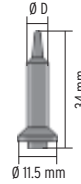
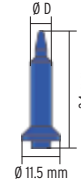
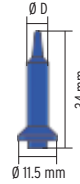
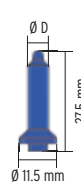


O-ring
> 1123-ZK-16434

Change electrodes

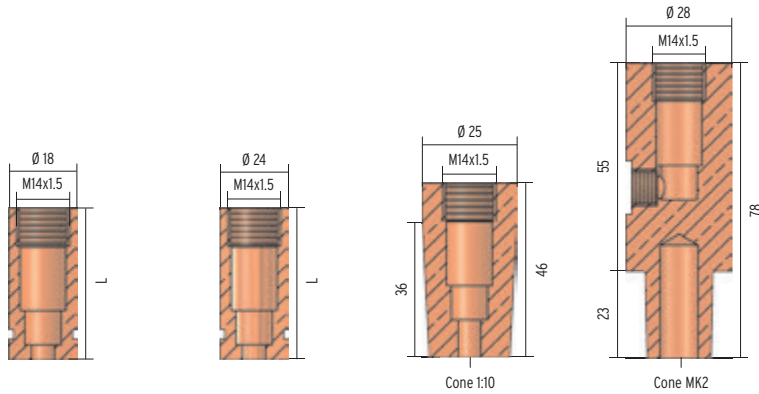
	SW 19		SW 24	
	Item No.	1111-ZK-	Item No.	1111-ZK-
Ø sheet hole (mm)	6.5	10031	10078	
	6.6	10032	10079	
	6.7	10033	10080	
	6.8	10034	10081	
	6.9	10035	10082	
	7.0	10036	10083	
	7.1	10037	10084	
	7.2	10038	10085	
	7.3	10039	10086	
	7.4	10040	10087	
	7.5	10041	10088	
	7.6	10042	10089	
	7.7	10043	10090	
	7.8	10044	10091	
	7.9	10045	10092	
	8.0	10046	10093	
	8.1	10047	10094	
	8.2	10048	10095	
	8.3	10049	10096	
	8.4	10050	10097	
	8.5	10051	10098	
	8.6	10052	10099	
	8.7	10053	10100	
	8.8	10054	10101	
	8.9	10055	10102	
	9.0	10056	10103	
	-	-	-	

Centring pins

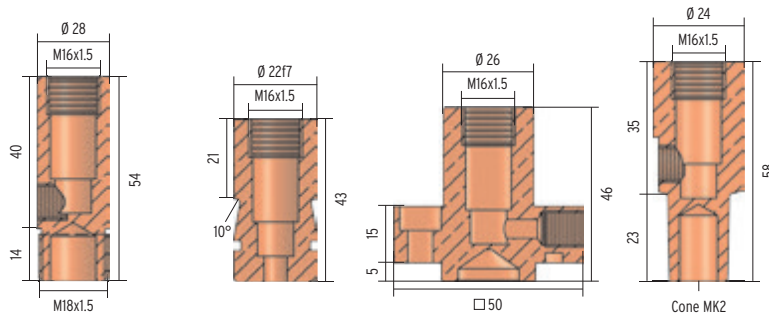


	Short			Long			With collar		
	Item No.	8228-ZK-	8228-ZK-	Item No.	8228-ZK-	8228-ZK-	Item No.	8228-ZK-	8228-ZK-
Ø sheet hole (mm)	6.5	11032	10032	10332			6.5	11032	10032
	6.6	11033	10033	10333			6.6	11033	10033
	6.7	11034	10034	10334			6.7	11034	10034
	6.8	11035	10035	10335			6.8	11035	10035
	6.9	11036	10036	10336			6.9	11036	10036
	7.0	11037	10037	10337			7.0	11037	10037
	7.1	11038	10038	10338			7.1	11038	10038
	7.2	11039	10039	10339			7.2	11039	10039
	7.3	11040	10040	10340			7.3	11040	10040
	7.4	11041	10041	10341			7.4	11041	10041
	7.5	11042	10042	10342			7.5	11042	10042
	7.6	11043	10043	10343			7.6	11043	10043
	7.7	11044	10044	10344			7.7	11044	10044
	7.8	11045	10045	10345			7.8	11045	10045
	7.9	11046	10046	10346			7.9	11046	10046
	8.0	11047	10047	10347			8.0	11047	10047
	8.1	11048	10048	10348			8.1	11048	10048
	8.2	11049	10049	10349			8.2	11049	10049
	8.3	11050	10050	10350			8.3	11050	10050
	8.4	11051	10051	10351			8.4	11051	10051
	8.5	11052	10052	10352			8.5	11052	10052

BASE ELECTRODES



Length (L in mm)	Standard Ø 18		Standard Ø 24		Cone 1:10		Cone MK2	
	Item No.	1111-ZK-	1111-ZK-	1111-ZK-	1111-ZK-	1111-ZK-	1111-ZK-	1111-ZK-
	30	10503	10509	-	-	-	-	-
	40	10504	10510	-	-	-	-	-
	50	10505	10511	-	-	-	-	-
		-	-	10581	10541			



Item No.	Thread M18x1.5	S-type	R-type	T-type
	1111-ZK-	1111-ZK-	1111-ZK-	1111-ZK-
	10561	10681	10611	10641



Perfectly fitting centring of



sheet and projection weld nut for an



optimised welding process

Accessories for base electrodes

Springs

For base electrodes up to 30 mm



Springs

For base electrodes from 40 mm



Spring M6		
Length	Item No.	1112-ZK-
30 mm		12205

Spring M6		
Length	Item No.	1112-ZK-
40 mm		12206

O-rings



Compressed air connector



O-rings M6		
Ø (mm)	Item No.	1123-ZK-
18		16434
24		16435
S-type		58440

Compressed air connector 1/8-6		
Item No.	1116-ZK-	
	12353	

PROJECTION WELD NUT M8

AIR-COOLED

Item number example
for a complete electrode



for sheet hole diameter
> 9.9 mm



Change electrode SW 24
> 1111-ZK-10118



Centring pin long, Cerazur
> 8228-ZK-10067



Spring for BE up to 40 mm
> 1112-ZK-12206



Base electrode standard Ø 24,
40 mm length
> 1111-ZK-10512



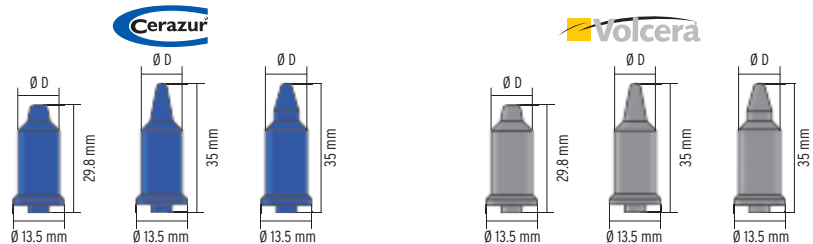
O-ring
> 1123-ZK-16435

Change electrodes



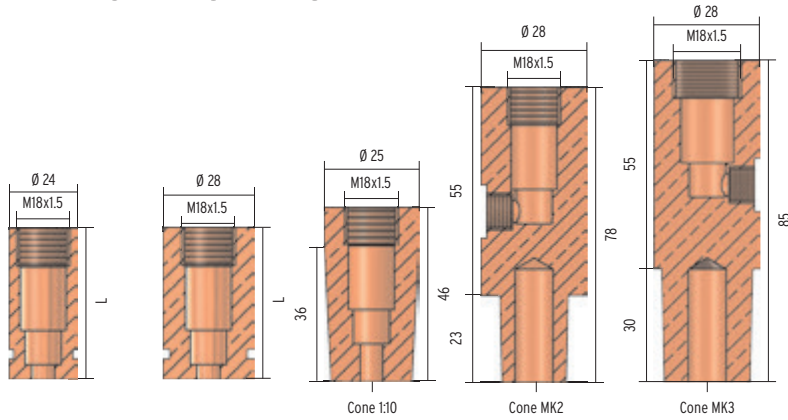
	SW 24		SW 30		SW 24		SW 30		SW 24		SW 30	
	Item No.	1111-ZK-	1111-ZK-		Item No.	1111-ZK-	1111-ZK-		Item No.	1111-ZK-	1111-ZK-	
ø sheet hole (mm)	8.5	10104	10135		9.6	10115	10146		10.7	10126	10157	
	8.6	10105	10136		9.7	10116	10147		10.8	10127	10158	
	8.7	10106	10137		9.8	10117	10148		10.9	10128	10159	
	8.8	10107	10138		9.9	10118	10149		11.0	10129	10160	
	8.9	10108	10139		10.0	10119	10150		11.1	10130	10161	
	9.0	10109	10140		10.1	10120	10151		11.2	10131	10162	
	9.1	10110	10141		10.2	10121	10152		11.3	10132	10163	
	9.2	10111	10142		10.3	10122	10153		11.4	10133	10164	
	9.3	10112	10143		10.4	10123	10154		11.5	10134	10165	
	9.4	10113	10144		10.5	10124	10155		-	-	-	
	9.5	10114	10145		10.6	10125	10156		-	-	-	

Centring pins

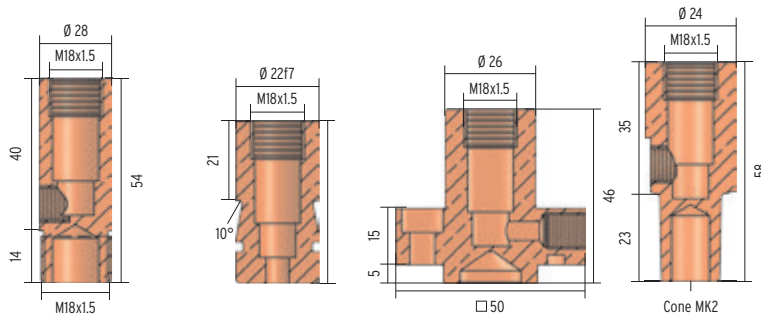


	Short			Long			With collar			Short			Long			With collar		
	Item No.	8228-ZK-	8228-ZK-	8228-ZK-	Item No.	8228-ZK-	8228-ZK-	8228-ZK-		Item No.	8440-ZK-	8440-ZK-	8440-ZK-	Item No.	8440-ZK-	8440-ZK-	8440-ZK-	
ø sheet hole (mm)	8.5	11053	10053	10353	8.5	11053	10053	10353		8.5	11053	10053	10353	8.5	11053	10053	10353	
	8.6	11054	10054	10354	8.6	11054	10054	10354		8.6	11054	10054	10354	8.6	11054	10054	10354	
	8.7	11055	10055	10355	8.7	11055	10055	10355		8.7	11055	10055	10355	8.7	11055	10055	10355	
	8.8	11056	10056	10356	8.8	11056	10056	10356		8.8	11056	10056	10356	8.8	11056	10056	10356	
	8.9	11057	10057	10357	8.9	11057	10057	10357		8.9	11057	10057	10357	8.9	11057	10057	10357	
	9.0	11058	10058	10358	9.0	11058	10058	10358		9.0	11058	10058	10358	9.0	11058	10058	10358	
	9.1	11059	10059	10359	9.1	11059	10059	10359		9.1	11059	10059	10359	9.1	11059	10059	10359	
	9.2	11060	10060	10360	9.2	11060	10060	10360		9.2	11060	10060	10360	9.2	11060	10060	10360	
	9.3	11061	10061	10361	9.3	11061	10061	10361		9.3	11061	10061	10361	9.3	11061	10061	10361	
	9.4	11062	10062	10362	9.4	11062	10062	10362		9.4	11062	10062	10362	9.4	11062	10062	10362	
	9.5	11063	10063	10363	9.5	11063	10063	10363		9.5	11063	10063	10363	9.5	11063	10063	10363	
	9.6	11064	10064	10364	9.6	11064	10064	10364		9.6	11064	10064	10364	9.6	11064	10064	10364	
	9.7	11065	10065	10365	9.7	11065	10065	10365		9.7	11065	10065	10365	9.7	11065	10065	10365	
	9.8	11066	10066	10366	9.8	11066	10066	10366		9.8	11066	10066	10366	9.8	11066	10066	10366	
	9.9	11067	10067	10367	9.9	11067	10067	10367		9.9	11067	10067	10367	9.9	11067	10067	10367	
	10.0	11068	10068	10368	10.0	11068	10068	10368		10.0	11068	10068	10368	10.0	11068	10068	10368	
	10.1	11069	10069	10369	10.1	11069	10069	10369		10.1	11069	10069	10369	10.1	11069	10069	10369	
	10.2	11070	10070	10370	10.2	11070	10070	10370		10.2	11070	10070	10370	10.2	11070	10070	10370	
	10.3	11071	10071	10371	10.3	11071	10071	10371		10.3	11071	10071	10371	10.3	11071	10071	10371	
	10.4	11072	10072	10372	10.4	11072	10072	10372		10.4	11072	10072	10372	10.4	11072	10072	10372	
	10.5	11073	10073	10373	10.5	11073	10073	10373		10.5	11073	10073	10373	10.5	11073	10073	10373	
	10.6	11074	10074	10374	10.6	11074	10074	10374		10.6	11074	10074	10374	10.6	11074	10074	10374	
	10.7	11075	10075	10375	10.7	11075	10075	10375		10.7	11075	10075	10375	10.7	11075	10075	10375	
	10.8	11076	10076	10376	10.8	11076	10076	10376		10.8	11076	10076	10376	10.8	11076	10076	10376	
	10.9	11077	10077	10377	10.9	11077	10077	10377		10.9	11077	10077	10377	10.9	11077	10077	10377	

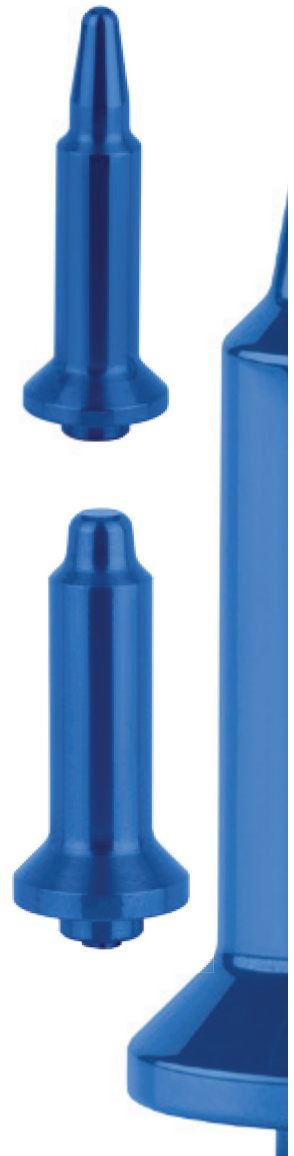
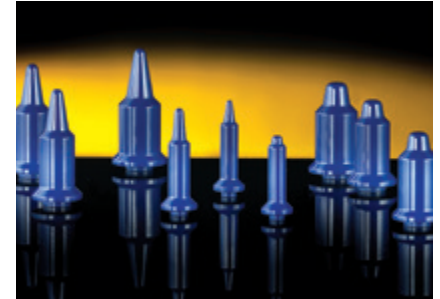
BASE ELECTRODES



	Standard Ø 24	Standard Ø 28	Cone 1:10	Cone MK2	Cone MK3
Length (L in mm)	Item No.	1111-ZK-	1111-ZK-	1111-ZK-	1111-ZK-
40	10512	10515	-	-	-
50	10513	10516	-	-	-
60	10514	10517	-	-	-
	-	-	10582	10542	10543



	Thread M18x1.5	S-type	R-type	T-type
Item No.	1111-ZK-	1111-ZK-	1111-ZK-	1111-ZK-
	10562	10682	10616	10642



Accessories for base electrodes

Springs

For base electrodes from 40 mm



	Spring M8
Length	Item No.
40 mm	1112-ZK-
	12206

O-rings



Compressed air connector



	O-rings M8
Ø (mm)	Item No.
24	1123-ZK-
28	16435
S-type	16436
	16435

	Compressed air connector 1/8-6
Item No.	1116-ZK-
	12353

PROJECTION WELD NUT M10

AIR-COOLED

Item number example
for a complete electrode



for sheet hole diameter
> 12.0 mm



Change electrode SW 30
> 1111-ZK-10176



Centring pin long, Cerazur
> 8228-ZK-10089



Spring for BE up to 40 mm
> 1112-ZK-12207

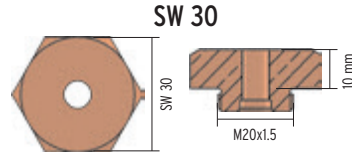


Base electrode standard Ø 28,
40 mm length
> 1111-ZK-10518



O-ring
> 1123-ZK-16436

Change electrodes

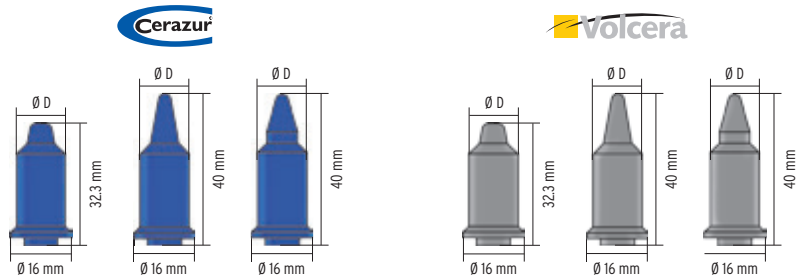


Ø sheet hole (mm)	SW 30	
	Item No.	1111-ZK-
	11.0	10166
	11.1	10167
	11.2	10168
	11.3	10169
	11.4	10170
	11.5	10171
	11.6	10172
	11.7	10173
	11.8	10174

SW 30	
1111-ZK-	
11.9	10175
12.0	10176
12.1	10177
12.2	10178
12.3	10179
12.4	10180
12.5	10181
12.6	10182
12.7	10183

SW 30	
1111-ZK-	
12.8	10184
12.9	10185
13.0	10186
13.1	10187
13.2	10188
13.3	10189
13.4	10190
13.5	10191
-	-

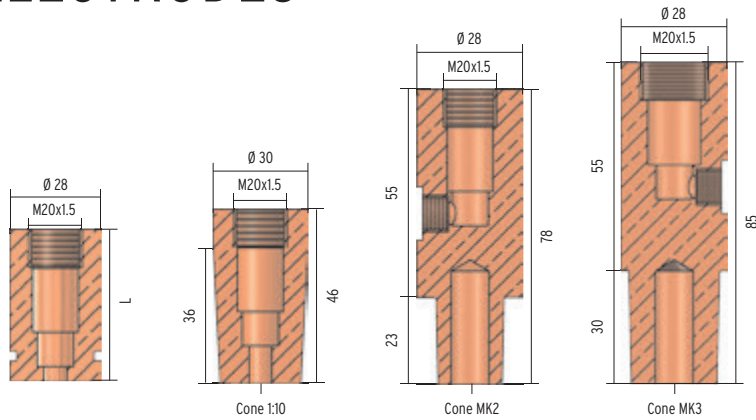
Centring pins



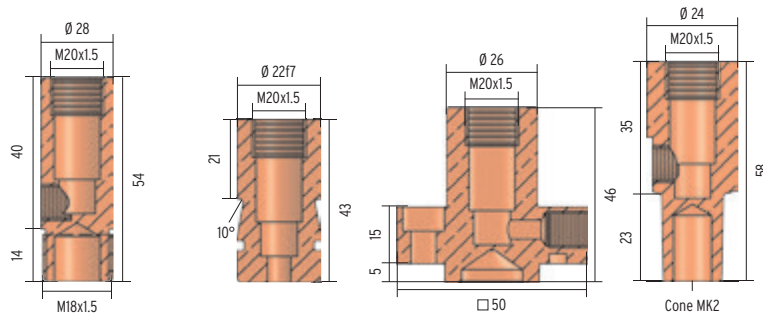
Ø sheet hole (mm)	Short		
	Item No.	8228-ZK-	8228-ZK-
	11.0	11079	10079
	11.1	11080	10080
	11.2	11081	10081
	11.3	11082	10082
	11.4	11083	10083
	11.5	11084	10084
	11.6	11085	10085
	11.7	11086	10086
	11.8	11087	10087
	11.9	11088	10088
	12.0	11089	10089
	12.1	11090	10090
	12.2	11091	10091
	12.3	11092	10092
	12.4	11093	10093
	12.5	11094	10094
	12.6	11095	10095
	12.7	11096	10096
	12.8	11097	10097
	12.9	11098	10098
	13.0	11099	10099

Long		
8440-ZK-		
11.0	11079	10079
11.1	11080	10080
11.2	11081	10081
11.3	11082	10082
11.4	11083	10083
11.5	11084	10084
11.6	11085	10085
11.7	11086	10086
11.8	11087	10087
11.9	11088	10088
12.0	11089	10089
12.1	11090	10090
12.2	11091	10091
12.3	11092	10092
12.4	11093	10093
12.5	11094	10094
12.6	11095	10095
12.7	11096	10096
12.8	11097	10097
12.9	11098	10098
13.0	11099	10099

BASE ELECTRODES



Length (L in mm)	Standard Ø 28		Cone 1:10		Cone MK2		Cone MK3	
	Item No.	1111-ZK-	1111-ZK-	1111-ZK-	1111-ZK-	1111-ZK-	1111-ZK-	1111-ZK-
	40	10518	-	-	-	-	-	-
	50	10518	-	-	-	-	-	-
	60	10520	-	-	-	-	-	-
		-	10583	10544	10545			



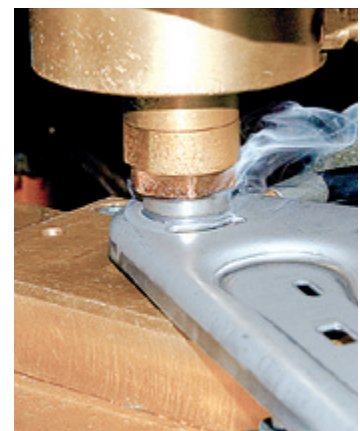
Item No.	Thread M18x1.5	S-type	R-type	T-type
	1111-ZK-	1111-ZK-	1111-ZK-	1111-ZK-
	10563	10683	10619	10644



Extremely durable



Extremely temperature-stable



Perfect welding results

Accessories for base electrodes

Springs

For base electrodes from 40 mm



Spring M10		
Length	Item No.	1112-ZK-
40 mm		12207

O-rings



O-rings M10		
Ø (mm)	Item No.	1123-ZK-
28		16436
S-type		16436

Compressed air connector



Compressed air connector 1/8-6		
Item No.	1116-ZK-	
	12353	

PROJECTION WELD NUT M12

AIR-COOLED

Item number example
for a complete electrode



for sheet hole diameter
> 14.4 mm



Change electrode SW 30
> 1111-ZK-10206



Centring pin long, Cerazur
> 8228-ZK-10114



Spring for BE up to 40 mm
> 1112-ZK-12207

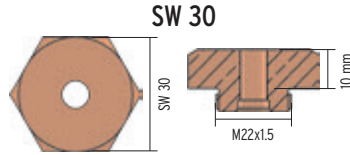


Base electrode standard Ø 28,
40 mm length
> 1111-ZK-10521



O-ring
> 1123-ZK-16436

Change electrodes

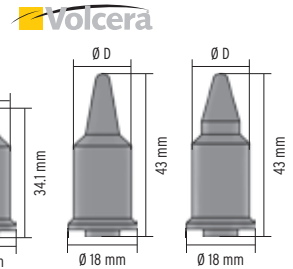
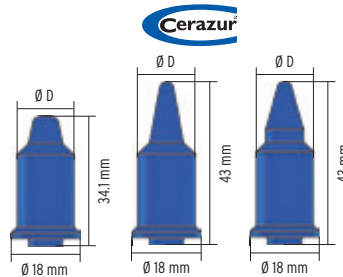


Ø sheet hole (mm)	SW 30	
	Item No.	1111-ZK-
	13.0	10192
	13.1	10193
	13.2	10194
	13.3	10195
	13.4	10196
	13.5	10197
	13.6	10198
	13.7	10199
	13.8	10200

SW 30	
1111-ZK-	
13.9	10201
14.0	10202
14.1	10203
14.2	10204
14.3	10205
14.4	10206
14.5	10207
14.6	10208
14.7	10209

SW 30	
1111-ZK-	
14.8	10210
14.9	10211
15.0	10212
15.1	10213
15.2	10214
15.3	10215
15.4	10216
15.5	10217
-	-

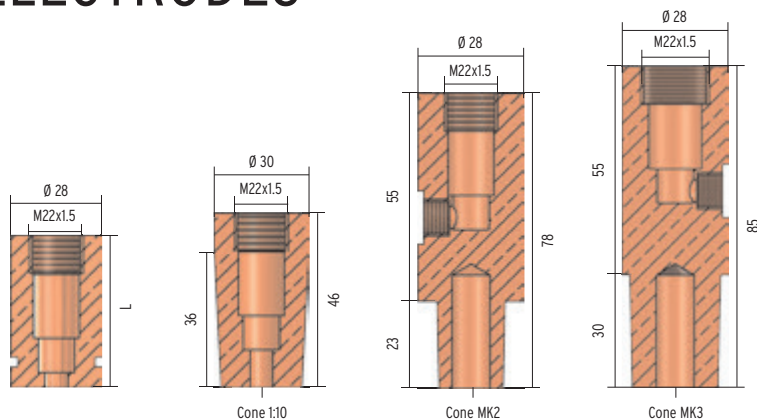
Centring pins



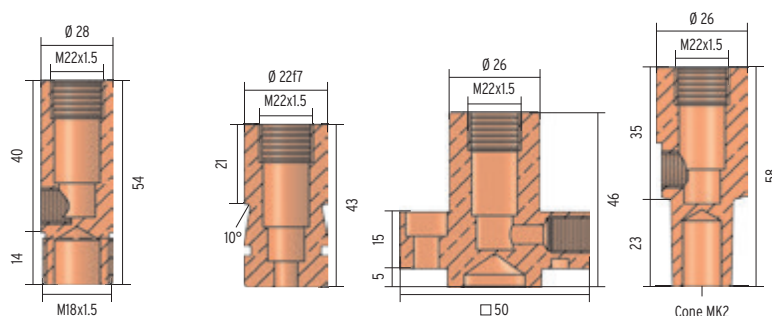
Ø sheet hole (mm)	Short		Long		With collar	
	Item No.	8228-ZK-	Item No.	8228-ZK-	Item No.	8228-ZK-
	13.0	11100	10100	10400	10400	10400
	13.1	11101	10101	10401	10401	10401
	13.2	11102	10102	10402	10402	10402
	13.3	11103	10103	10403	10403	10403
	13.4	11104	10104	10404	10404	10404
	13.5	11105	10105	10405	10405	10405
	13.6	11106	10106	10406	10406	10406
	13.7	11107	10107	10407	10407	10407
	13.8	11108	10108	10408	10408	10408
	13.9	11109	10109	10409	10409	10409
	14.0	11110	10110	10410	10410	10410
	14.1	11111	10111	10411	10411	10411
	14.2	11112	10112	10412	10412	10412
	14.3	11113	10113	10413	10413	10413
	14.4	11114	10114	10414	10414	10414
	14.5	11115	10115	10415	10415	10415
	14.6	11116	10116	10416	10416	10416
	14.7	11117	10117	10417	10417	10417
	14.8	11118	10118	10418	10418	10418
	14.9	11119	10119	10419	10419	10419
	15.0	11120	10120	10420	10420	10420

Short		Long		With collar	
8440-ZK-		8440-ZK-		8440-ZK-	
13.0	11100	10100	10400	10400	10400
13.1	11101	10101	10401	10401	10401
13.2	11102	10102	10402	10402	10402
13.3	11103	10103	10403	10403	10403
13.4	11104	10104	10404	10404	10404
13.5	11105	10105	10405	10405	10405
13.6	11106	10106	10406	10406	10406
13.7	11107	10107	10407	10407	10407
13.8	11108	10108	10408	10408	10408
13.9	11109	10109	10409	10409	10409
14.0	11110	10110	10410	10410	10410
14.1	11111	10111	10411	10411	10411
14.2	11112	10112	10412	10412	10412
14.3	11113	10113	10413	10413	10413
14.4	11114	10114	10414	10414	10414
14.5	11115	10115	10415	10415	10415
14.6	11116	10116	10416	10416	10416
14.7	11117	10117	10417	10417	10417
14.8	11118	10118	10418	10418	10418
14.9	11119	10119	10419	10419	10419
15.0	11120	10120	10420	10420	10420

BASE ELECTRODES

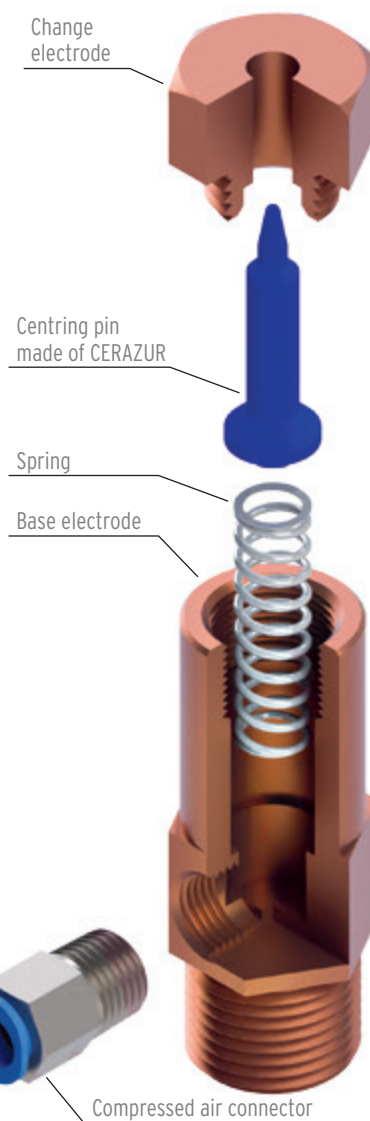


Length (L in mm)	Standard Ø 28		Cone 1:10		Cone MK2		Cone MK3	
	Item No.	1111-ZK-	1111-ZK-	1111-ZK-	1111-ZK-	1111-ZK-	1111-ZK-	1111-ZK-
	40	10521	-	-	-	-	-	-
	50	10522	-	-	-	-	-	-
	60	10523	-	-	-	-	-	-
		-	10583	10544	10545			



Item No.	Thread M18x1.5	S-type	R-type	T-type
	1111-ZK- 10564	1111-ZK- 10684	1111-ZK- 10622	1111-ZK- 10646

Air-cooled complete electrode for projection nut welding



Accessories for base electrodes

Springs

For base electrodes from 40 mm



Spring M12		
Length	Item No.	1112-ZK-
40 mm		12207

O-rings



O-rings M12		
Ø (mm)	Item No.	1123-ZK-
28		16436
S-type		16436

Compressed air connector



Compressed air connector 1/8-6		
Item No.	1116-ZK-	
	12353	

PROJECTION WELD NUT M4 TO M12

WATER-COOLED

Benefits from the water-cooled electrode

- > Direct heat dissipation due to central cooling in the hot area
- > Permanently ensuring the heat resistance
- > Compact design

Item number example
for a complete electrode



for sheet hole diameter
> 7.6 mm, M6



Change electrode SW 30
> 1111-ZK-20042



Centring pin long, Cerazur
> 8228-ZK-10043



Spring for BE up to 40 mm
> 1112-ZK-12206



Base electrode for cone MK2,
85 mm length
> 1111-ZK-20542



O-ring for BE
> 1123-ZK-16436 (2x)

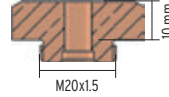
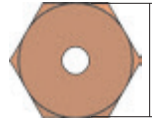


Cooling ring
> 1113-ZK-19766

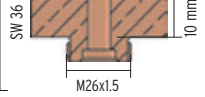
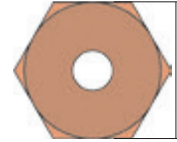


Change electrodes

SW 30



SW 36



	M4, M5		M6		M8		M10		M12	
	Item No.	1111-ZK-	Item No.	1111-ZK-	Item No.	1111-ZK-	Item No.	1111-ZK-	Item No.	1111-ZK-
Ø sheet hole (mm)	4.5	20000	6.5	20031	8.5	20104	11.0	20166	13.0	20192
	4.6	20001	6.6	20032	8.6	20105	11.1	20167	13.1	20193
	4.7	20002	6.7	20033	8.7	20106	11.2	20168	13.2	20194
	4.8	20003	6.8	20034	8.8	20107	11.3	20169	13.3	20195
	4.9	20004	6.9	20035	8.9	20108	11.4	20170	13.4	20196
	5.0	20005	7.0	20036	9.0	20109	11.5	20171	13.5	20197
	5.1	20006	7.1	20037	9.1	20110	11.6	20172	13.6	20198
	5.2	20007	7.2	20038	9.2	20111	11.7	20173	13.7	20199
	5.3	20008	7.3	20039	9.3	20112	11.8	20174	13.8	20200
	5.4	20009	7.4	20040	9.4	20113	11.9	20175	13.9	20201
	5.5	20010	7.5	20041	9.5	20114	12.0	20176	14.0	20202
	5.6	20011	7.6	20042	9.6	20115	12.1	20177	14.1	20203
	5.7	20012	7.7	20043	9.7	20116	12.2	20178	14.2	20204
	5.8	20013	7.8	20044	9.8	20117	12.3	20179	14.3	20205
	5.9	20014	7.9	20045	9.9	20118	12.4	20180	14.4	20206
	6.0	20015	8.0	20046	10.0	20119	12.5	20181	14.5	20207
	6.1	20016	8.1	20047	10.1	20120	12.6	20182	14.6	20208
	6.2	20017	8.2	20048	10.2	20121	12.7	20183	14.7	20209
	6.3	20018	8.3	20049	10.3	20122	12.8	20184	14.8	20210
	6.4	20019	8.4	20050	10.4	20123	12.9	20185	14.9	20211
	6.5	20020	8.5	20051	10.5	20124	13.0	20186	15.0	20212
	6.6	20021	8.6	20052	10.6	20125	13.1	20187	15.1	20213
	6.7	20022	8.7	20053	10.7	20126	13.2	20188	15.2	20214
	6.8	20023	8.8	20054	10.8	20127	13.3	20189	15.3	20215
	6.9	20024	8.9	20055	10.9	20128	13.4	20190	15.4	20216
	7.0	20025	9.0	20056	11.0	20129	13.5	20191	15.5	20217
	7.1	20026	-	-	11.1	20130	-	-	-	-
	7.2	20027	-	-	11.2	20131	-	-	-	-
	7.3	20028	-	-	11.3	20132	-	-	-	-
	7.4	20029	-	-	11.4	20133	-	-	-	-
	7.5	20030	-	-	11.5	20134	-	-	-	-

Accessories for base electrodes

Springs

For base electrodes up to 30 mm and base electrodes from 40 mm



	M4		M5		M6		M8		M10		M12	
	Item No.	1112-ZK-	Item No.	1112-ZK-	Item No.	1112-ZK-	Item No.	1112-ZK-	Item No.	1112-ZK-	Item No.	1112-ZK-
Length	up to 30 mm	12205	12205	-	-	-	-	-	-	-	-	-
	from 40 mm	12204	12204	12206	12206	12207	12207	12207	12207	12207	12207	12207

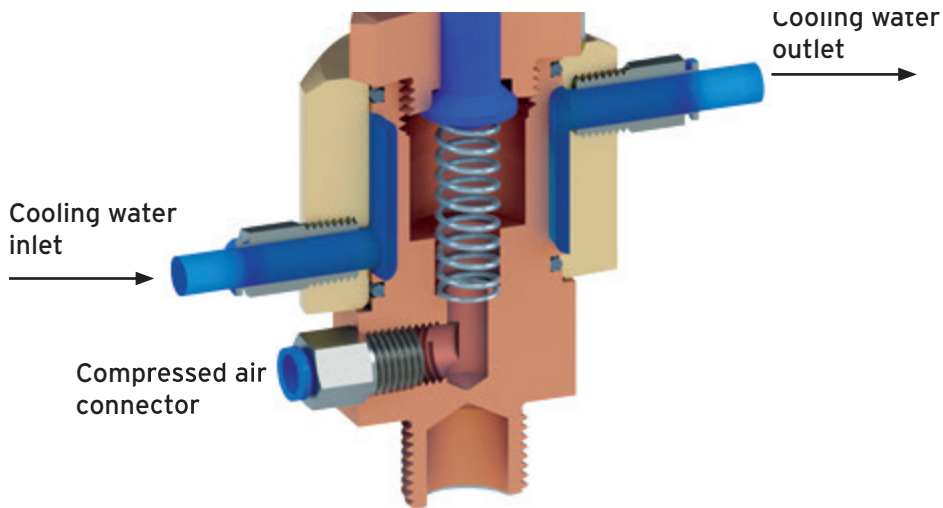
O-rings for base electrodes



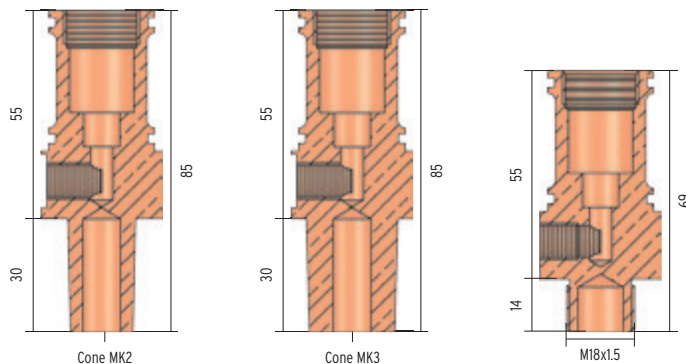
Compressed air connector



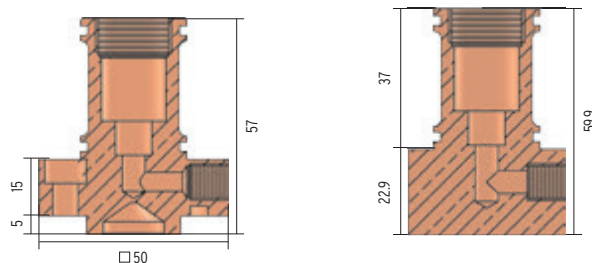
O-rings M4 to M12				Compressed air connector 1/8-6			
Item No.	1123-ZK-	Item No.	1116-ZK-	Item No.	1116-ZK-	Item No.	1116-ZK-



BASE ELECTRODES



	Cone MK2	Cone MK3	Thread M18x1.5
Item No.	1111-ZK-	1111-ZK-	1111-ZK-
M4, M5, M6, M8	20542	20543	20562
M10, M12	20544	20545	20563

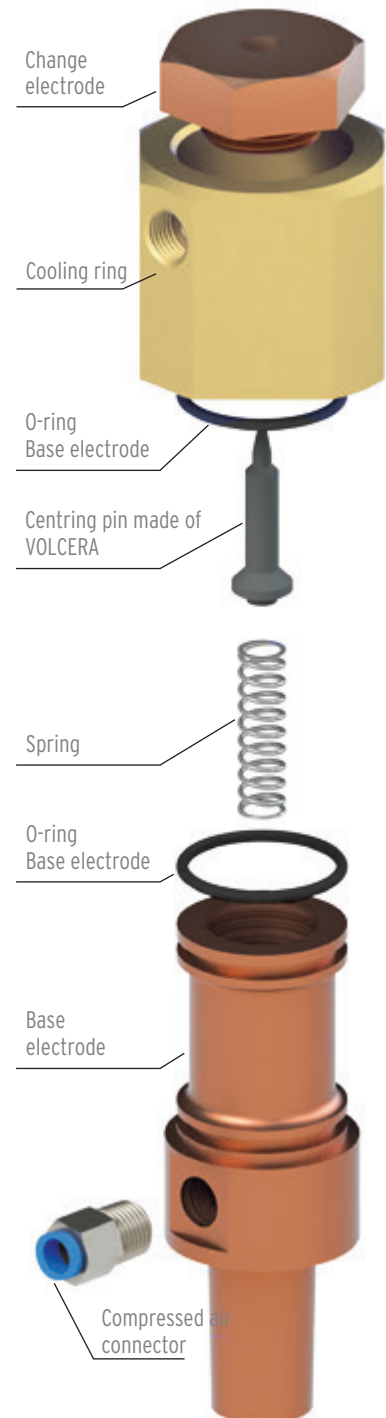


	R-type	C-type
Item No.	1111-ZK-	1111-ZK-
M4, M5, M6, M8	20642	20662
M10, M12	10644	10663

Cooling ring

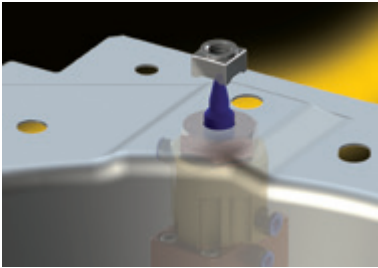


	Cooling ring		
Item No.	1113-ZK-	1113-ZK-	1113-ZK-
M4 to M8	19766	M10, M12	19767
C-type M4 to M8	19766	C-type M10 to M12	19769



DOCERAM

SOLUTION FOR PERFECT CENTRING



We only require very few details from you. Based on this information we can put the suitable complete electrode together for you.

What we need is:

- > Sheet hole diameter
- > Nut size (nominal thread size)
- > Pin shape

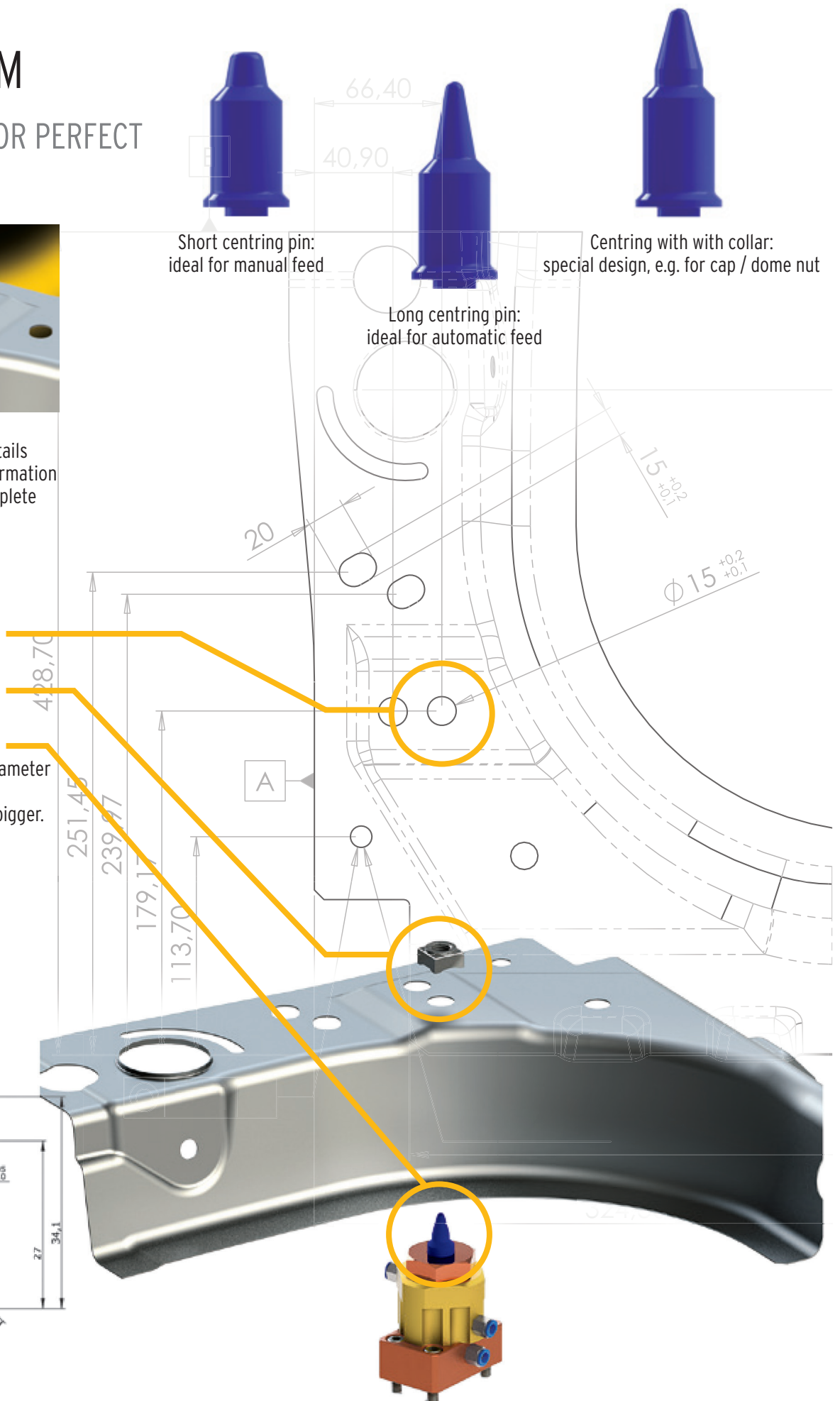
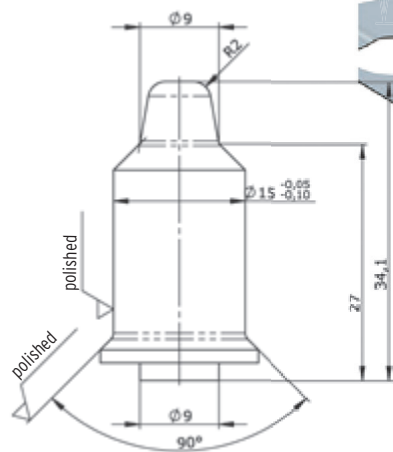
In general, the sheet hole diameter has a plus tolerance, i.e. the bore would become bigger.

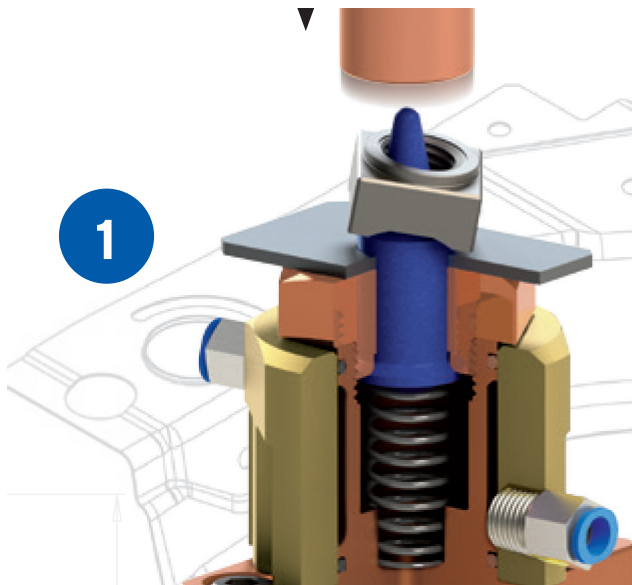
Our pins have a minus tolerance, i.e. the pin will always fit in the bore.

Short centring pin:
ideal for manual feed

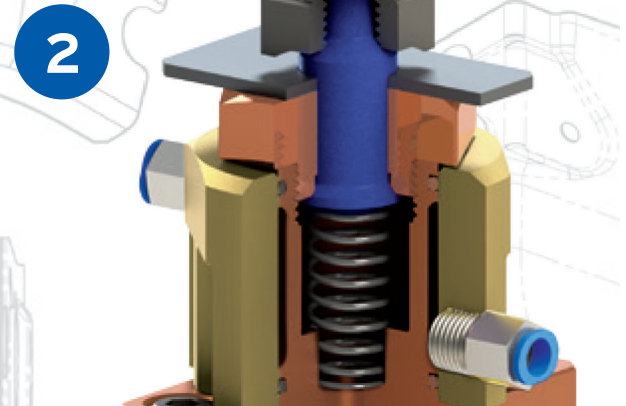
Long centring pin:
ideal for automatic feed

Centring with with collar:
special design, e.g. for cap / dome nut

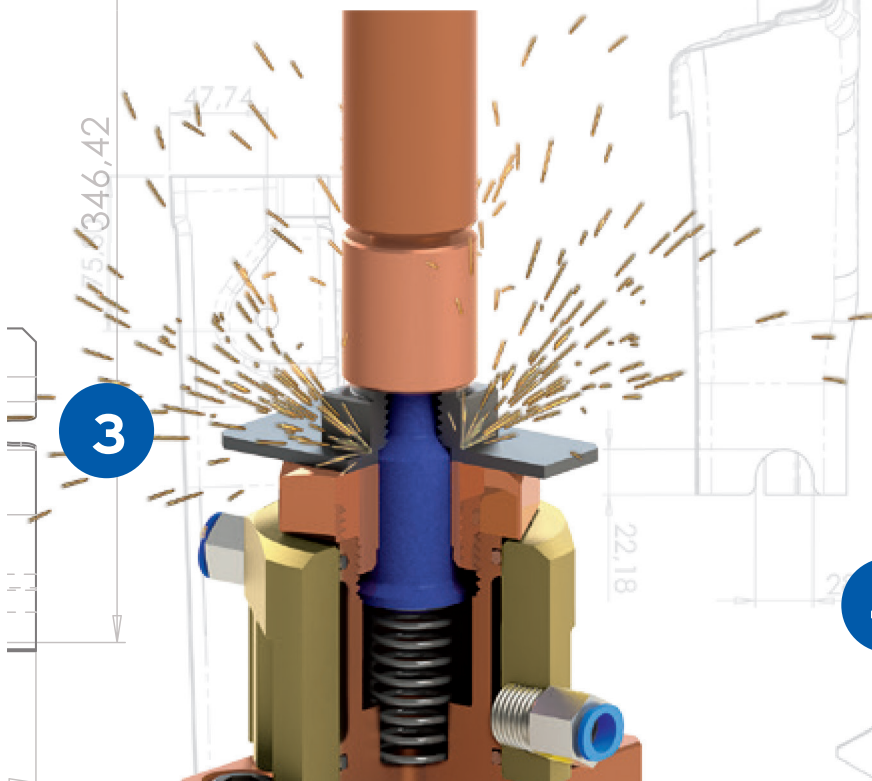




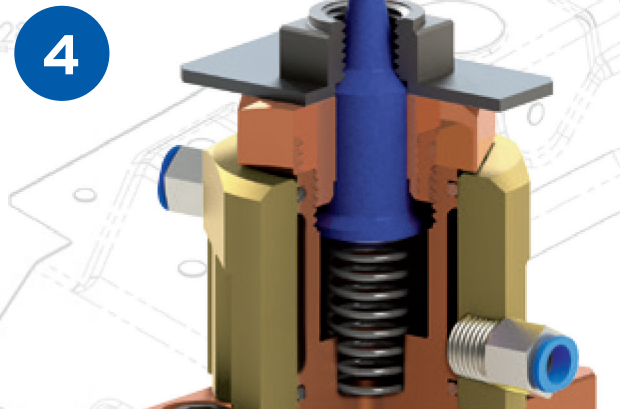
1
The centring pin loosely picks up the projection weld nut. The top electrode is lowered towards the sheet or panel.



2
The top electrode grips the projection weld nut and pushes it onto the sheet in a perfectly centred position.



3
The welding process is triggered and the compressed air blows the weld spatter away from the centre.



4
The top electrode moves upwards. A perfect welding result.

STUDS M4 TO M12

M4, M5, M6

AIR-COOLED

Item number example
for a complete electrode



For threaded studs
> M4



Change electrode SW 24
> 1111-ZK-13000



Centring sleeve, Volcera
> 8440-ZK-13000

DOGLAS insert
> 1115-ZK-12000

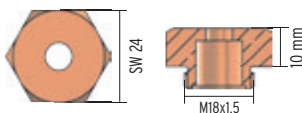


O-ring for stud insert
> 1123-ZK-16437



Base electrode
M18x1.5
> 1111-ZK-10562

Change electrodes



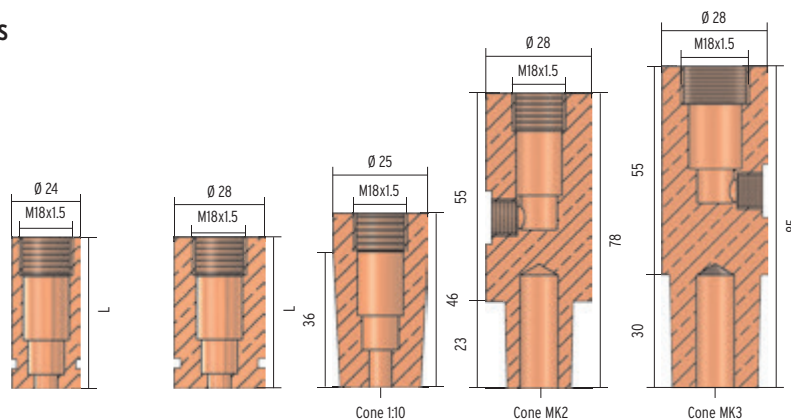
Screw thread	SW 24	
	Item No.	1111-ZK-
	M4	13000
	M5	13001
	M6	13002

Centring sleeves

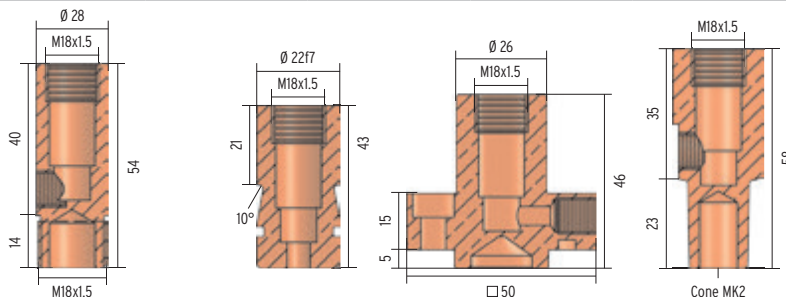


Screw thread	Centring sleeve		
	Item No.	8440-ZK-	8210-ZK-
	M4	13000	13000
	M5	13001	13001
	M6	13002	13002

Base electrodes



Length (L in mm)	Standard Ø 24		Standard Ø 28	Cone 1:10	Cone MK2	Cone MK3
	Item No.	1111-ZK-	1111-ZK-	1111-ZK-	1111-ZK-	1111-ZK-
40		10512	10515	-	-	-
50		10513	10516	-	-	-
60		10514	10517	-	-	-
		-		10582	10542	10543



Thread M18x1.5		S-type	R-type	T-type
Item No.	1111-ZK-	1111-ZK-	1111-ZK-	1111-ZK-
	10562	10682	10616	10642

Accessories

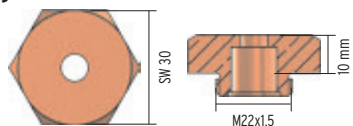
DOGLAS
insulating insert



	M4	M5	M6	M8	M10	M12
$\varnothing D$ (mm)	Item No.	1115-ZK-	1115-ZK-	1115-ZK-	1115-ZK-	1115-ZK-
	13.8	12000	12001	12002	-	-
	18.8	-	-	-	12003	12004 12005

M8, M10, M12

Change electrodes



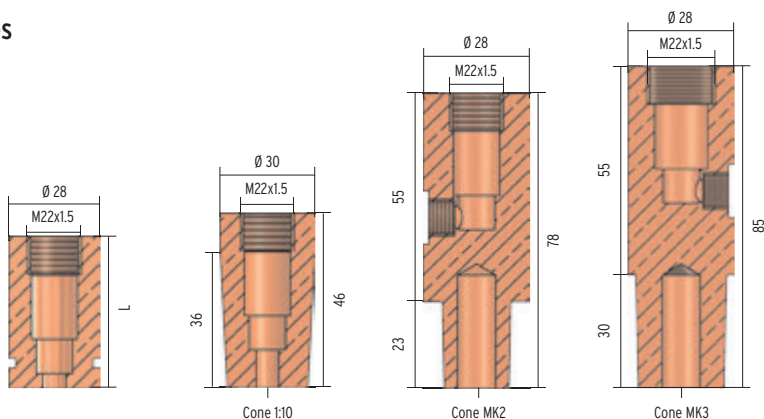
Screw thread	SW 30	
	Item No.	1111-ZK-
	M8	13003
	M10	13004
	M12	13005

Centring sleeves

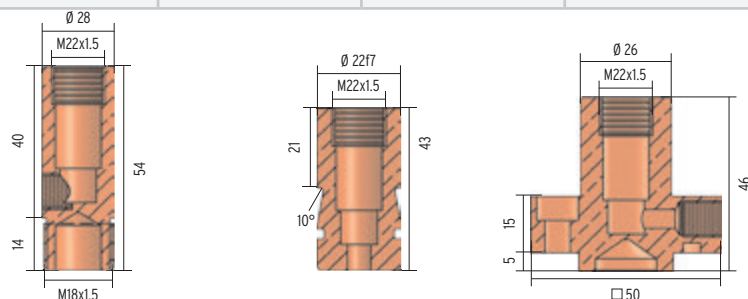


Screw thread	Centring sleeve		
	Item No.	8440-ZK-	8210-ZK-
	M8	13003	13003
	M10	13004	13004
	M12	13005	13005

Base electrodes



Length (L in mm)	Standard Ø 28			
	Item No.	1111-ZK-	1111-ZK-	1111-ZK-
	40	10521	-	-
	50	10522	-	-
	60	10523	-	-



Item No.	Thread M18x1.5	S-type	R-type
	1111-ZK- 10564	1111-ZK- 10684	1111-ZK- 10622

Compressed air connector



Compressed air connector 1/8-6	
Item No.	1116-ZK- 12353

O-rings for base electrode



O-rings for base electrodes	
Ø (mm)	Item No.
24	1123-ZK- 16435
28	16436

O-rings for stud insert

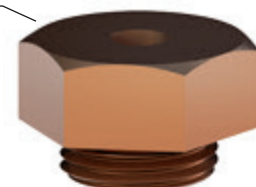


O-rings for stud insert	
Ø (mm)	Item No.
M4 to M6	1123-ZK- 16437
M8 to M12	16438

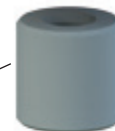


Perfect stud and sheet centring with a sleeve made of VOLCERA

Change electrode



Centring sleeve made of VOLCERA



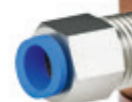
Insert made of DOGLAS



O-ring Stud insert



Compressed air connector (optional)



Air-cooled complete electrode for stud welding

STUDS M4 TO M12

WATER-COOLED

Item number example
for a complete electrode



For threaded studs
> M6



Change electrode SW 30
> 1111-ZK-22002



Centring sleeve, Volcera
> 8440-ZK-13002



DOGLAS insert
> 1115-ZK-13002



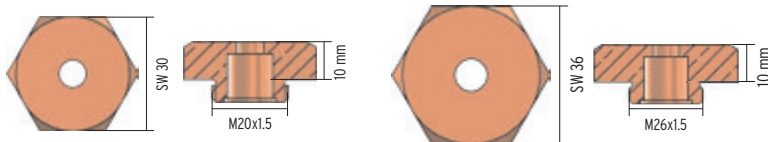
O-ring for stud insert
> 1123-ZK-16437



Base electrode for MK2
fixing
> 1111-ZK-20542



Change electrodes



	SW30		SW36	
	Item No.	1111-ZK-	Item No.	1111-ZK-
Diameter	M4	22000		-
	M5	22001		-
	M6	22002		-
	M8	-		22003
	M10	-		22004
	M12	-		22005

Centring sleeves



	Centring sleeve		
	Item No.	8440-ZK-	8210-ZK-
Screw thread	M4	13000	13000
	M5	13001	13001
	M6	13002	13002
	M8	13003	13003
	M10	13004	13004
	M12	13005	13005

Accessories

DOGLAS insulating insert



Ø D (mm)	M4		M5		M6		M8		M10		M12	
	Item No.	1115-ZK-	Item No.	1115-ZK-	Item No.	1115-ZK-	Item No.	1115-ZK-	Item No.	1115-ZK-	Item No.	1115-ZK-
16.8		13000		13001		13002		-		-		-
22.8		-		-		-		13003		13004		13005

O-rings for base electrode



O-rings for base electrodes		
Ø (mm)	Item No.	1123-ZK-
28		16436
34		26187

O-rings for stud insert



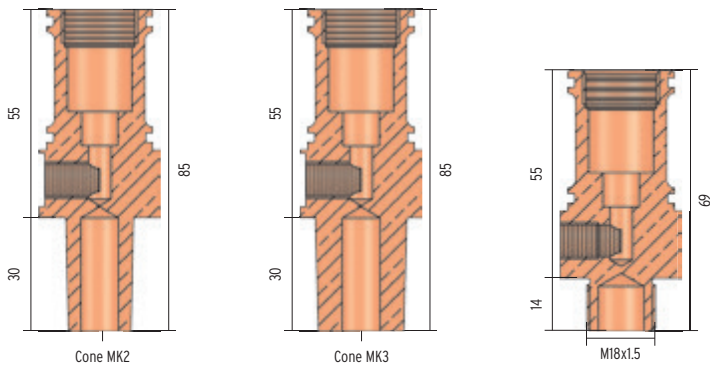
O-rings for stud insert		
Ø (mm)	Item No.	1123-ZK-
M4 to M6		16437
M8 to M12		16438

Compressed air connector

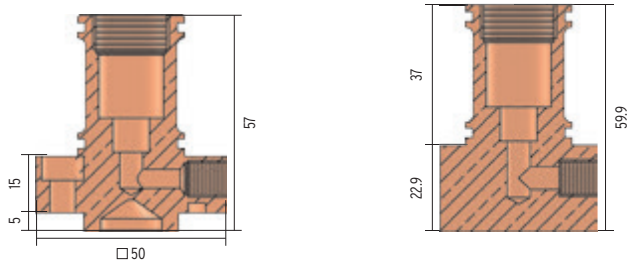


Compressed air connector 1/8-6	
Item No.	1116-ZK-
	12353

Base electrodes



Diameter	Cone MK2		Cone MK3		Thread M18x1.5	
	Item No.	1111-ZK-	1111-ZK-	1111-ZK-	1111-ZK-	1111-ZK-
	M4, M5, M6	20542	20543	20543	20562	20562
	M8, M10, M12	20544	20545	20545	20563	20563



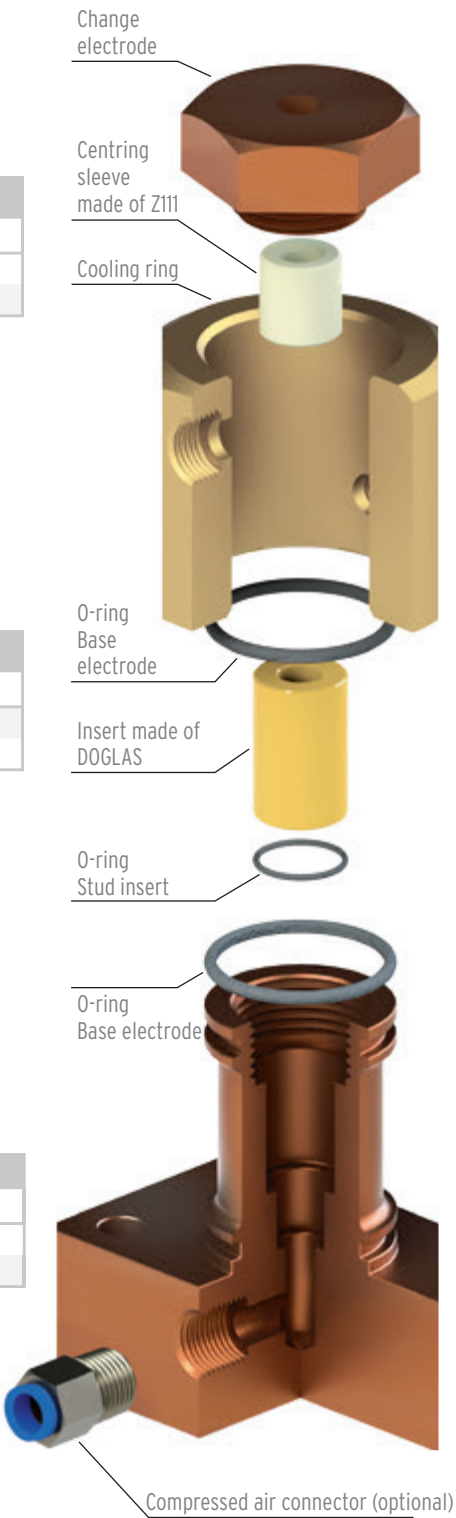
Diameter	R-type		C-type	
	Item No.	1111-ZK-	1111-ZK-	1111-ZK-
	M4, M5, M6	20642	20662	20662
	M8, M10, M12	20644	20663	20663

Cooling ring



Screw thread	Cooling ring			
	Item No.	1113-ZK-	1113-ZK-	1113-ZK-
	M4 to M6	19766	M8 to M12	19767
	C-type M4 to M6	19766	C-type M8 to M12	19769

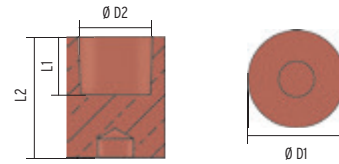
Perfect stud and sheet centring with a sleeve made of VOLCERA



TOP ELECTRODES

WELDING

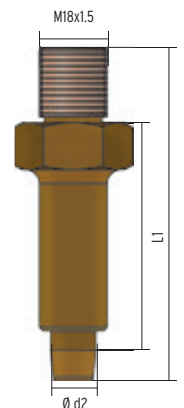
Caps



	(mm)				Item No.	
	Ø D1 (in mm)	Ø D2	L2	L1	For nut	1111-ZK-
	13.0	10.0	18.0	8.0	M6	30000
	13.0	10.0	18.0	8.0	M8	30001
	13.0	10.0	18.0	8.0	M10	30002
	16.0	12.0	20.0	9.5	M6	30003
	16.0	12.0	20.0	9.5	M8	30004
	16.0	12.0	20.0	9.5	M10	30005
	16.0	12.0	20.0	9.5	M12	30006
	20.0	15.0	22.0	11.5	M6	30007
	20.0	15.0	22.0	11.5	M8	30008
	20.0	15.0	22.0	11.5	M10	30009
	20.0	15.0	22.0	11.5	M12	30010

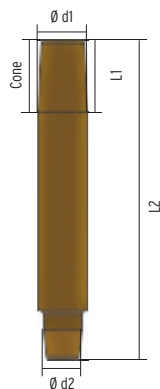
Screw shafts with through-hole Ø 16 mm caps

	(mm)			Item No.	
	Length L2 (in mm)	L1	Ø d2	1111-ZK-	
	48	20	12	31018	
	58	30	12	31019	
	68	40	12	31020	
	78	50	12	31021	
	88	60	12	31022	
	98	70	12	31023	
	108	80	12	31024	
	118	90	12	31025	
	128	100	12	31026	
	138	110	12	31027	
	148	120	12	31028	
	158	130	12	31029	
	168	140	12	31030	
	178	150	12	31031	



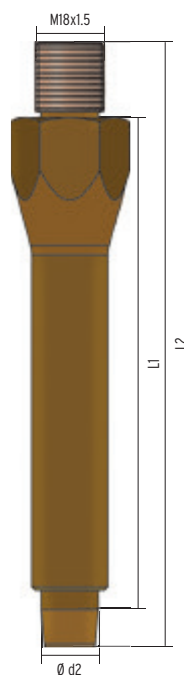
Cone shafts with through-hole

	(mm)		(mm)		Item No.	
	L1	Cone	Ø d1	Ø d2	1111-ZK-	
Length L2 (in mm)	36.0	16	1:10	13	10	31000
	44.5	16	1:10	13	10	31001
	54.5	16	1:10	13	10	31002
	67.5	16	1:10	13	10	31003
	84.5	16	1:10	13	10	31004
	104.5	16	1:10	13	10	31005
	129.5	16	1:10	13	10	31006
	48.0	20	1:10	16	12	31007
	58.0	20	1:10	16	12	31008
	71.0	20	1:10	16	12	31009
	88.0	20	1:10	16	12	31010
	108	20	1:10	16	12	31011
	133	20	1:10	16	12	31012
	168	20	1:10	16	12	31013
	53.5	15	MK1	12.5	10	31014
	73.5	15	MK1	12.5	10	31015
	56.0	18	MK2	–	12	31016
	76.0	18	MK2	–	12	31017



Screw shafts with through-hole Ø 20 mm caps

Length L2 (in mm)	(mm)			Item No.
	L1		Ø d2	1111-ZK-
	50	20	15	31032
	60	30	15	31033
	70	40	15	31034
	80	50	15	31035
	90	60	15	31036
	100	70	15	31037
	110	80	15	31038
	120	90	15	31039
	130	100	15	31040
	140	110	15	31041
	150	120	15	31042
	160	130	15	31043
	170	140	15	31044
	180	150	15	31045



DOWEL PINS

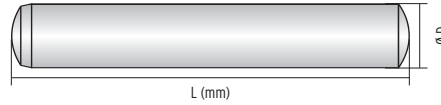
FIXTURE CONSTRUCTION

Item number example
for dowels:

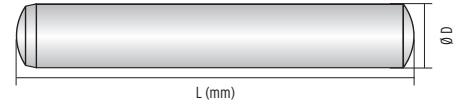
Dowel (tolerance h6)
with diameter 5 mm
and 16 mm length
> 8221-ZK-14059

Dowel pins for fixture construction
made of Z101 high-performance ceramic

Z101

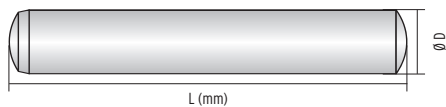


Tolerance h6
as per DIN 6325



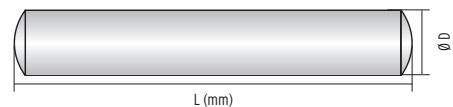
Tolerance m5
as per DIN 6325

	L h6			L h6				L m5			L m5		
	Item No.		8221-ZK-	8221-ZK-				Item No.		8221-ZK-	8221-ZK-		
	1.5	5	14012		24	14073		1.5	5	15012		24	15073
Diameter (mm)	2.0	6	14019		28	14074		2.0	6	15019		28	15074
		10	14021		32	14075			10	15021		32	15075
		12	14022		36	14076			12	15022		36	15076
		14	14023		40	14077			14	15023		40	15077
		10	14037		50	14079		3.0	10	15037		50	15079
	3.0	12	14038		60	14081			12	15038		60	15081
		14	14039	8.0	18	14082			14	15039	8.0	18	15082
		20	14042		20	14083			20	15042		20	15083
		28	14044		24	14084			28	15044		24	15084
		10	14046		32	14086		4.0	10	15046		32	15086
	4.0	12	14047		40	14088			12	15047		40	15088
		16	14049		50	14090			16	15049		50	15090
		18	14050		60	14092			18	15050		60	15092
		20	14051		70	14093			20	15051		70	15093
		28	14053	10.0	24	14095			28	15053	10.0	24	15095
	5.0	32	14054		32	14097			32	15054		32	15097
		16	14059		40	14099		5.0	16	15059		40	15099
		18	14060		50	14101			18	15060		50	15101
		20	14061		60	14103			20	15061		60	15103
		24	14062		70	14104			24	15062		70	15104
	6.0	28	14063		90	14106			28	15063		90	15106
		32	14064	12.0	28	14108			32	15064	12.0	28	15108
		36	14065		40	14111			36	15065		40	15111
		14	14069		60	14115		6.0	14	15069		60	15115
		18	14071	14.0	40	14121			18	15071	14.0	40	15121
		20	14072	-	-	-			20	15072	-	-	-



Tolerance m6
as per DIN 6325

Diameter (mm)	L m6		L m6	
	Item No.	8221-ZK-	8221-ZK-	
1.5	5	13012	24	13073
	6	13014	28	13074
	10	13015	32	13075
	2.0	6	36	13076
2.0	10	13021	40	13077
	12	13022	50	13079
	14	13023	60	13081
	3.0	10	8.0	18
3.0	12	13038	20	13083
	14	13039	24	13084
	18	13041	32	13086
	20	13042	40	13088
4.0	28	13044	50	13090
	32	13045	60	13092
	10	13046	70	13093
	12	13047	10.0	24
5.0	16	13049	32	13097
	18	13050	40	13099
	20	13051	50	13101
	24	13052	60	13103
6.0	28	13053	70	13104
	32	13054	90	13106
	16	13059	12.0	28
	18	13060	40	13111
7.0	20	13061	60	13115
	24	13062	14.0	40
	28	13063	-	-
	32	13064	-	-
8.0	36	13065	-	-
	14	13069	-	-
	18	13071	-	-
	20	13072	-	-



Tolerance m6
as per ISO 2338

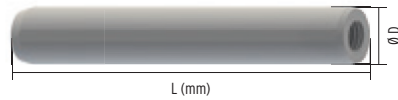
Diameter (mm)	L m6		L m6	
	Item No.	8221-ZK-	8221-ZK-	
1.5	5	16012	24	16073
	2.0	6	28	16074
	10	16021	32	16075
	12	16022	36	16076
2.0	14	16023	40	16077
	3.0	10	50	16079
	12	16038	60	16081
	14	16039	8.0	18
3.0	20	16042	20	16083
	28	16044	24	16084
	4.0	10	32	16086
	12	16047	40	16088
4.0	16	16049	50	16090
	18	16050	60	16092
	20	16051	70	16093
	28	16053	10.0	24
5.0	32	16054	32	16097
	16	16059	40	16099
	18	16060	50	16101
	20	16061	60	16103
6.0	24	16062	70	16104
	28	16063	90	16106
	32	16064	12.0	28
	36	16065	40	16111
7.0	14	16069	60	16115
	18	16071	14.0	40
	20	16072	-	-
	-	-	-	-

PULL DOWEL PINS

FIXTURE CONSTRUCTION

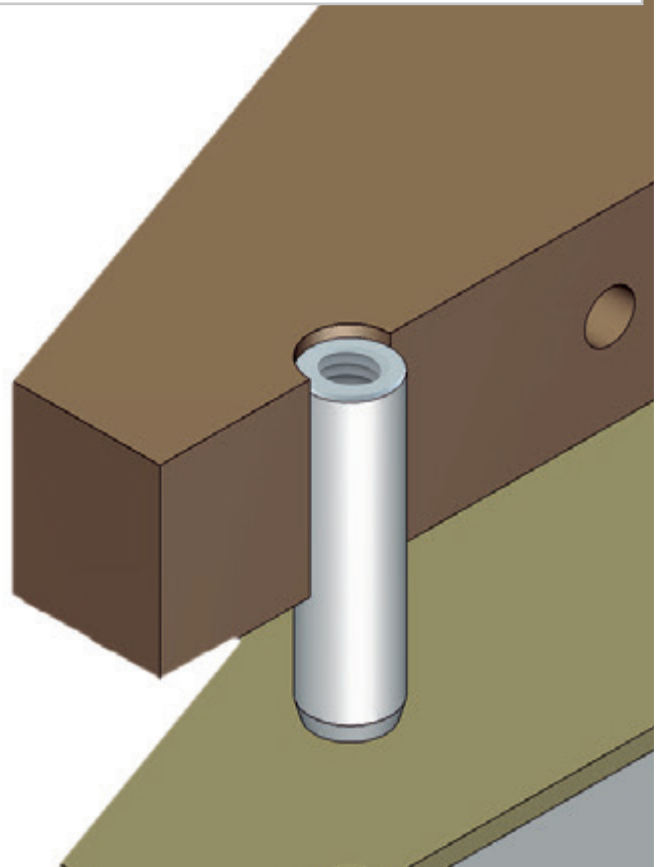
Dowel pins for fixture construction
made of high-performance ceramic

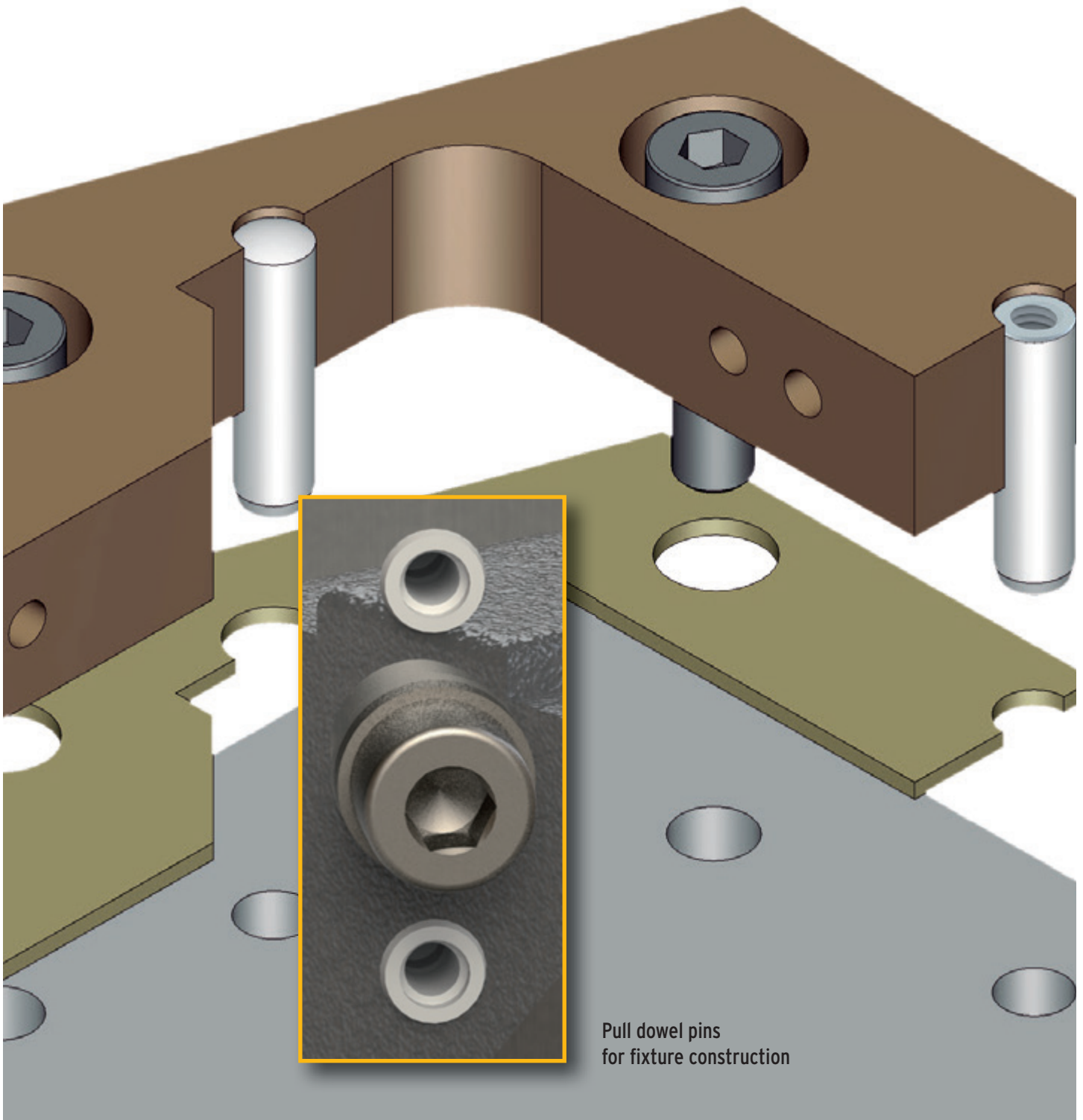
ZIOL



Tolerance m6
as per DIN 7979-D

		Ø 6.0	Ø 8.0	Ø 10.0	Ø 12.0	Ø 14.0
Length (mm)	Item No.	8221-ZK-	8221-ZK-	8221-ZK-	8221-ZK-	8221-ZK-
	14	23069	-	-	-	-
	18	23071	23082	-	-	-
	20	23072	23083	-	-	-
	24	23073	23084	-	-	-
	28	23074	-	-	23108	-
	32	23075	23086	-	-	-
	36	23076	-	-	-	-
	40	23077	23088	-	23111	23121
	50	23079	23090	-	-	-
	60	23081	23092	-	23115	-
	70	-	23093	-	-	-
	90	-	-	-	-	-

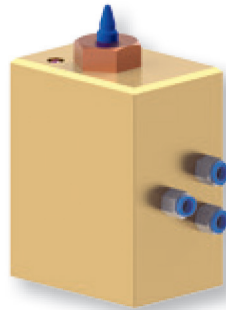




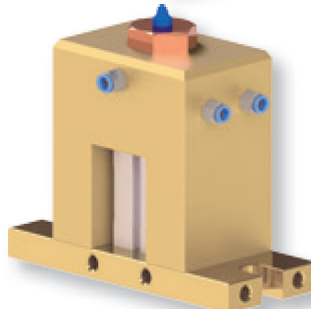
Pull dowel pins
for fixture construction

STANDARD WELDING FIXTURES

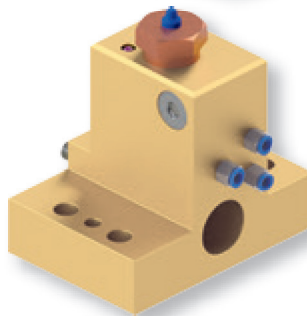
MODULAR VARIANTS



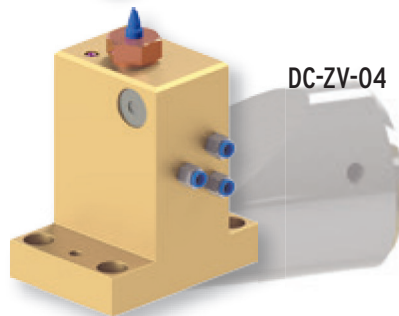
DC-ZV-01



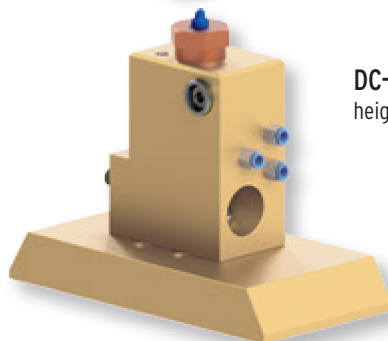
DC-ZV-02
pull version



DC-ZV-03
height-adjustable



DC-ZV-04



DC-ZV-05
height-adjustable

DOCERAM® offers the complete standard range for resistance welding technology.

Can be freely combined due the flexible modular system.

Available for all international automotive standards.

Quote by Tobias Lange (Application Engineer of DOCERAM® GmbH):

"This is unsurpassed with regard to flexibility and speed! All parts and components are available from stock and can be freely combined."

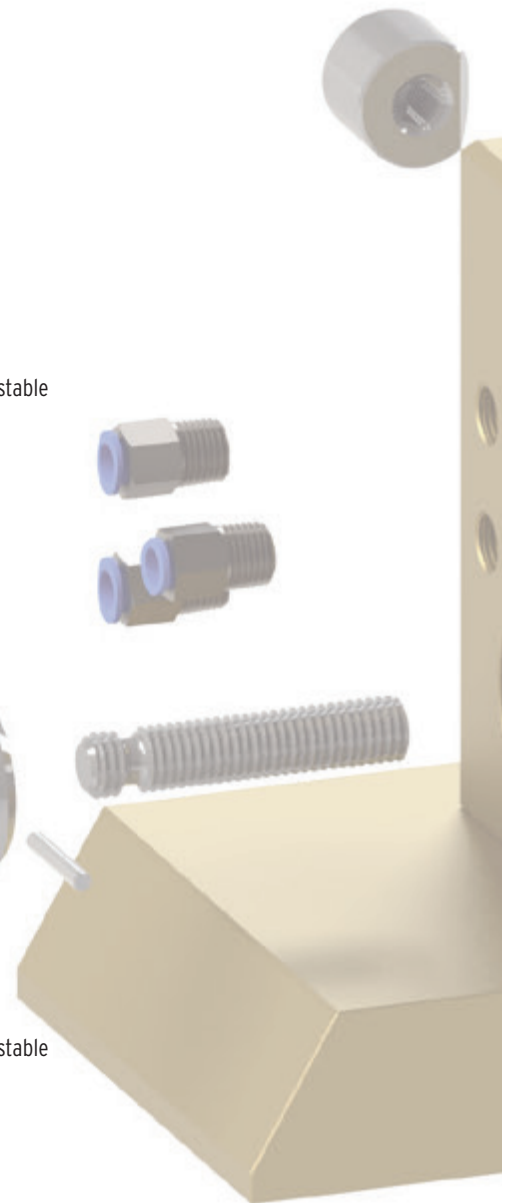
The comprehensive standard range includes:

- > Welding centring pins
- > Complete electrodes
- > Complete welding devices
- > Positioning pins
- > Dowel pins
- > Screw head insulation
- > MIG/MAG gas nozzles

Individual solutions can be supplied at short notice.

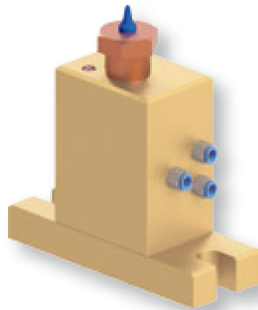
Your benefits include:

- > No need for new designs
- > Plug & Play solution due to 3D data
- > Quick operational readiness on site
- > Safe process based on our many years of experience

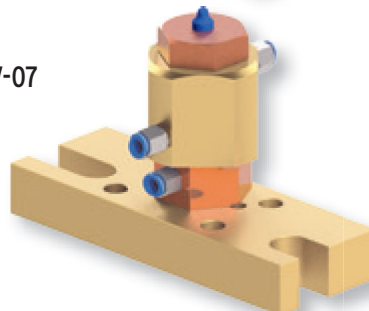




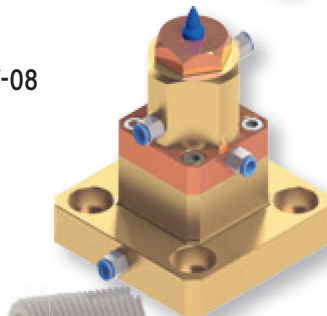
DC-ZV-06



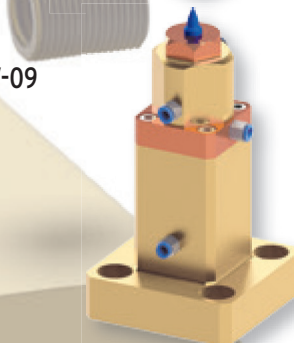
DC-ZV-07



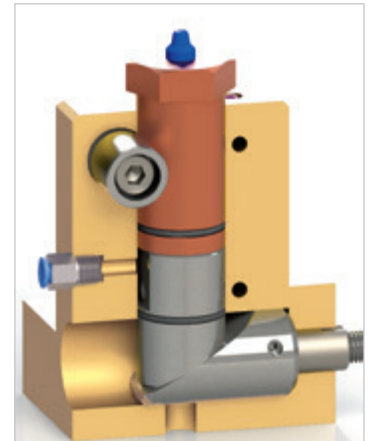
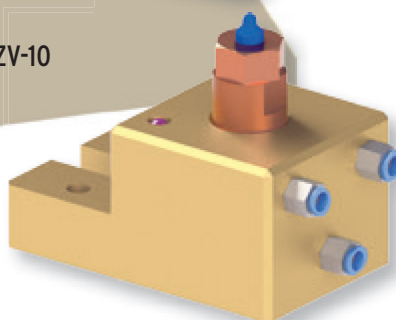
DC-ZV-08



DC-ZV-09



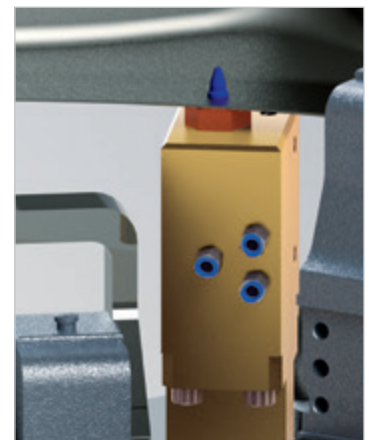
DC-ZV-10



The special case...



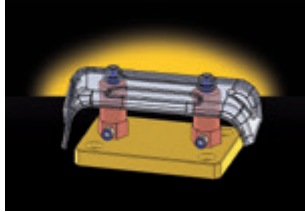
...is what we deal with every day.



Standard welding device in use for resistance welding

YOUR VISION

OUR IMPLEMENTATION



**Your vision -
our implementation**

Due to its multi-functional aspects, the innovative high-performance ceramic could soon be used in your company.

Our development engineers and application technicians are ideally placed to develop the right solution for you.

The production sequences are prepared and planned down to the last detail by our development engineers and application technicians.



> **Your virtual product is created**

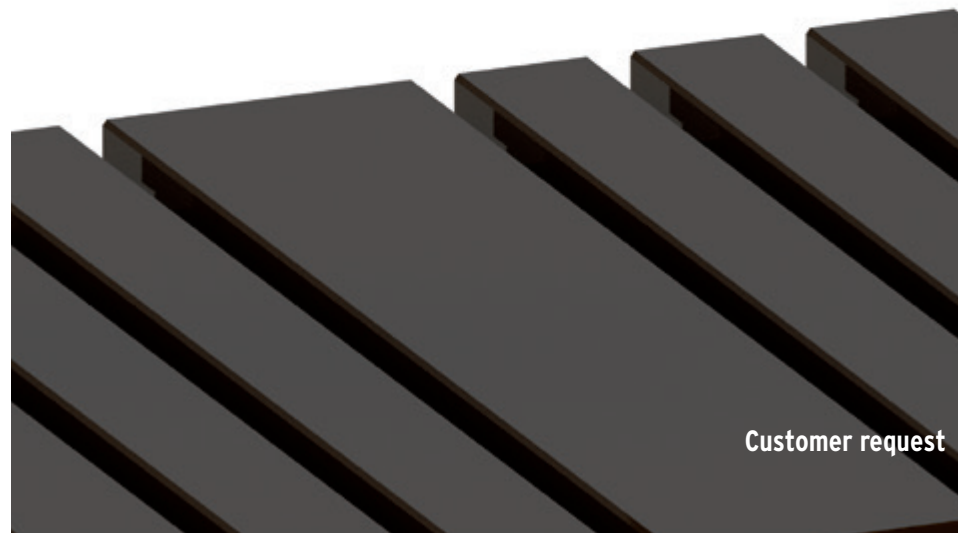
Our highly motivated team of application engineers uses the initial contact with you to clarify the implementability of your requirements parameters with regard to efficiency, cost and deadline.

> **Your product is taking shape**

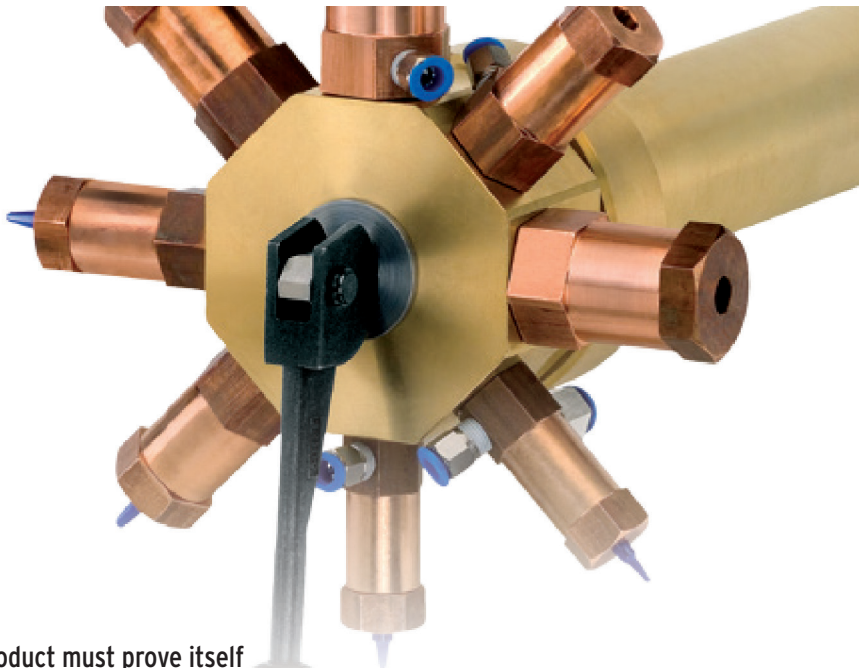
We develop a solution together with you according to your specifications and based on CAD data. Then we will present you with a drawing and/or 3D CAD file, which you can use to review the solution during your development process.

> **Your product is manufactured**

After the material and fixing have been selected and the sizes have been determined subject to all operational parameters, the prototype is made into a mature series part that is destined for the perfect fit in your production lines.



Customer request



> **Your product must prove itself**

The in-process quality control includes a 100% check and individual part documentation with regard to the material properties, surface finish, dimensional accuracy and stress resistance as well as guaranteeing reproducible quality.

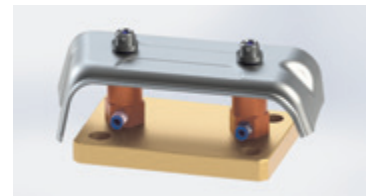
> **Your product is ready for use**

Your product, which has been manufactured according to your specifications, will quickly find its place in your production lines and ensure high-precision sequences and long production cycles subject to very small tolerances.

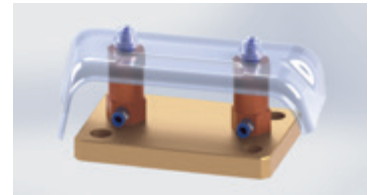
For car manufacturers and suppliers, mechanical and plant engineering, and soon you might want it as well!



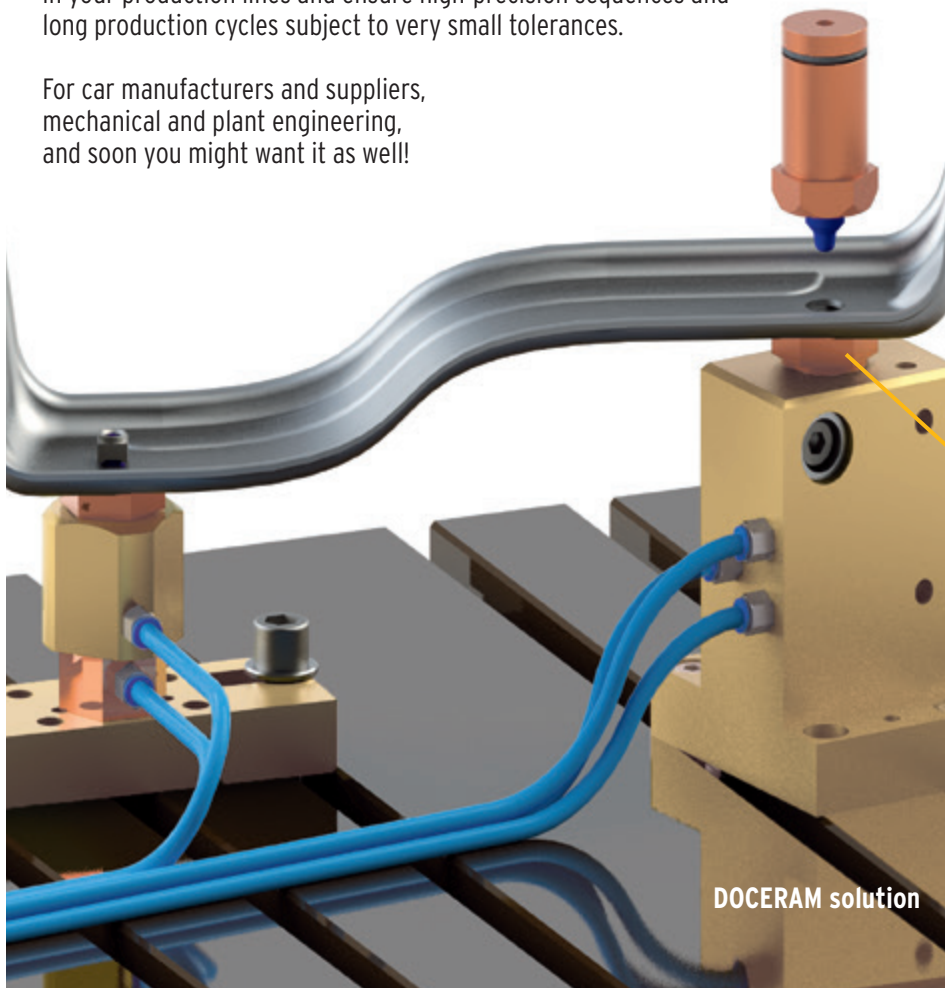
Customer-specific component request



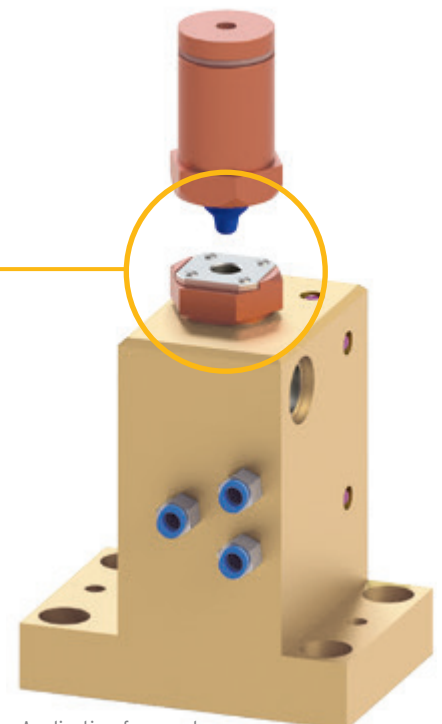
Application solution by DOCERAM



Perfect photo-realistic display for a detailed overview



DOCERAM solution



Application-focussed solution for the nut fixing

GAS NOZZLES



Item No.
8440-Z-35996

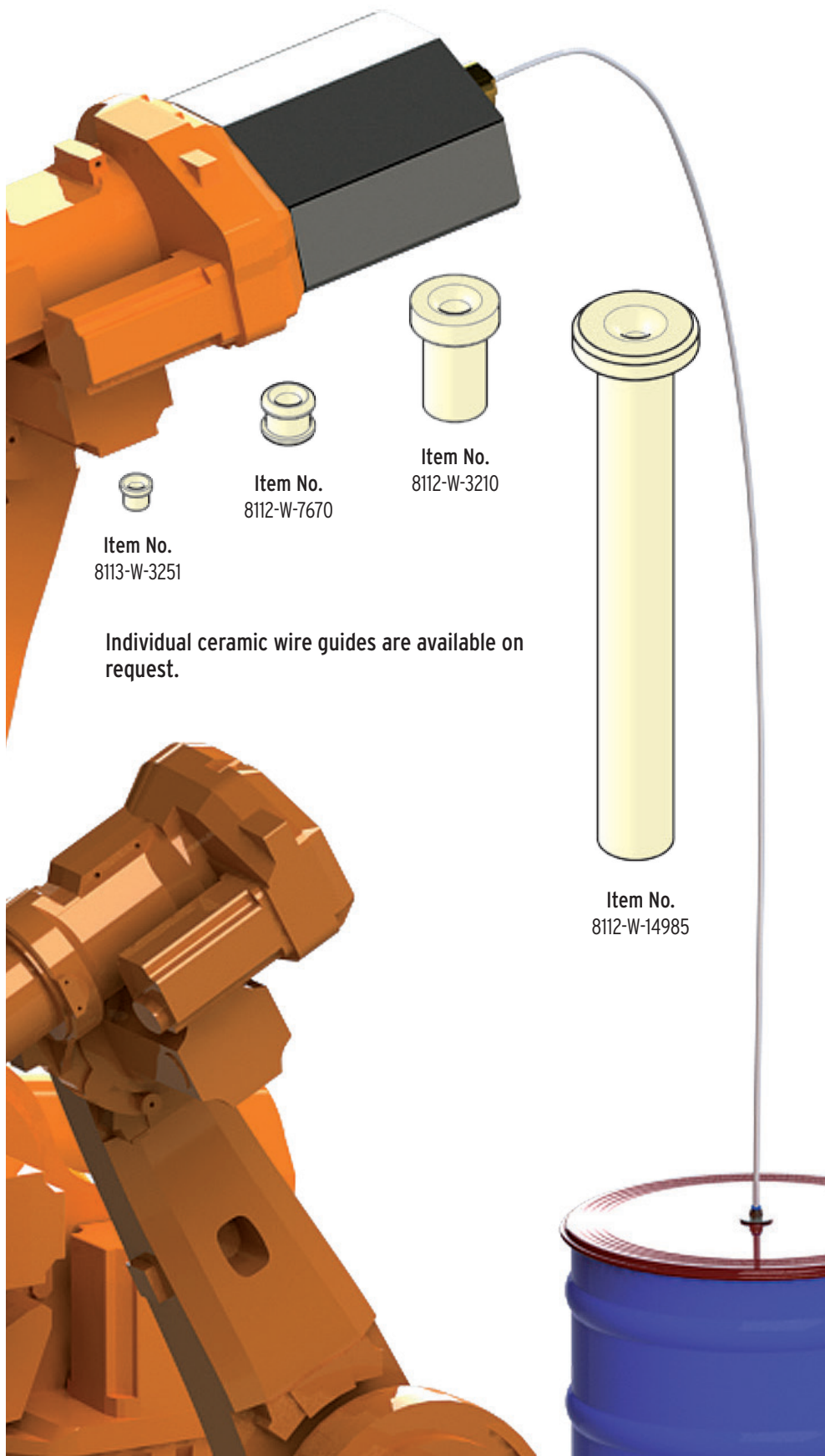


Example of a standard gas nozzle
for the automotive industry made
of VOLCERA with a thread
Adaptable gas nozzle with
42 0001 5041

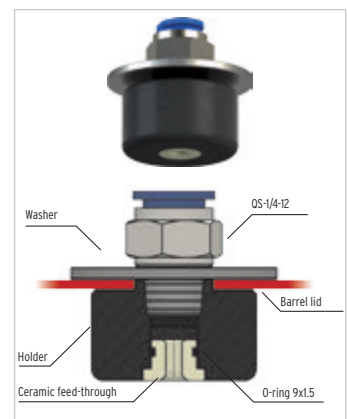


BARREL CONNECTORS

WITH CERAMIC FEED-THROUGH



"Simple" ceramic feed-through at the wire core



Cost-effective "high-end" ceramic feed-through...



A safe and durable solution for your barrel connector

INSULATION



Compression-proof screw insulation for hexagon socket screws, for example at welding tools

- > Compression strength 600 N/mm² at 20°C
- > Duroplast, no yielding under pressure
- > Able to carry loads (withstand stress) of up to 180°C
- > Compact design due to high material stability



Example:
Compression-proof screw head insulation made of DOGLAS in use



Example:
Non-compression-proof screw head insulation

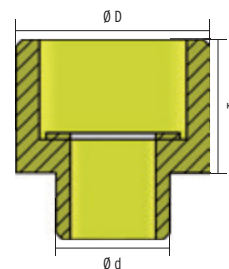
SCREW HEAD

Compression-proof screw head insulation
made of the DOGLAS 180 G insulating material



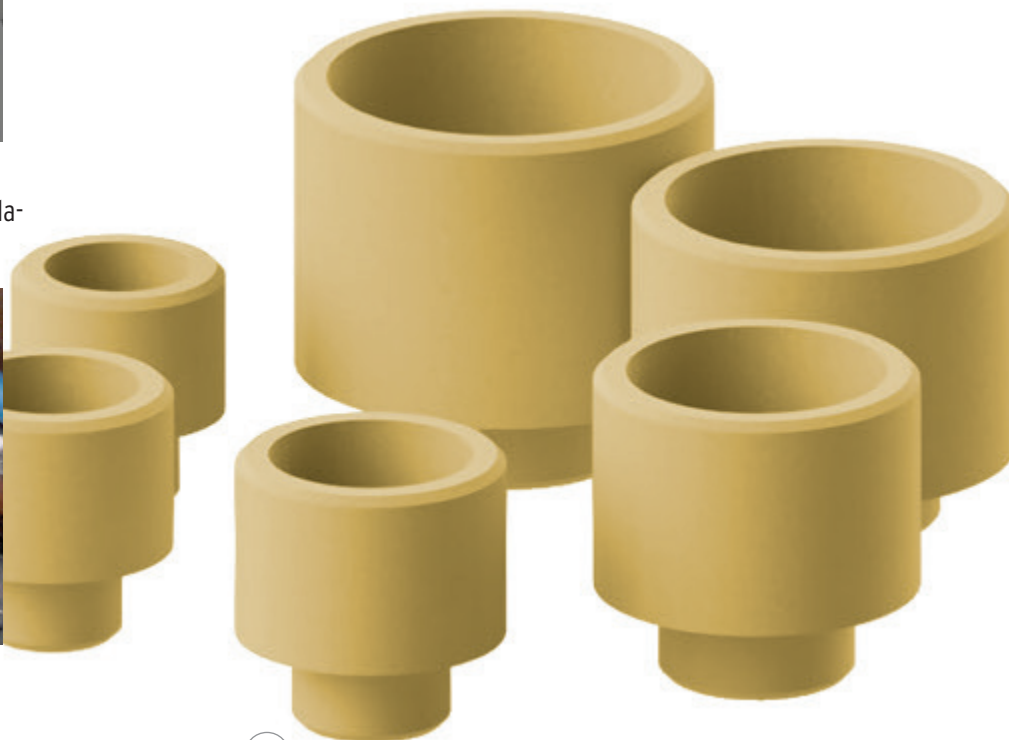
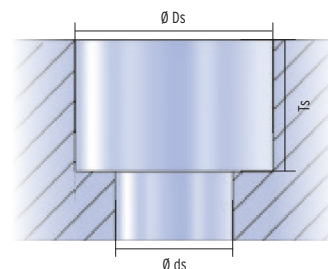
Screws insulating sockets

		(mm)			Item No.
For screw		d	D	T	1462-Z
	M5	7.5	13.0	9.0	93653
	M6	8.5	14.5	10.0	93655
	M8	10.5	17.5	12.0	93657
	M10	12.5	20.5	14.0	93658
	M12	14.5	22.5	16.0	93659



Recommendation for countersunk hole

		(mm)		
For insulating socket		ds	Ds	Ts
	M5	8.0	14.0	9.0
	M6	9.0	18.0	10.0
	M8	11.0	20.0	12.0
	M10	13.0	24.0	14.0
	M12	15.0	26.0	16.0



INSULATION

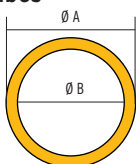
TUBES

Insulating tubes

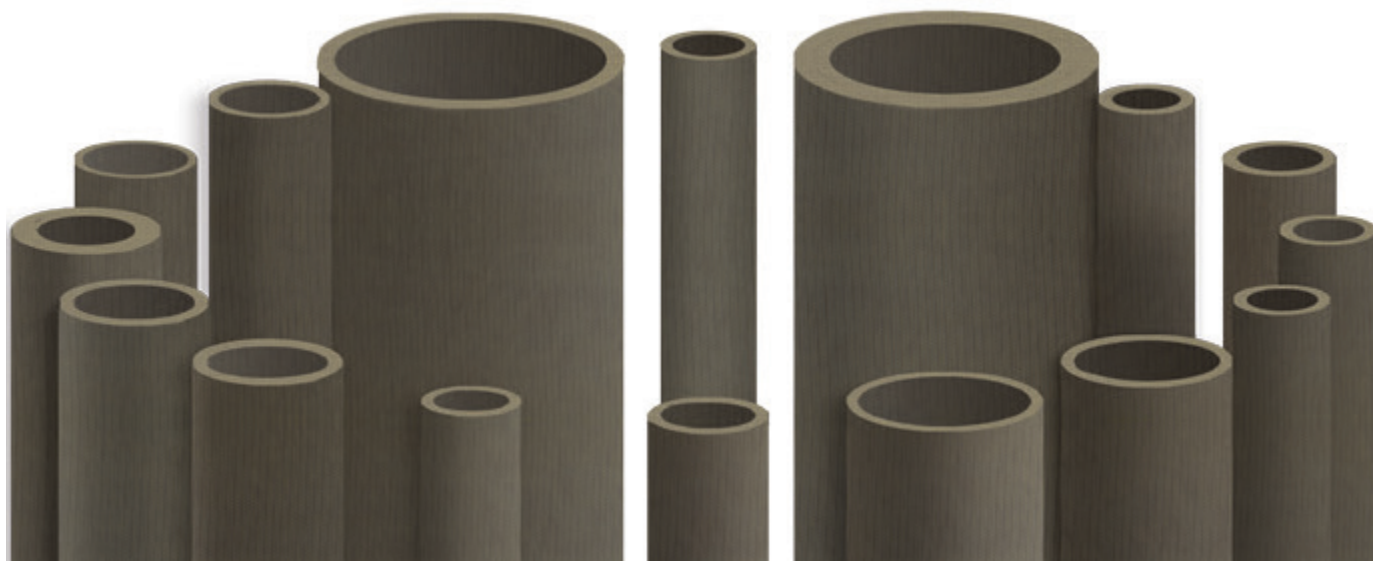
made of the DOTEX 120, DOTEX 110 and DOGLAS 180 G insulating material



Insulating tubes

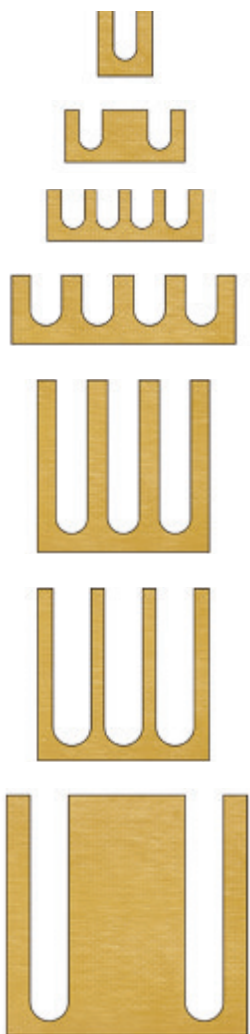


Dimensions (mm)	(mm)			Item No.	(mm)	Item No.	(mm)	Item No.
	Ø A	Ø B	Length	1408-R	Length	1457-R	Length	1468-R
	7.9	6.0	500	140037	500	140037	500	140037
	8.0	5.2	500	140038	500	140038	500	140038
	8.0	6.0	500	140040	500	140040	500	140040
	8.0	6.2	500	140041	500	140041	500	140041
	9.0	7.0	1050	140042	650	140042	1050	140042
	10.0	7.0	1050	140043	650	140043	1050	140043
	10.0	8.0	1050	140044	650	140044	1050	140044
	10.0	8.2	1050	140045	650	140045	1050	140045
	12.0	7.0	1050	140047	650	140047	1050	140047
	12.0	9.0	1050	140048	650	140048	1050	140048
	12.0	10.0	1050	140049	650	140049	1050	140049
	14.0	12.0	1050	140050	650	140050	1050	140050
	16.0	14.0	1050	140051	650	140051	1050	140051
	25.0	19.0	1050	140052	650	140052	1050	140052
	25.0	22.0	1050	140053	650	140053	1050	140053



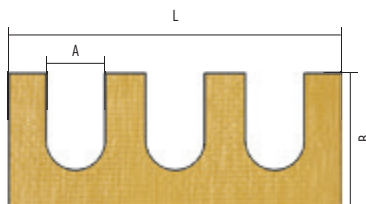
INSULATION

SHIMS / ADAPTER PLATES



Adapter plates for
fixture construction

Shims and adapter plates



DOTEX®
120

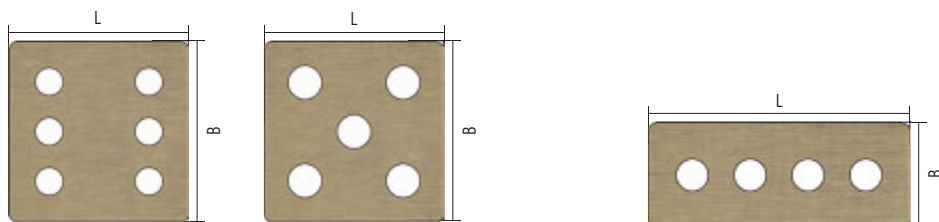
DOTEX®
110

DOGLAS®
180 G

	Thickness	A	Item No.	Item No.	Item No.
			1400-F	1450-F	1462-F
50 x 20	5.0	9.0	140000	140000	140000
	2.0	9.0	140001	140001	140001
	1.0	9.0	140002	140002	140002
	0.5	9.0	140003	140003	140003
50 x 50	5.0	9.0	140004	140004	140004
	2.0	9.0	140005	140005	140005
	1.0	9.0	140006	140006	140006
	0.5	9.0	140007	140007	140007
50 x 50	5.0	11.0	140008	140008	140008
	2.0	11.0	140009	140009	140009
	1.0	11.0	140010	140010	140010
	0.5	11.0	140011	140011	140011
45 x 15	5.0	6.6	140012	140012	140012
	2.0	6.6	140013	140013	140013
	1.0	6.6	140014	140014	140014
	0.5	6.6	140015	140015	140015
65 x 20	5.0	9.0	140016	140016	140016
	2.0	9.0	140017	140017	140017
	1.0	9.0	140018	140018	140018
	0.5	9.0	140019	140019	140019
20 x 16	5.0	6.6	140020	140020	140020
	2.0	6.6	140021	140021	140021
	1.0	6.6	140022	140022	140022
	0.5	6.6	140023	140023	140023
35 x 15	5.0	6.6	140024	140024	140024
	2.0	6.6	140025	140025	140025
	1.0	6.6	140026	140026	140026
	0.5	6.6	140027	140027	140027
70 x 70	5.0	11.0	140028	140028	140028
	2.0	11.0	140029	140029	140029
	1.0	11.0	140030	140030	140030
	0.5	11.0	140031	140031	140031

INSULATION BOARDS

Insulating boards with bores



DOTEX® 120 **DOTEX®** 110 **DOGLAS®** 180 G

L x B (mm)	Item No.		Item No.		Item No.	
	Square design		Item No.		Item No.	
		Thickness	Bore	1400-F	1450-F	1462-F
60 x 60	2.0	6 x Ø 9 mm	140034	140034	140034	140034
50 x 50	2.0	5 x Ø 9 mm	140035	140035	140035	140035
60 x 60	2.0	5 x Ø 11 mm	140036	140036	140036	140036
Rectangular design						
60 x 30	2.0	3 x Ø 9 mm	140032	140032	140032	140032
75 x 30	2.0	4 x Ø 9 mm	140033	140033	140033	140033



Adapter plates in use for resistance welding and
MIG/MAG welding

Insulating boards without bores



DOTEX® 110

DOTEX® 120

DOGLAS® 180 G

(in mm)	Item No.		
	B x L	Thickness	1450-BS
	1050 x 2050	1.0	0010
	1050 x 2050	3.0	0030
	1050 x 2050	6.0	0060
	1050 x 2050	8.0	0080
	1050 x 2050	10.0	0100
	1050 x 2050	15.0	0150
	1050 x 2050	20.0	0200
	1050 x 2050	30.0	0300
	1050 x 2050	40.0	0400
	1050 x 2050	50.0	0500
	1050 x 2050	60.0	0600
	-	-	-

(in mm)	Item No.		
	B x L	Thickness	1400-BS
	1050 x 2050	1.0	0010
	1050 x 2050	3.0	0030
	1050 x 2050	6.0	0060
	1050 x 2050	8.0	0080
	1050 x 2050	10.0	0100
	1050 x 2050	15.0	0150
	1050 x 2050	20.0	0200
	1050 x 2050	25.0	0250
	1050 x 2050	30.0	0300
	1050 x 2050	35.0	0350
	-	-	-
	-	-	-

(in mm)	Item No.		
	B x L	Thickness	1462-BS
	1220 x 2440	1.0	10010
	1220 x 2440	3.0	10030
	1220 x 2440	6.0	10060
	1220 x 2440	8.0	10080
	1220 x 2440	10.0	10100
	1220 x 2440	15.0	10150
	1220 x 2440	20.0	10200
	1220 x 2440	25.0	10250
	1220 x 2440	30.0	10300
	1220 x 2440	40.0	10400
	1220 x 2440	50.0	10500
	1220 x 2440	60.0	10600

Thickness tolerance +/- 0.5 mm polished. Also available in other dimensions and as finished parts on request.

INSULATION MATERIALS



Innovative insulation solutions, especially for thermal separation at 280°C for very high cyclical mechanical stress in presses for the wood material industry and up to 1200°C for other applications.

- > Flexible system partner
- > Materials developer
- > Long-term production experience
- > Well-known OEM of the wood material industry

At the MOESCHTER GROUP, we develop highly complex multi-resistant system solutions to meet your future requirements!

We offer you a complete range to suit

- > All budgets
- > All temperature ranges
- > All pressure conditions
- > All geometries
- > All installation situations

Our own quality management and process log ensure documented safety.

Material		
Material description		
Colour		
Applications		
Delivery formats		
Properties	Test standard	Unit
Physical properties		
Density	ISO 1183	(g/m ³)
Water absorption	ISO 62	(%)
Thermal properties		
Application temperature, permanent	–	(°C)
Application temperature, temporary	–	(°C)
Linear expansion coefficient	DIN 51045	(10 ⁻⁶ x K ⁻¹)
Thermal conductivity	DIN 52612	(W/mK)
Mechanical properties		
Compression strength at 23°C	ISO 604	(N/mm ²)
Compression strength at 200°C	ISO 604	(N/mm ²)
Bending strength at 23°C	ISO 178	(N/mm ²)
E-modulus from bending tests	ISO 178	(N/mm ²)
Tensile strength	ISO 527	(N/mm ²)
Splitting force	DIN 53463	(N)
Electrical properties		
Creep resistance	IEC 112	–
Dielectric constant	DIN 53483	–
Electrical dielectric strength (⊥)	IEC 243-1	(kV/3 mm)
Electrical dielectric strength (I)	IEC 243-1	(kV/25 mm)

DOTEX®
110

DOTEX®
120

DOGLAS®
180 G

Coating material made
of resin-bonded cotton
fabric

brown

Electrical and thermal
insulation parts for
mechanical and plant
engineering

Boards, cut to size
and components /
assemblies acc. to
drawing

Value

Coating material made
of resin-bonded paper

brown

Electrical and thermal
insulation parts for
mechanical and plant
engineering

Boards, cut to size
and components /
assemblies acc. to
drawing

Value

Coating material made
of resin-bonded glass
fabric

yellowish, brown

Electrical and thermal
insulation parts for
mechanical and plant
engineering

Boards, cut to size
and components /
assemblies acc. to
drawing

Value

1.4

2.4

110

110

30

0.2

320

-

100

7000

80

3000

CTI 100

-

1.5

1.0

1.4

5.2

120

120

30

0.2

300

-

135

7000

120

1900

CTI 100

-

10

10

1.85

0.1

180

210

15

0.3

600

260

450

20000

400

3500

CTI 350

5.1

30

36



We provide solutions for extreme thermal...



...electrical and mechanical...



stress every day.

JOINT PROJECTS

DOCERAM, DOTHERM AND STS FRICTION



Every single application problem has the potential to deliver a truly innovative solution. We will support you from the application-focussed consulting, CAD-based 3D design and manufacturing of prototypes to your series production.

To us, the in-process quality assurance with subsequent 100% control of all items is just as much a requirement as the detailed dialogue with our customers.

**Joint projects by
MOESCHTER GROUP
and its subsidiaries
DOTHERM,
DOCERAM and
STS Friction
ensure**

- > A cross-material technology transfer
- > Cross-product manufacturing know-how
- > Options for selecting the ideal manufacturing site, and
- > High-quality components and mature total solutions, thereby permanently giving you a competitive advantage in a highly competitive global market.



DOCERAM ceramics for mechanical engineering

Application areas

- > Automotive industry
- > Mechanical and plant engineering
 - Laser technology
 - Food industry
 - Plastics industry
 - Operating resources construction
- > Medical technology
- > Textile engineering

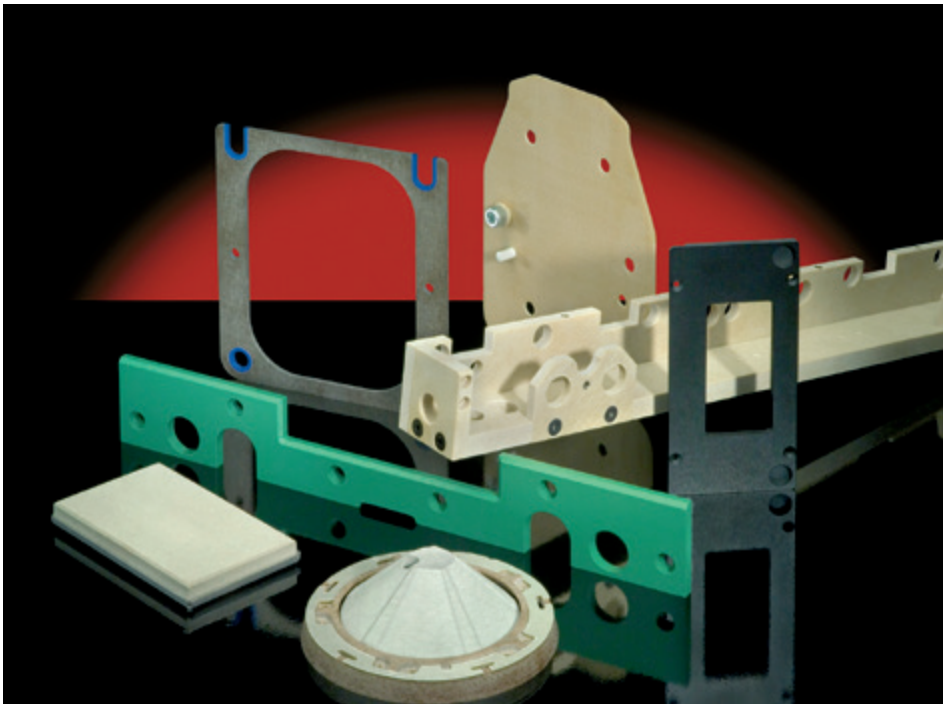
Dynamic continuous development for advanced solutions

- > Engineering
- > Materials
- > Manufacturing technologies



Broad application ranges require a comprehensive product range.

- > Proven product groups have eventually become standard products.
- > Today's individual solutions become the standards of tomorrow.
- > Your future requirements are already realised by today's innovations.



DOTHERM high-temperature insulating technology



**Cross-material
total solutions by
MOESCHTER GROUP**

