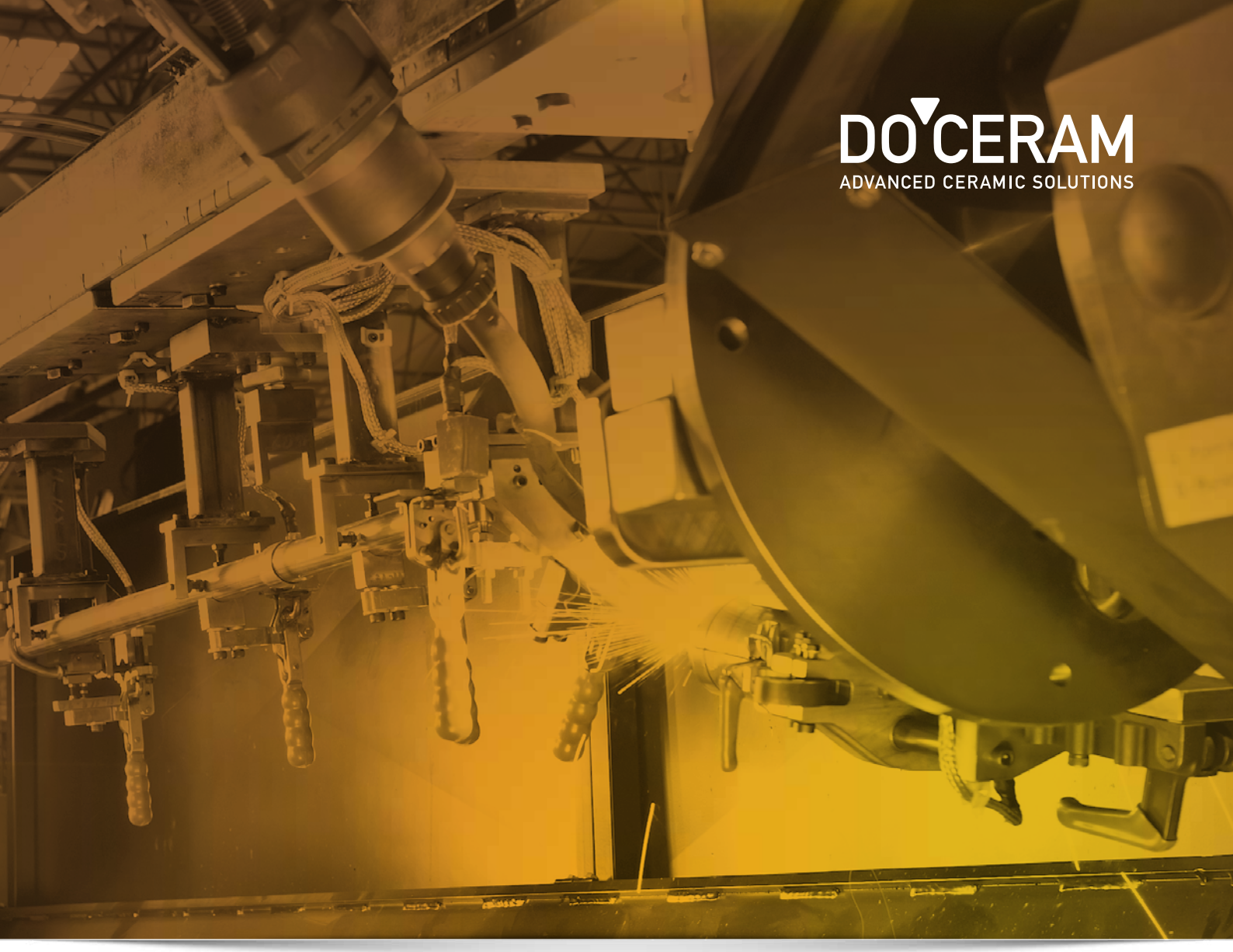
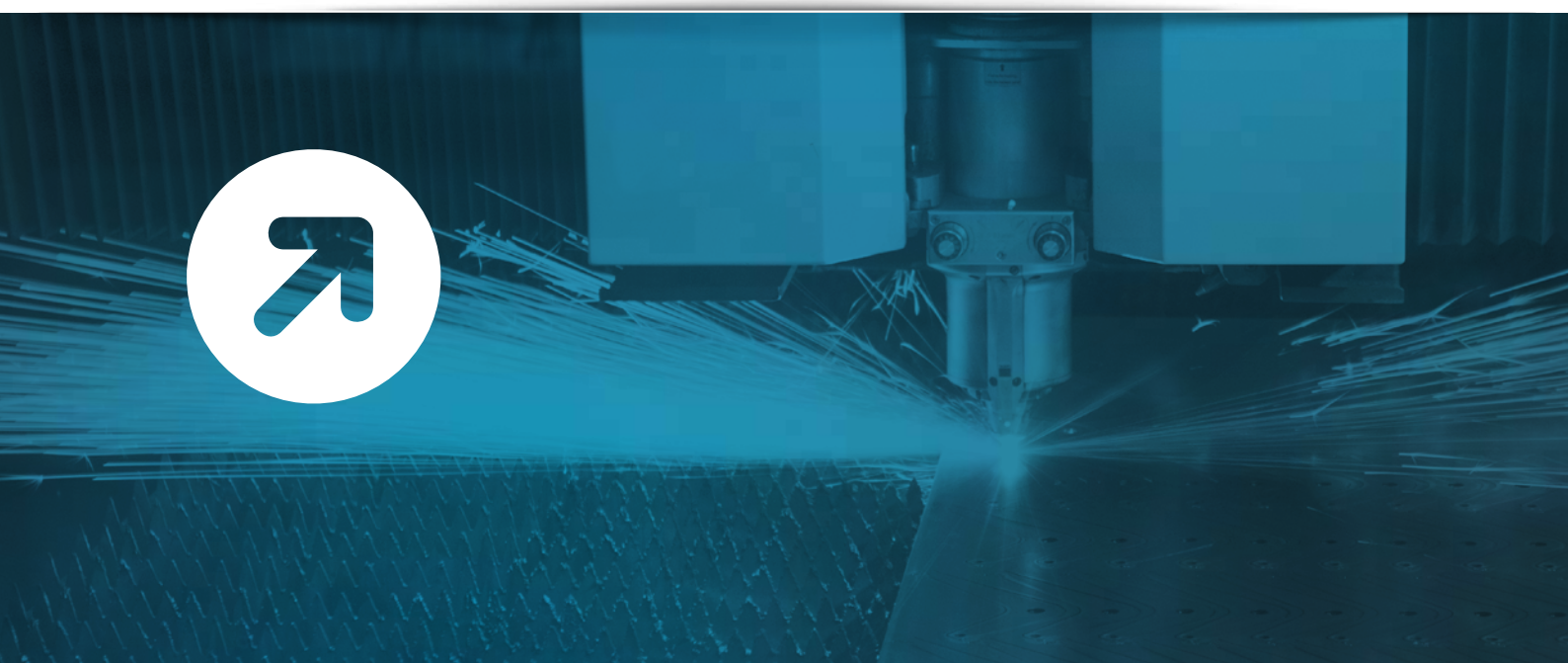


DOCERAM
ADVANCED CERAMIC SOLUTIONS

WELDING TECHNOLOGY



ENGINEERING MATERIALS

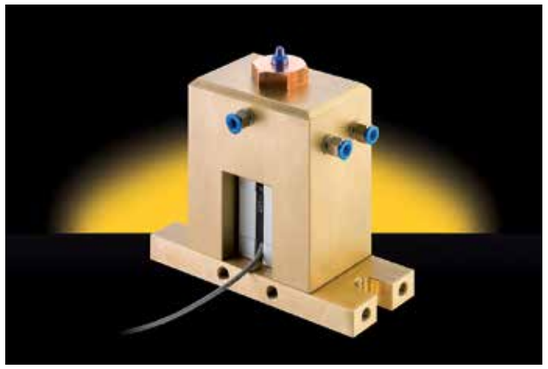
CERAMIC MATERIALS IN INDUSTRY

DOCERAM

ADVANCED CERAMIC SOLUTIONS

Centring

Positioning



Complete welding devices

MIG/MAG welding

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.

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

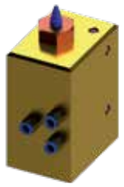
high-performance ceramics are used for machining processes such as milling, punching and drilling of hard materials at high speeds because of their extraordinary hardness.

DOCERAM HIGH-PERFORMANCE CERAMICS

EXAMPLE: RESISTANCE WELDING

DOCERAM
ADVANCED CERAMIC SOLUTIONS

Positioning pin made of CERAZUR



Complete welding device
with a centring pin made of CERAZUR

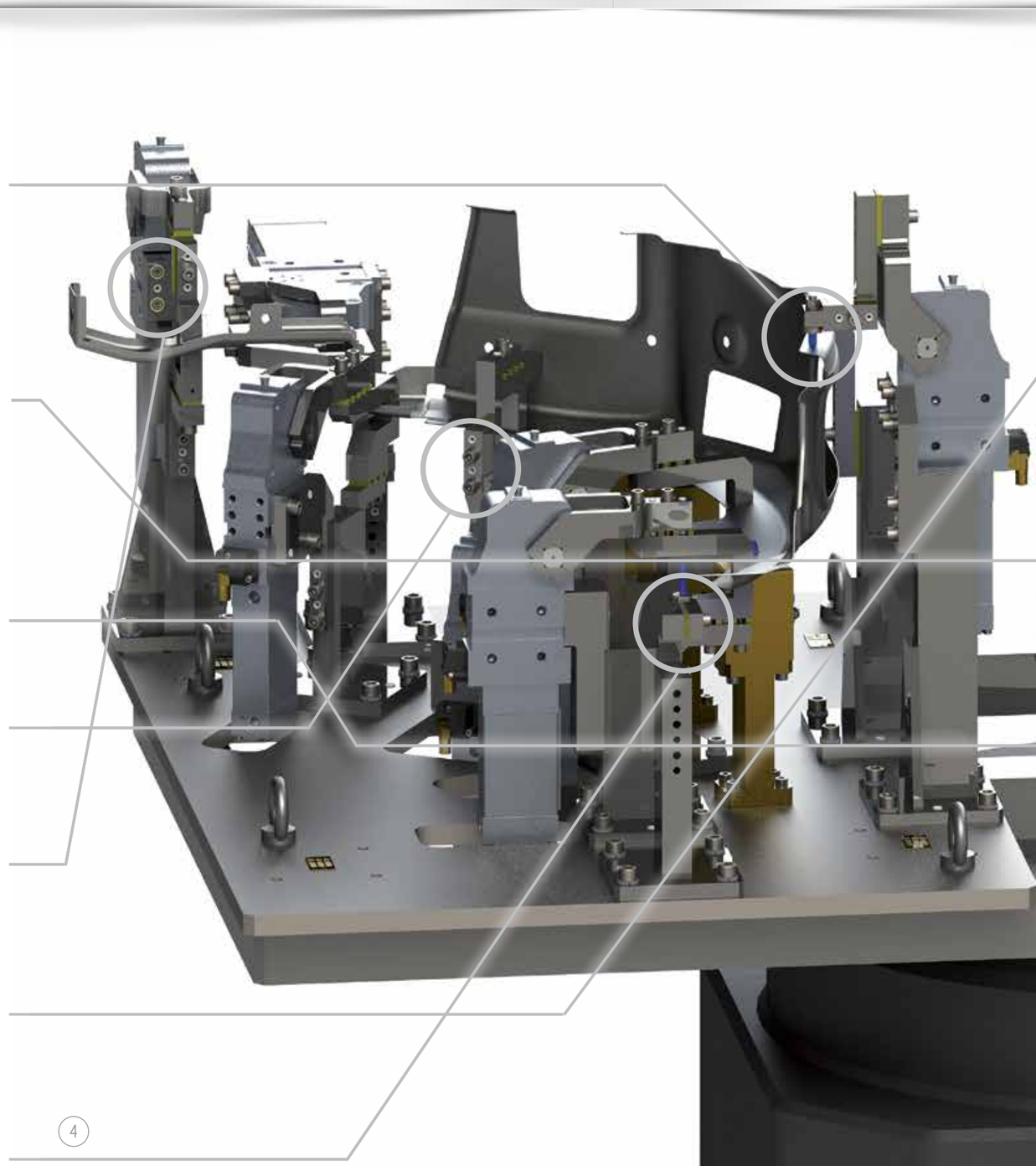
Centring pin made of CERAZUR

Pull dowel pin made of Z101

Compression-resistant screw head
insulation made of DOGLAS

Adapter plate made of
DOTEX / DOGLAS

Insulating plate made of DOTEX / DOGLAS



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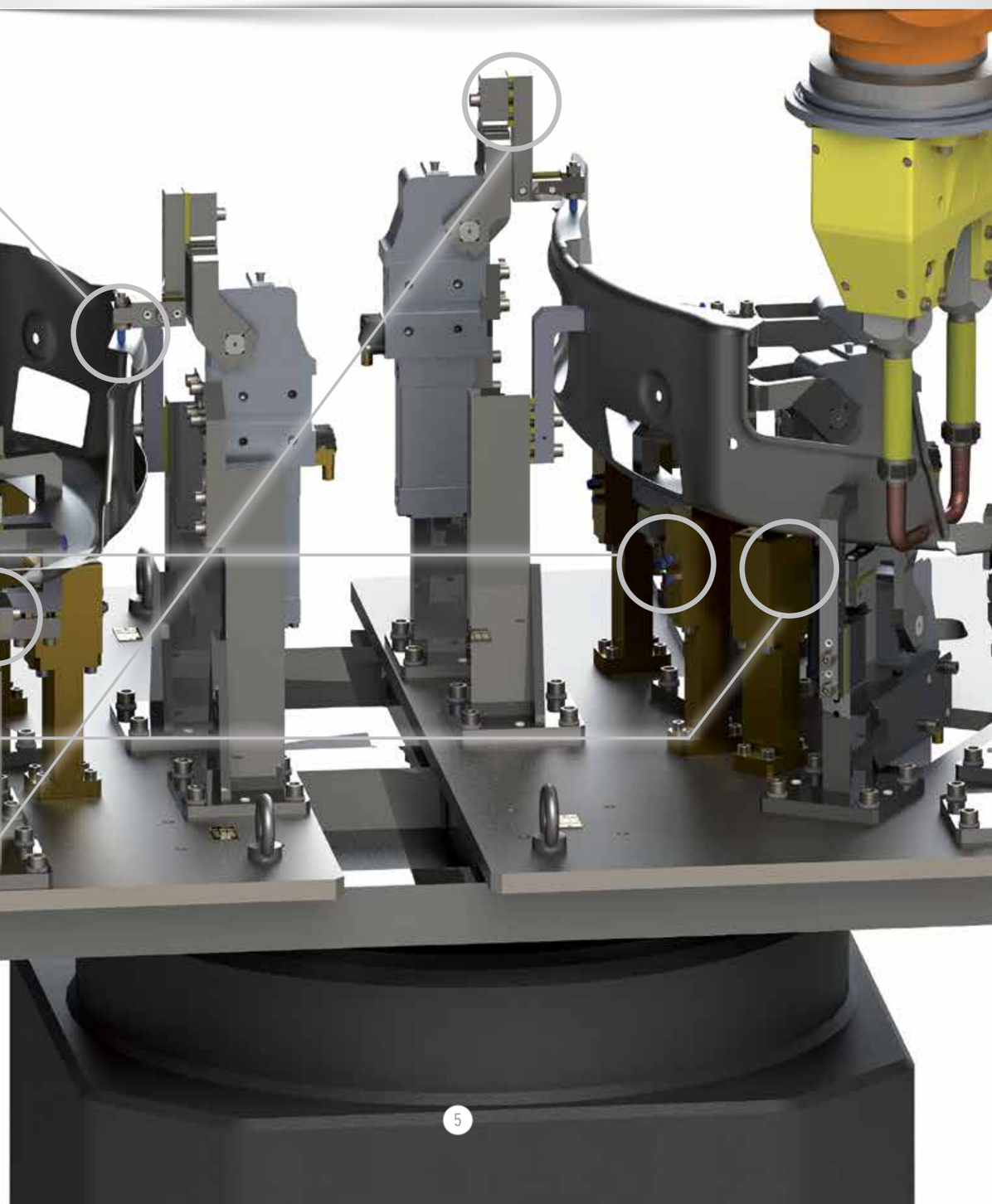

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DOCERAM HIGH-PERFORMANCE CERAMICS

EXAMPLE MIG/MAG WELDING

DOCERAM
ADVANCED CERAMIC SOLUTIONS

Gas nozzle made of VOLCERA

Dowel pin made of Z101

Positioning pin made of CERAZUR

Connection for a large welding wire container with a ceramic wire guide

Insulating plate made of DOTEX or DOGLAS

Adapter plate made of DOTEX or DOGLAS

COMPARISON OF TECHNICAL PROPERTIES

MATERIAL PROPERTIES AND CERAMIC-SUITABLE DESIGN

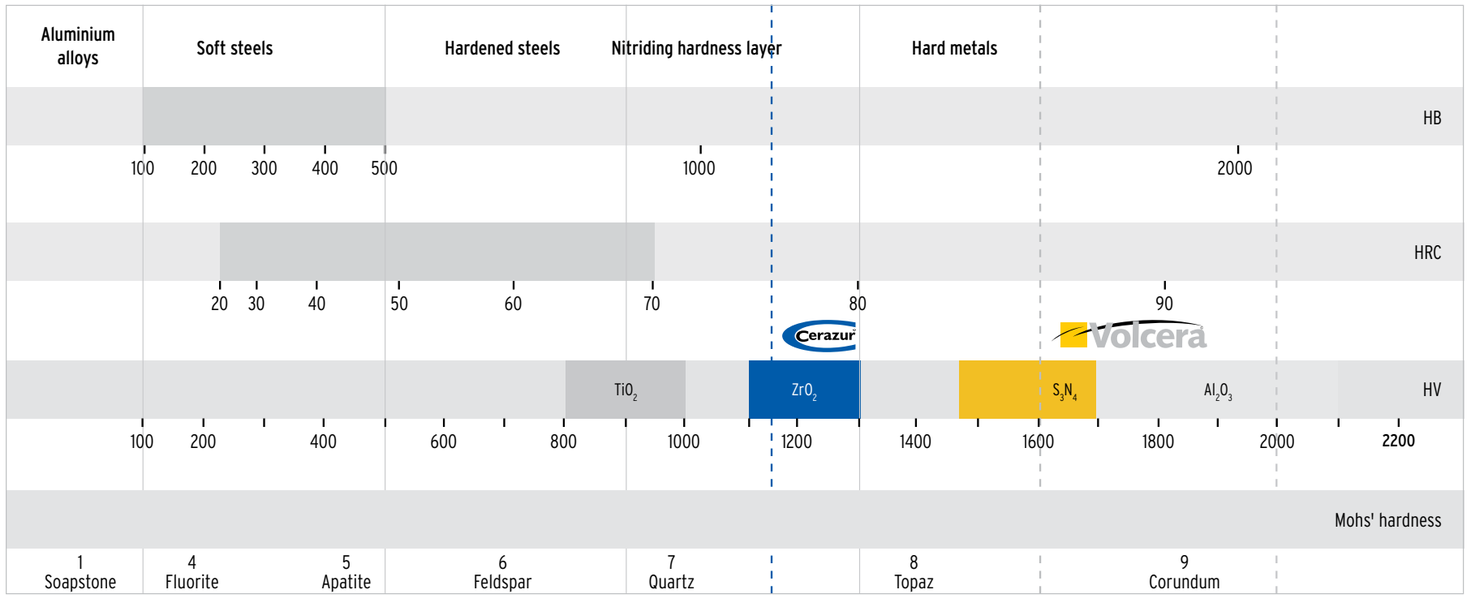
DO CERAM
ADVANCED CERAMIC SOLUTIONS

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

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

Material property	Unit	A-997	ZTA	Z-101	Cerazur	Volcera
		Al_2O_3 >99.796	$Al_2O_3 + ZrO_2$	ZrO_2 Y-PSZ	ZrO_2 Y-PSZ	Si3N4
Colour		ivory	white	white	blue	grey
Density	(g/cm+)	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 m1/2)	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	($10^{-6}K^{-1}$)	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)	$>10^{15}$	$>10^{13}$	$>10^{10}$	$>10^{10}$	$>10^{11}$
Dielectric strength	(kV/mm)	30	-	-	-	20

- The proven combination options of the standard range allow the use for almost all applications for projection welding.
- Ceramic centring pins for immediate replacement and use.
- Variable due to the comprehensive standard range.



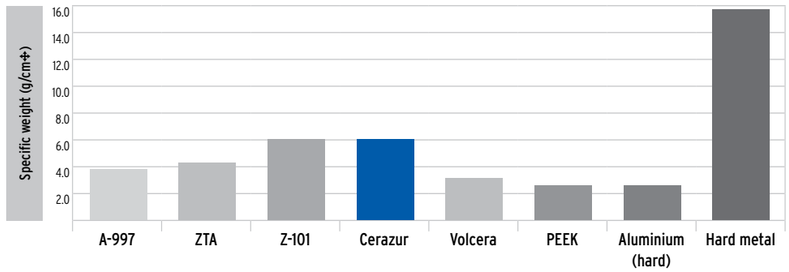
COMPARISON OF MATERIAL BENEFITS

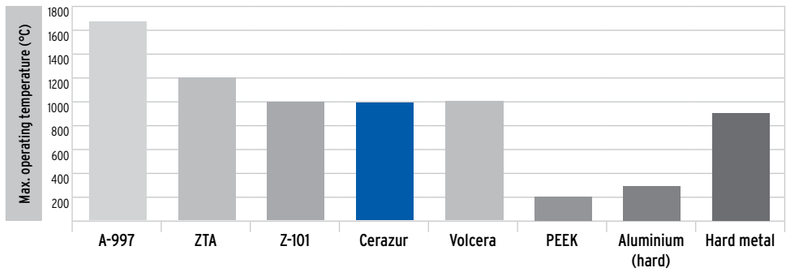
Benefits of high-performance ceramics in direct contact with the material

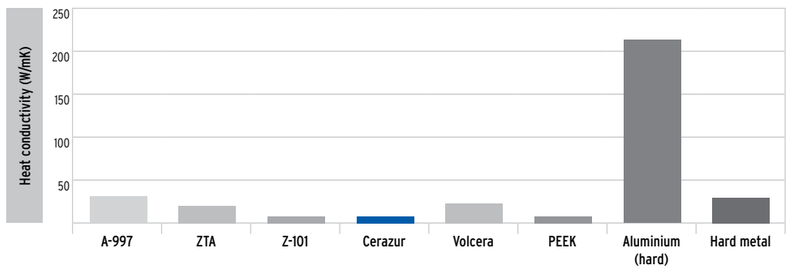
- Extremely high abrasion resistance
- Dimensional stability
- Anti-adhesion effect
- Electrical insulation
- Extremely high operating temperature

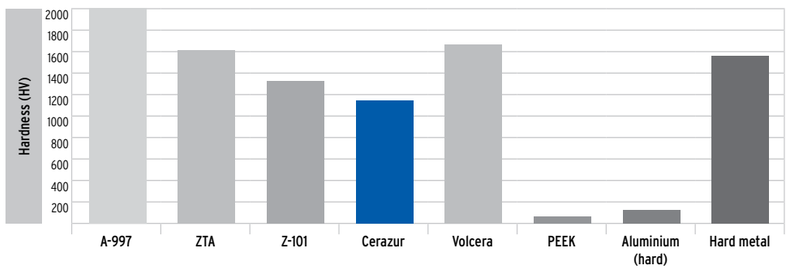
Benefits of high-performance ceramics for high-temperature applications

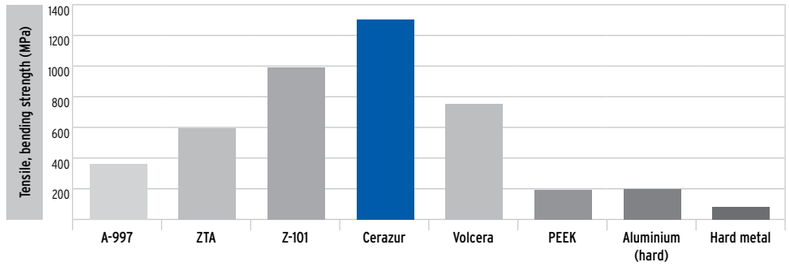
- Dimensional stability at maximum temperatures
- Thermal shock resistance
- Electrical insulation
- Very high heat resistance

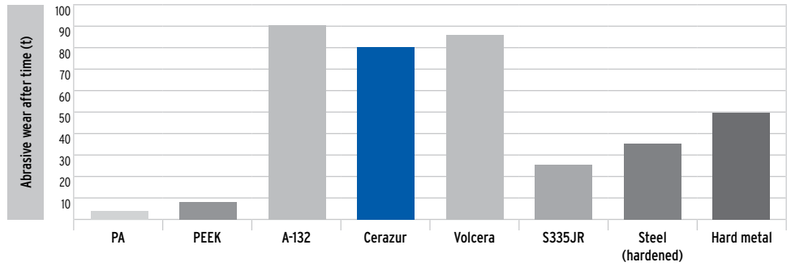












EXAMPLES FOR WEAR OF STANDARD MATERIALS

Hardened steel

Hard metal insert

Centring pin made hardened steel

Standard gas nozzle made of nickel-plated copper

CONFIGURABLE POSITIONING PINS

PROVEN STANDARD QUALITIES

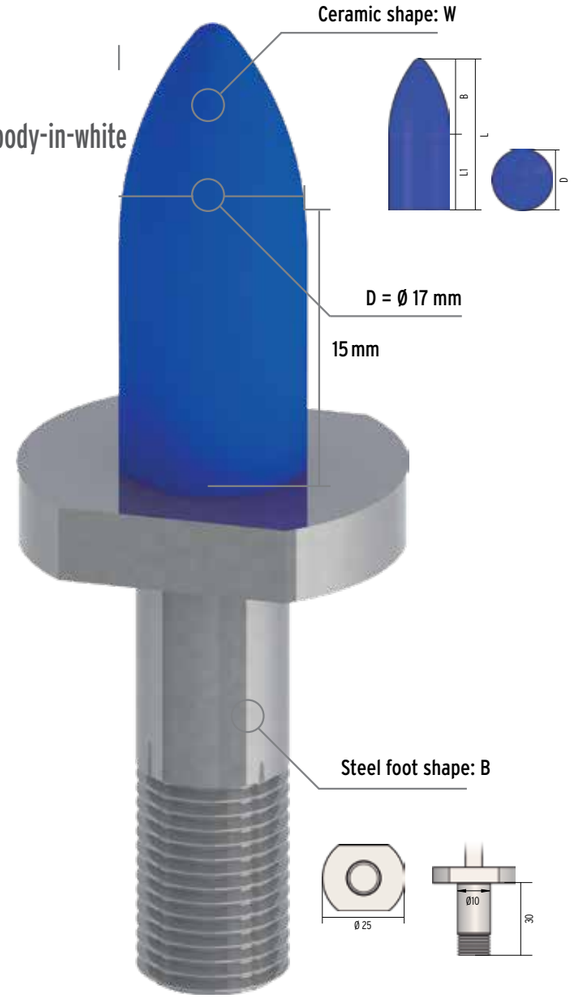
- Flexible modular system
- Individual head geometries
- Quickly available due to standard components
- Developed based on European car standards
- Immediately usable in the production process, e.g. body-in-white

SELECTION CRITERIA FOR THE STANDARD POSITIONING PIN

Specification

- Fixing foot geometry
- Head diameter
- Head length

FURTHER GEOMETRIES ARE AVAILABLE ON REQUEST



Ceramic shape	W
Diameter	Ø17
Cylinder length	15 mm
Tolerance	N
Steel foot	shape B

Example of ordering a positioning pin

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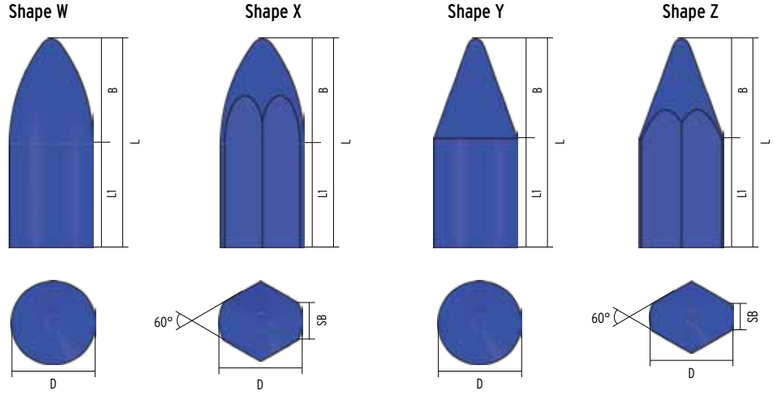
ADVANCED CERAMIC SOLUTIONS

Ceramic shapes



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

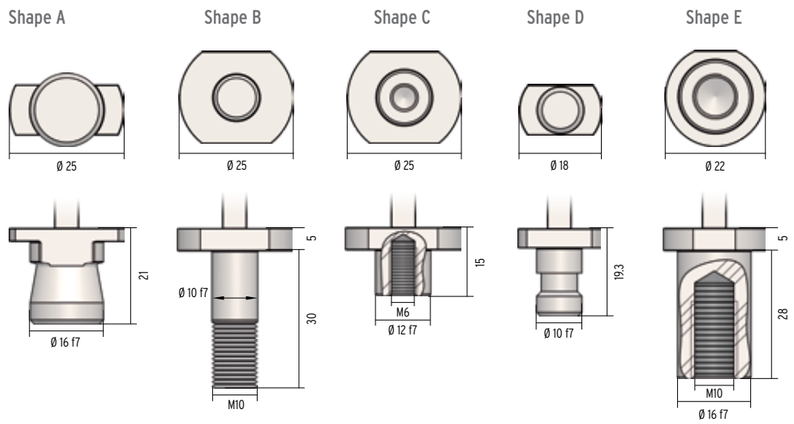
Selection of the cylinder length (L1)

Cylinder length can be selected in steps of 0.1 mm

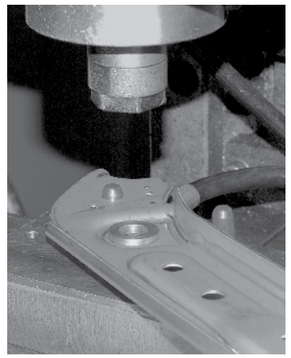
Selection of tolerances

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

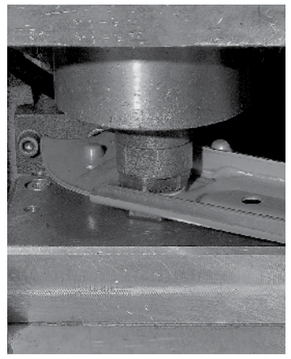
Steel feet



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

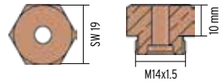
Spring for BE (stud insert) up to 30 mm
> 1112-ZK-12205

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

O-ring
> 1123-ZK-16434

Change electrodes

SW 19

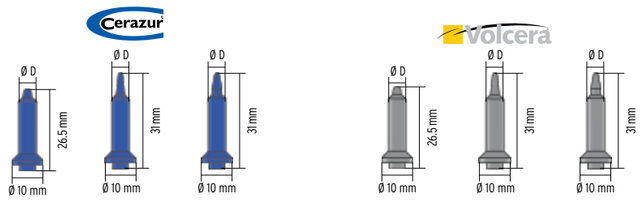


Ø sheet hole (mm)	SW 19 Item No.	1111-ZK-
	4.5	10000
	4.6	10001
	4.7	10002
	4.8	10003
	4.9	10004
	5.0	10005
	5.1	10006

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

	Short 8440-ZK-	Long 8440-ZK-	With collar 8440-ZK-
4.5	11000	10000	10300
4.6	11001	10001	10301
4.7	11002	10002	10302
4.8	11003	10003	10303
4.9	11004	10004	10304
5.0	11005	10005	10305
5.1	11006	10006	10306
5.2	11007	10007	10307
5.3	11008	10008	10308
5.4	11009	10009	10309
5.5	11010	10010	10310
5.6	11011	10011	10311
5.7	11012	10012	10312
5.8	11013	10013	10313
5.9	11014	10014	10314
6.0	11015	10015	10315

Accessories for base electrodes

Springs

For base electrodes up to 30 mm

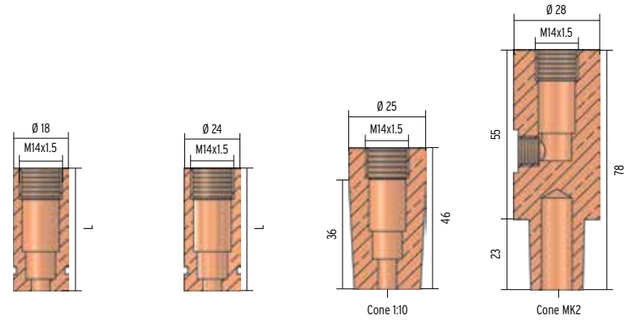
Length	Spring M4 Item No.	1112-ZK-
30 mm		12205

Springs

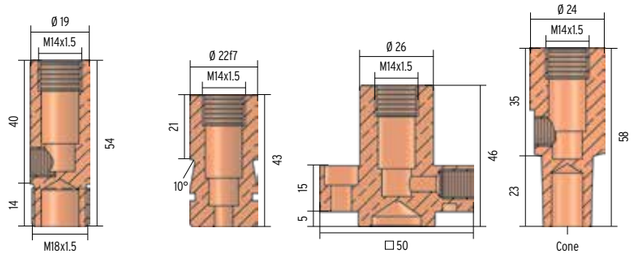
For base electrodes from 40 mm

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

BASE ELECTRODES



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



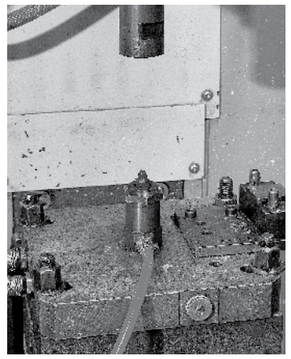
	Thread M18x1.5 Item No.	1111-ZK-	S-type 1111-ZK-	R-type 1111-ZK-	T-type 1111-ZK-
		10560	10680	10608	10640

O-rings

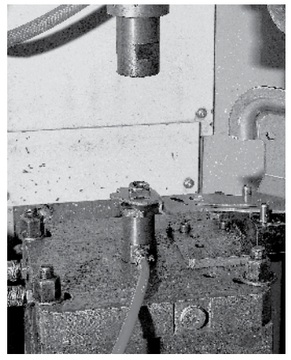
Ø (mm)	O-rings M4 Item No.	1123-ZK-
	18	16434
	24	16435
	S-type	58440

Compressed air connector

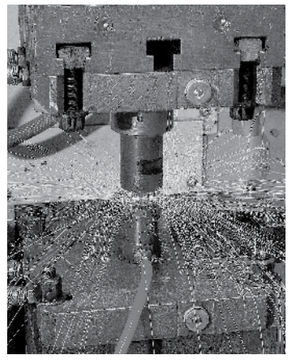
	Compressed air connector 1/8-6 Item No.	1116-ZK-
		12353



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

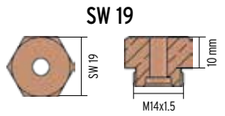
Centring pin long, Cerazur
> 8228-ZK-10023

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

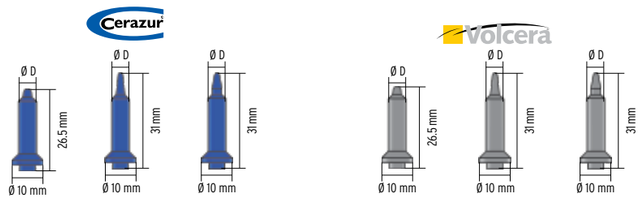


Ø sheet hole (mm)	SW 19 Item No.	SW 19 1111-ZK-	SW 24 1111-ZK-
	5.5	10010	10057
	5.6	10011	10058
	5.7	10012	10059
	5.8	10013	10060
	5.9	10014	10061
	6.0	10015	10062
	6.1	10016	10063

Ø sheet hole (mm)	SW 19 1111-ZK-	SW 24 1111-ZK-
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

Ø sheet hole (mm)	SW 19 1111-ZK-	SW 24 1111-ZK-
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



Ø sheet hole (mm)	Short Item No.	Short 8228-ZK-	Long 8228-ZK-	With collar 8228-ZK-
	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
	6.9	11030	10030	10330
	7.0	11031	10031	10331

Ø sheet hole (mm)	Short 8440-ZK-	Long 8440-ZK-	With collar 8440-ZK-
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
6.9	11030	10030	10330
7.0	11031	10031	10331

Accessories for base electrodes

Springs
For base electrodes up to 30 mm

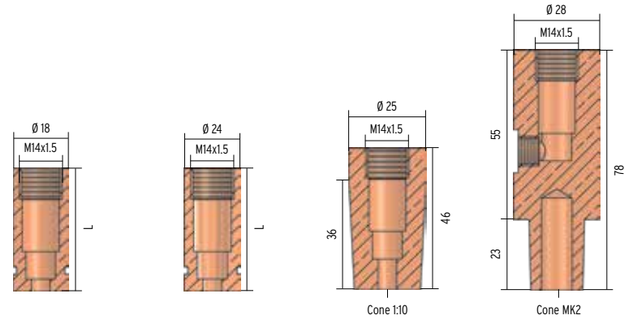
Length	Item No.	Spring M5 1112-ZK-
30 mm		12205

Springs
For base electrodes from 40 mm

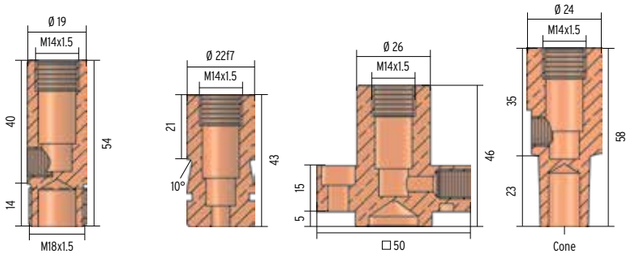
Length	Item No.	Spring M5 1112-ZK-
40 mm		12204

BASE ELECTRODES

DO CERAM
ADVANCED CERAMIC SOLUTIONS



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



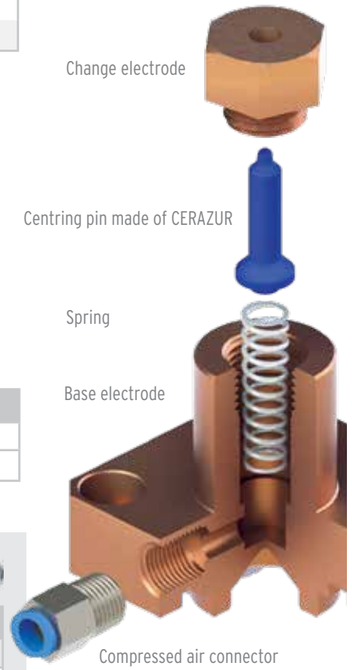
	Thread M18x1.5 Item No.	Thread M18x1.5 1111-ZK-	S-type 1111-ZK-	R-type 1111-ZK-	T-type 1111-ZK-
		10560	10680	10608	10640

O-rings

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

Compressed air connector

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



Air-cooled complete electrode
for projection nut welding

PROJECTION WELD NUT M6

AIR-COOLED

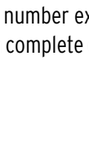
Item number example
for a complete electrode

for sheet hole diameter
> 7.8 mm

Change electrode SW 19
> 1111-ZK-10044

Centring pin long, Cerazur
> 8228-ZK-10045

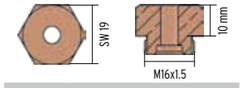
Spring for BE up to 40 mm
> 1112-ZK-12206



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

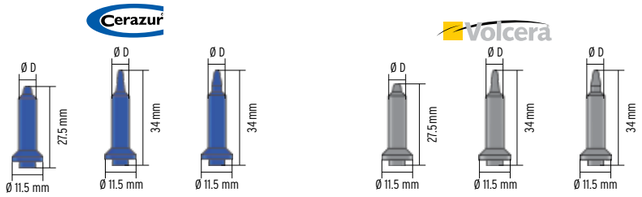
O-ring
> 1123-ZK-16434

Change electrodes



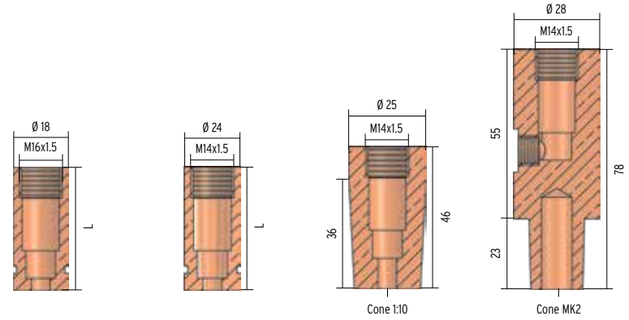
Ø sheet hole (mm)	SW 19 Item No. 1111-ZK-	SW 24 1111-ZK-	SW 19 Item No. 1111-ZK-	SW 24 1111-ZK-	SW 19 Item No. 1111-ZK-	SW 24 1111-ZK-
6.5	10031	10078	7.4	10040	10087	8.3	10049	10096
6.6	10032	10079	7.5	10041	10088	8.4	10050	10097
6.7	10033	10080	7.6	10042	10089	8.5	10051	10098
6.8	10034	10081	7.7	10043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

Centring pins

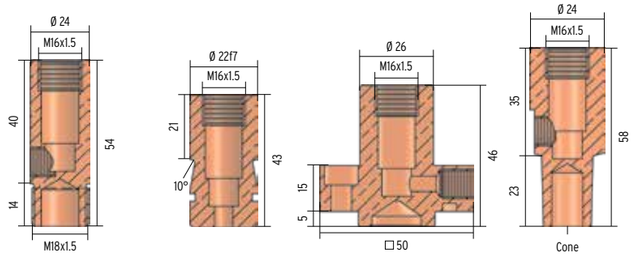


Ø sheet hole (mm)	Short Item No. 8228-ZK-	Long 8228-ZK-	With collar 8228-ZK-	Short 8440-ZK-	Long 8440-ZK-	With collar 8440-ZK-
6.5	11032	10032	10332	6.5	11032	10032	10332
6.6	11033	10033	10333	6.6	11033	10033	10333
6.7	11034	10034	10334	6.7	11034	10034	10334
6.8	11035	10035	10335	6.8	11035	10035	10335
6.9	11036	10036	10336	6.9	11036	10036	10336
7.0	11037	10037	10337	7.0	11037	10037	10337
7.1	11038	10038	10338	7.1	11038	10038	10338
7.2	11039	10039	10339	7.2	11039	10039	10339
7.3	11040	10040	10340	7.3	11040	10040	10340
7.4	11041	10041	10341	7.4	11041	10041	10341
7.5	11042	10042	10342	7.5	11042	10042	10342
7.6	11043	10043	10343	7.6	11043	10043	10343
7.7	11044	10044	10344	7.7	11044	10044	10344
7.8	11045	10045	10345	7.8	11045	10045	10345
7.9	11046	10046	10346	7.9	11046	10046	10346
8.0	11047	10047	10347	8.0	11047	10047	10347
8.1	11048	10048	10348	8.1	11048	10048	10348
8.2	11049	10049	10349	8.2	11049	10049	10349
8.3	11050	10050	10350	8.3	11050	10050	10350
8.4	11051	10051	10351	8.4	11051	10051	10351
8.5	11052	10052	10352	8.5	11052	10052	10352

BASE ELECTRODES



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



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

Accessories for base electrodes

Springs
For base electrodes up to 30 mm

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

Springs
For base electrodes from 40 mm

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

O-rings

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

Compressed air connector

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

Perfectly fitting centring of

sheet and projection weld nut for an

optimised welding process

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

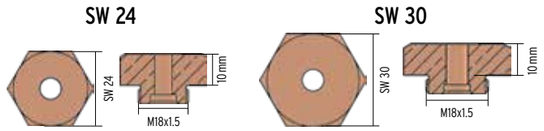
Centring pin long, Cerazur
> 8228-ZK-10067

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

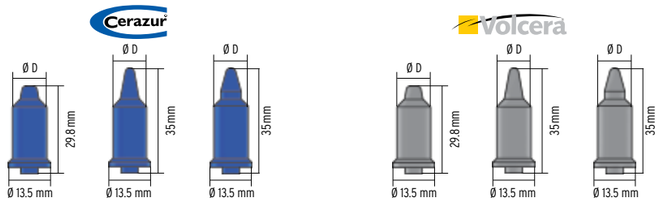


Ø sheet hole (mm)	SW 24 Item No.	SW 24 1111-ZK-	SW 30 1111-ZK-
	8.5	10104	10135
	8.6	10105	10136
	8.7	10106	10137
	8.8	10107	10138
	8.9	10108	10139
	9.0	10109	10140
	9.1	10110	10141
	9.2	10111	10142
	9.3	10112	10143
	9.4	10113	10144
	9.5	10114	10145

Ø sheet hole (mm)	SW 24 1111-ZK-	SW 30 1111-ZK-
9.6	10115	10146
9.7	10116	10147
9.8	10117	10148
9.9	10118	10149
10.0	10119	10150
10.1	10120	10151
10.2	10121	10152
10.3	10122	10153
10.4	10123	10154
10.5	10124	10155
10.6	10125	10156

Ø sheet hole (mm)	SW 24 1111-ZK-	SW 30 1111-ZK-
10.7	10126	10157
10.8	10127	10158
10.9	10128	10159
11.0	10129	10160
11.1	10130	10161
11.2	10131	10162
11.3	10132	10163
11.4	10133	10164
11.5	10134	10165
–	–	–
–	–	–

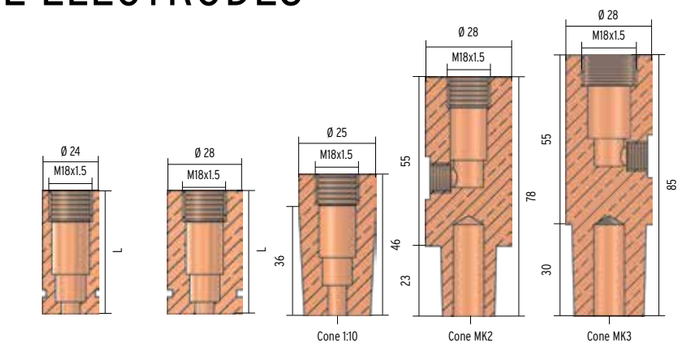
Centring pins



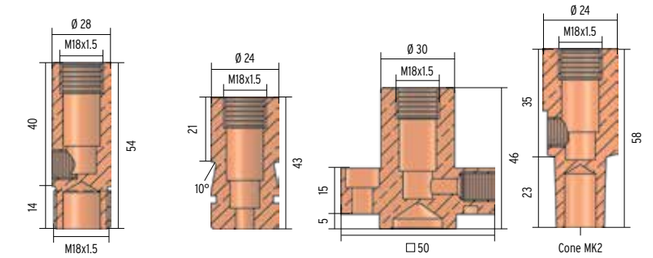
Ø sheet hole (mm)	Short Item No.	Short 8228-ZK-	Long 8228-ZK-	With collar 8228-ZK-
	8.5	11053	10053	10353
	8.6	11054	10054	10354
	8.7	11055	10055	10355
	8.8	11056	10056	10356
	8.9	11057	10057	10357
	9.0	11058	10058	10358
	9.1	11059	10059	10359
	9.2	11060	10060	10360
	9.3	11061	10061	10361
	9.4	11062	10062	10362
	9.5	11063	10063	10363
	9.6	11064	10064	10364
	9.7	11065	10065	10365
	9.8	11066	10066	10366
	9.9	11067	10067	10367
	10.0	11068	10068	10368
	10.1	11069	10069	10369
	10.2	11070	10070	10370
	10.3	11071	10071	10371
	10.4	11072	10072	10372
	10.5	11073	10073	10373
	10.6	11074	10074	10374
	10.7	11075	10075	10375
	10.8	11076	10076	10376
	10.9	11077	10077	10377
	11.0	11078	10078	10378

Ø sheet hole (mm)	Short 8440-ZK-	Long 8440-ZK-	With collar 8440-ZK-
8.5	11053	10053	10353
8.6	11054	10054	10354
8.7	11055	10055	10355
8.8	11056	10056	10356
8.9	11057	10057	10357
9.0	11058	10058	10358
9.1	11059	10059	10359
9.2	11060	10060	10360
9.3	11061	10061	10361
9.4	11062	10062	10362
9.5	11063	10063	10363
9.6	11064	10064	10364
9.7	11065	10065	10365
9.8	11066	10066	10366
9.9	11067	10067	10367
10.0	11068	10068	10368
10.1	11069	10069	10369
10.2	11070	10070	10370
10.3	11071	10071	10371
10.4	11072	10072	10372
10.5	11073	10073	10373
10.6	11074	10074	10374
10.7	11075	10075	10375
10.8	11076	10076	10376
10.9	11077	10077	10377
11.0	11078	10078	10378

BASE ELECTRODES



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



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

Accessories for base electrodes

Springs

For base electrodes from 40 mm

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

O-rings

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

Compressed air connector

Item No.	Compressed air connector 1/8-6 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

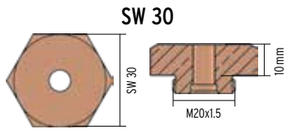
Centring pin long, Cerazur
> 8228-ZK-10089

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

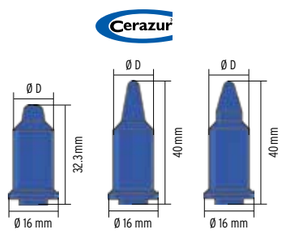
Change electrodes



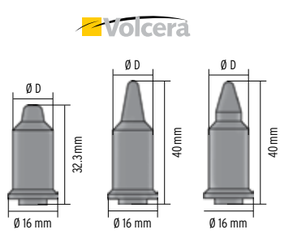
Ø sheet hole (mm)	SW 30 Item No.	1111-ZK-	SW 30	1111-ZK-	SW 30	1111-ZK-
	11.0	10166	11.9	10175	12.8	10184
	11.1	10167	12.0	10176	12.9	10185
	11.2	10168	12.1	10177	13.0	10186
	11.3	10169	12.2	10178	13.1	10187
	11.4	10170	12.3	10179	13.2	10188
	11.5	10171	12.4	10180	13.3	10189
	11.6	10172	12.5	10181	13.4	10190
	11.7	10173	12.6	10182	13.5	10191
	11.8	10174	12.7	10183	–	–

Centring pins

Cerazur

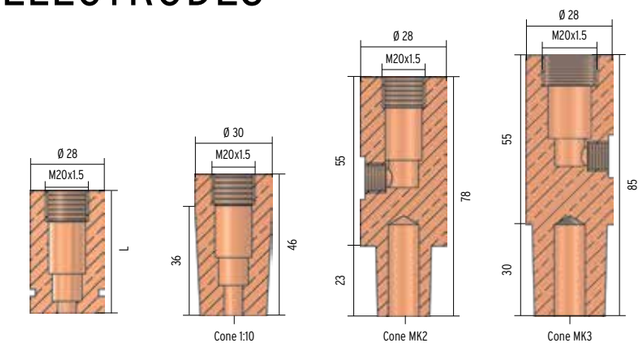


Volcera

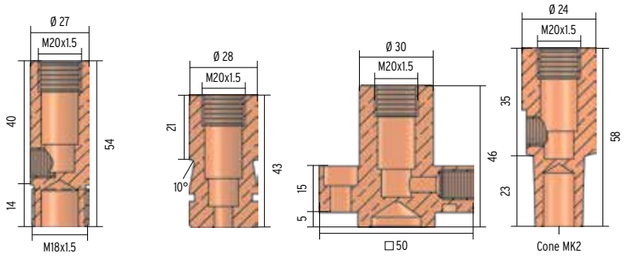


Ø sheet hole (mm)	Short Item No.	8228-ZK-	Long	8228-ZK-	With collar	8228-ZK-	Short	8440-ZK-	Long	8440-ZK-	With collar	8440-ZK-
	11.0	11079	10079		10379	11.0	11079		10079		10379	
	11.1	11080	10080		10380	11.1	11080		10080		10380	
	11.2	11081	10081		10381	11.2	11081		10081		10381	
	11.3	11082	10082		10382	11.3	11082		10082		10382	
	11.4	11083	10083		10383	11.4	11083		10083		10383	
	11.5	11084	10084		10384	11.5	11084		10084		10384	
	11.6	11085	10085		10385	11.6	11085		10085		10385	
	11.7	11086	10086		10386	11.7	11086		10086		10386	
	11.8	11087	10087		10387	11.8	11087		10087		10387	
	11.9	11088	10088		10388	11.9	11088		10088		10388	
	12.0	11089	10089		10389	12.0	11089		10089		10389	
	12.1	11090	10090		10390	12.1	11090		10090		10390	
	12.2	11091	10091		10391	12.2	11091		10091		10391	
	12.3	11092	10092		10392	12.3	11092		10092		10392	
	12.4	11093	10093		10393	12.4	11093		10093		10393	
	12.5	11094	10094		10394	12.5	11094		10094		10394	
	12.6	11095	10095		10395	12.6	11095		10095		10395	
	12.7	11096	10096		10396	12.7	11096		10096		10396	
	12.8	11097	10097		10397	12.8	11097		10097		10397	
	12.9	11098	10098		10398	12.9	11098		10098		10398	
	13.0	11099	10099		10399	13.0	11099		10099		10399	

BASE ELECTRODES



Length (L in mm)	Standard Ø 28 Item No.	1111-ZK-	Cone 1:10	1111-ZK-	Cone MK2	1111-ZK-	Cone MK3	1111-ZK-
	40	10518		–		–		–
	50	10519		–		–		–
	60	10520		–		–		–
		–		10583		10544		10545



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

Accessories for base electrodes

Springs

For base electrodes from 40 mm

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

O-rings

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

Compressed air connector

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

DO'CERAM
ADVANCED CERAMIC SOLUTIONS

Extremely durable

Extremely temperature-stable

Perfect welding results

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

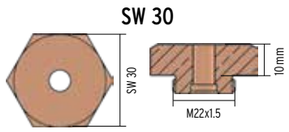
Centring pin long, Cerazur
> 8228-ZK-10114

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

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

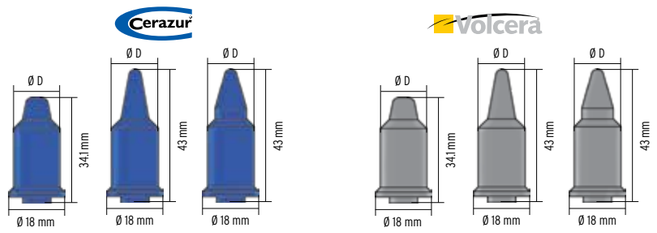
O-ring
> 1123-ZK-16436

Change electrodes



Ø sheet hole (mm)	SW 30 Item No.	1111-ZK-	SW 30	1111-ZK-	SW 30	1111-ZK-
	13.0	10192	13.9	10201	14.8	10210
	13.1	10193	14.0	10202	14.9	10211
	13.2	10194	14.1	10203	15.0	10212
	13.3	10195	14.2	10204	15.1	10213
	13.4	10196	14.3	10205	15.2	10214
	13.5	10197	14.4	10206	15.3	10215
	13.6	10198	14.5	10207	15.4	10216
	13.7	10199	14.6	10208	15.5	10217
	13.8	10200	14.7	10209	–	–

Centring pins



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

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

BASE ELECTRODES

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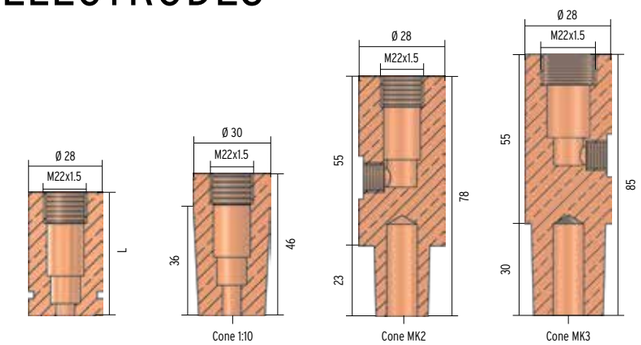
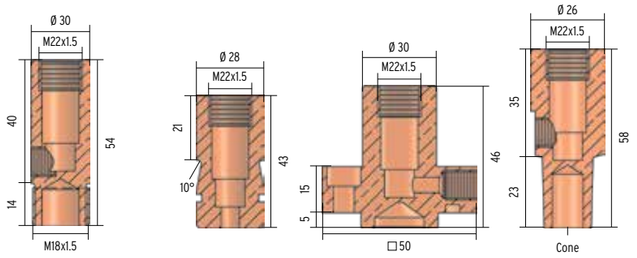


Length (L in mm)	Item No.	Standard Ø 28 1111-ZK-	Cone 1:10 1111-ZK-	Cone MK2 1111-ZK-	Cone MK3 1111-ZK-
	40	10521	–	–	–
	50	10522	–	–	–
	60	10523	–	–	–
		–	10584	10546	10547



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

Accessories for base electrodes

Springs

For base electrodes from 40 mm

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

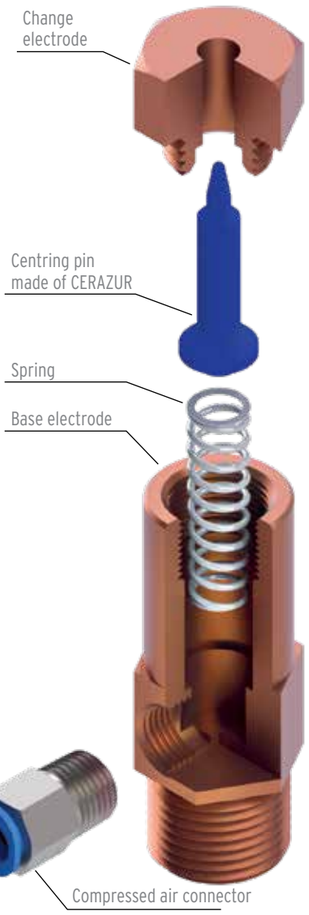
O-rings

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

Compressed air connector

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

Air-cooled complete electrode
for projection nut welding



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

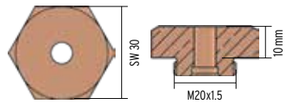
O-ring for BE
› 1123-ZK-16436 (2x)

Cooling ring
› 1113-ZK-19766

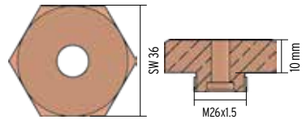
Compressed air connector
› 1116-ZK-12353

Change electrodes

SW 30



SW 36



Ø sheet hole (mm)	M4, M5		M6		M8		M10		M12	
	Item No.	1111-ZK-		1111-ZK-		1111-ZK-		1111-ZK-		1111-ZK-
	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

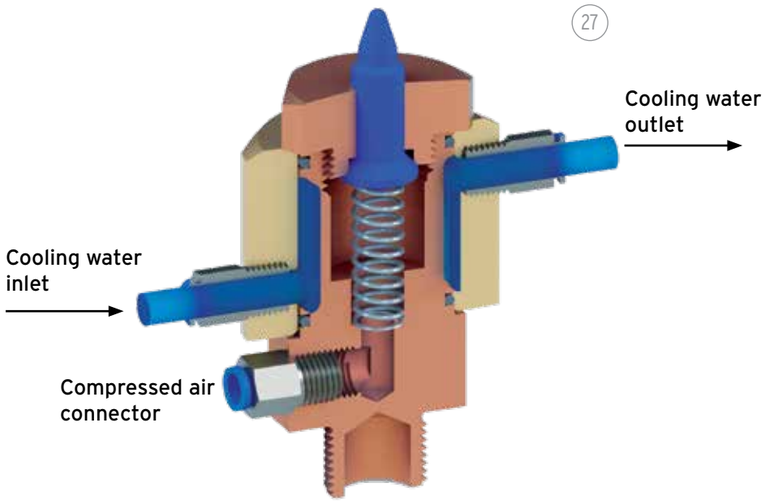
Length	Item No.	M4 1112-ZK-	M5 1112-ZK-	M6 1112-ZK-	M8 1112-ZK-	M10 1112-ZK-	M12 1112-ZK-
	up to 30 mm	12205	12205	–	–	–	–
	from 40 mm	12204	12204	12206	12206	12207	12207

O-rings for base electrodes

Ø (mm)	Item No.	O-rings M4 to M12 1123-ZK-
	28	16436 (M4 to M8)
	34	26187 (M10 to M12)

Compressed air connector

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



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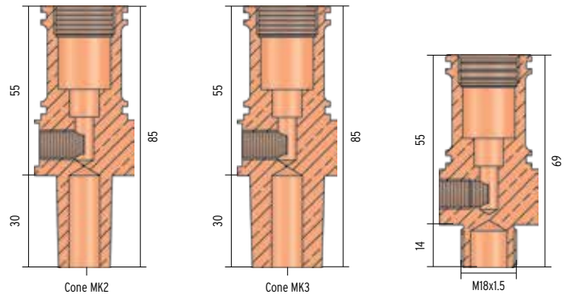
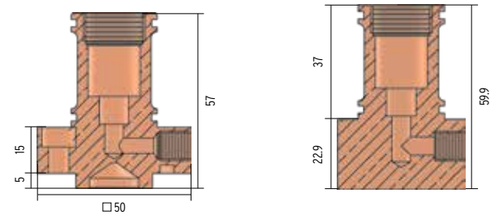
BASE ELECTRODES

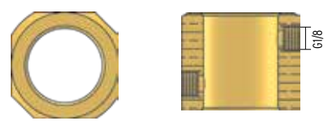


Ø	Item No.	Cone MK2 1111-ZK-	Cone MK3 1111-ZK-	Thread M18x1.5 1111-ZK-
	M4, M5, M6, M8	20542	20543	20562
	M10, M12	20544	20545	20563



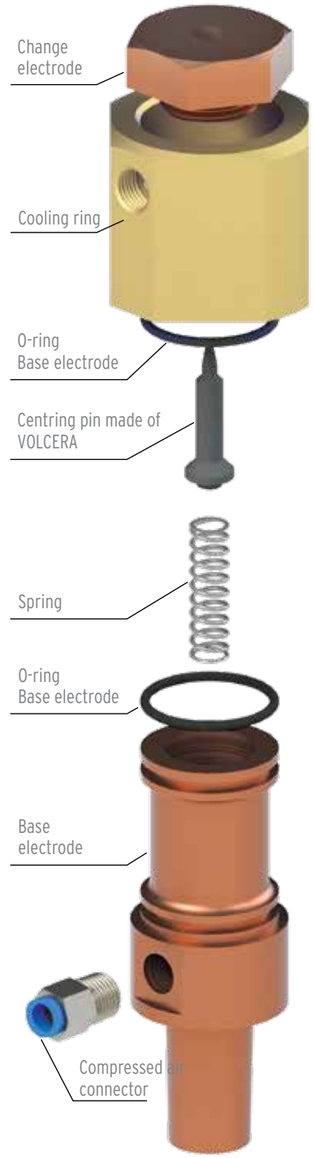
Ø	Item No.	R-type 1111-ZK-	C-type 1111-ZK-
	M4, M5, M6, M8	20642	20662
	M10, M12	20644	20663

Cooling ring



Ø	Item No.	Cooling ring 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

Centring pins
See pages 28 to 29



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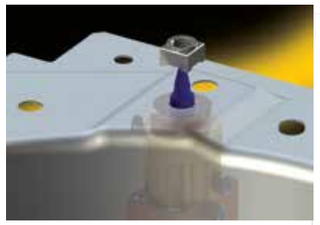
SOLUTION FOR PERFECT CENTRING



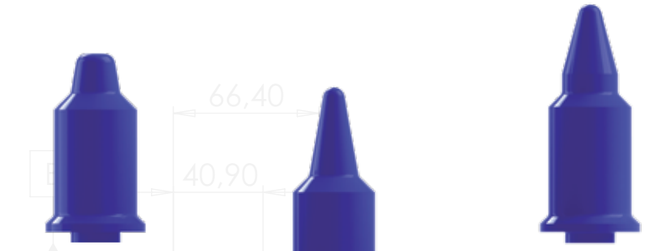
We only require very few details from you. Based on this information we can put the suitable complete electrode together for you.

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

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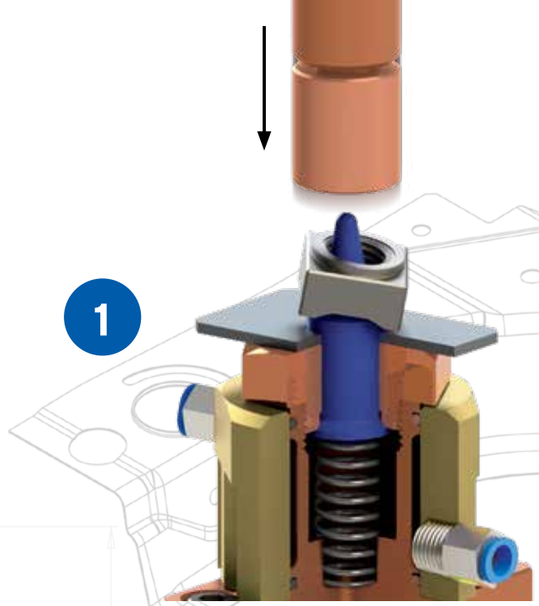
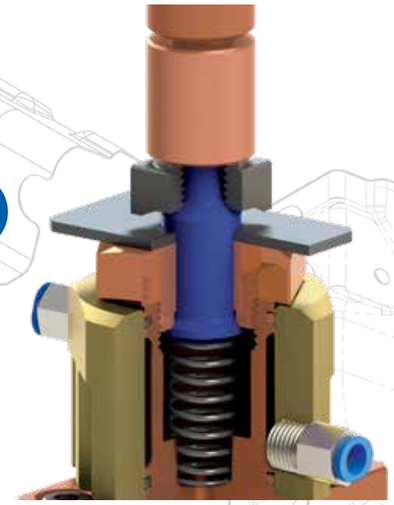


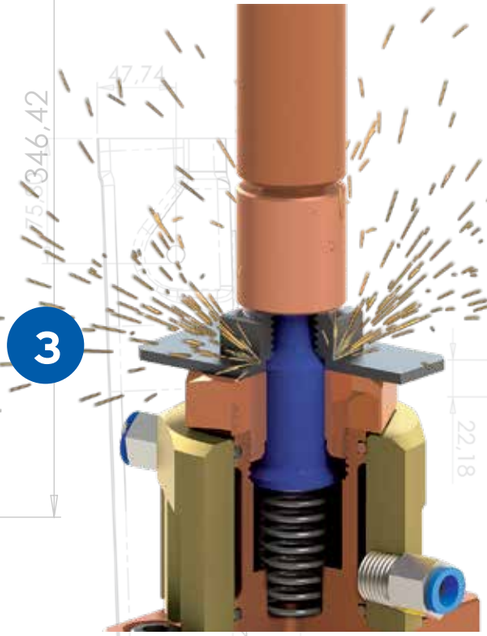
1

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



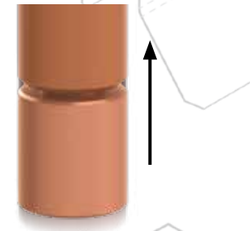
2

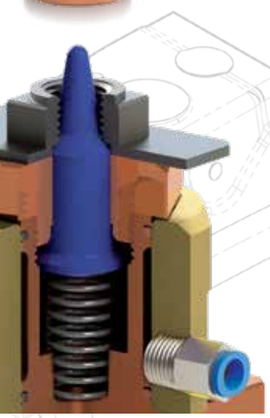
The top electrode grips the projection weld nut and pushes it onto the sheet in a perfectly centred position.



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

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

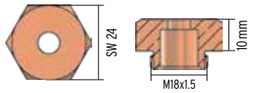
DOGLAS insert
> 1115-ZK-12000

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

Base electrode
M18x1.5
> 1111-ZK-10562

M4, M5, M6

Change electrodes

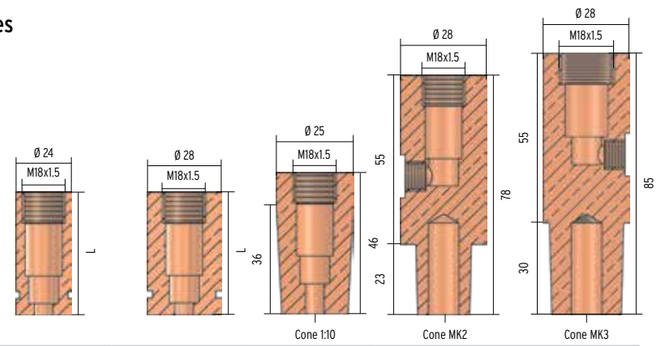


Screw thread	Item No.	SW 24 1111-ZK-
	M4	13000
	M5	13001
	M6	13002

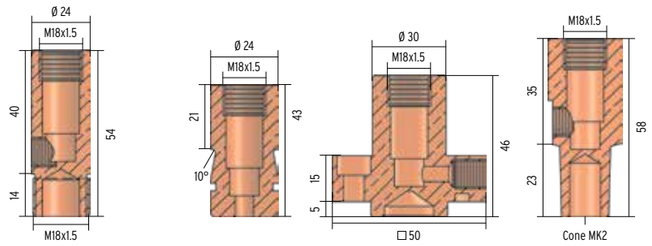
Centring sleeves

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

Base electrodes



Length (L in mm)	Item No.	Standard Ø 24 1111-ZK-	Standard Ø 28 1111-ZK-	Cone 1:10 1111-ZK-	Cone MK2 1111-ZK-	Cone MK3 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

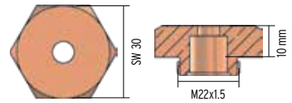
Accessories

DOGLAS insulating insert

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

M8, M10, M12

Change electrodes

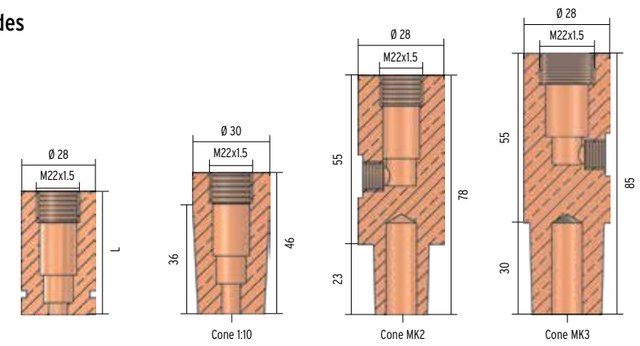


Screw thread	Item No.	SW 30 1111-ZK-
	M8	13003
	M10	13004
	M12	13005

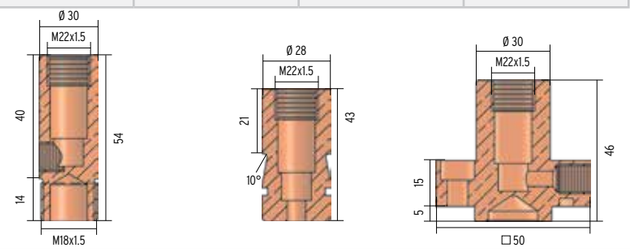
Centring sleeves

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

Base electrodes



Length (L in mm)	Item No.	Standard Ø 28 1111-ZK-	Cone 1:10 1111-ZK-	Cone MK2 1111-ZK-	Cone MK3 1111-ZK-
	40	10521	–	–	–
	50	10522	–	–	–
	60	10523	–	–	–
			10584	10546	10547



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

Compressed air connector

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

O-rings for base electrode

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

O-rings for stud insert

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

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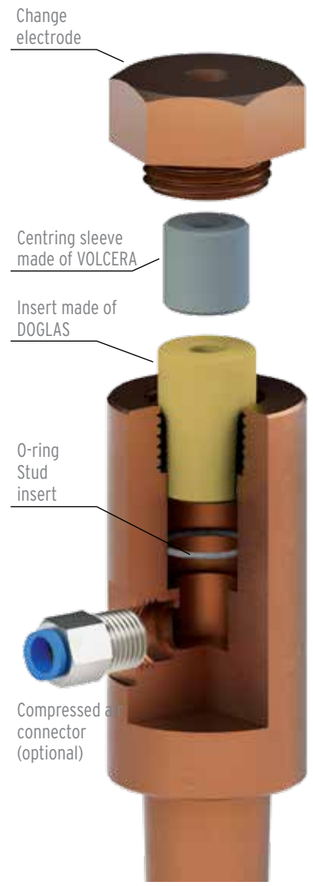
Perfect stud and sheet centring with a sleeve made of VOLCERA



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

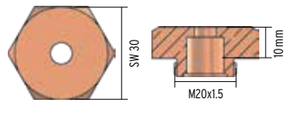
DOGLAS insert
> 1115-ZK-13002

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

Base electrode for MK2
fixing
> 1111-ZK-20542

Cooling ring
> 1113-ZK-19766

Change electrodes



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

Centring sleeves

Screw thread	Centring sleeve	
Item No.	8440-ZK-	8210-ZK-
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-	1115-ZK-	1115-ZK-	1115-ZK-	1115-ZK-	1115-ZK-
16.8	13000	13001	13002	–	–	–
22.8	–	–	–	13003	13004	13005

O-rings for base electrode

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

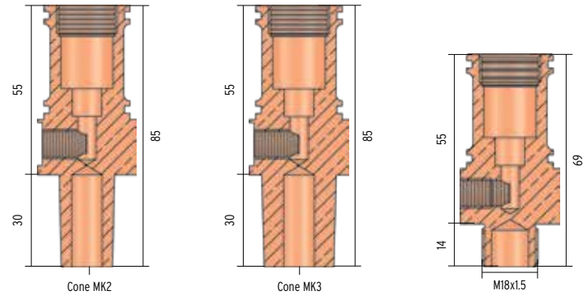
O-rings for stud insert

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

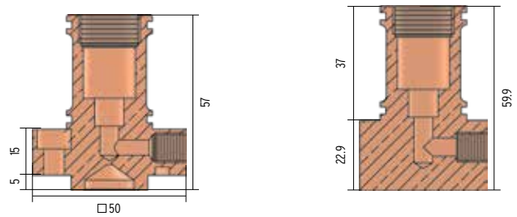
Compressed air connector

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

Base electrodes

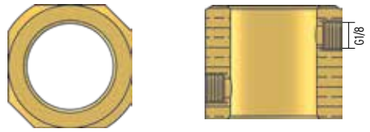


Diameter	Cone MK2	Cone MK3	Thread M18x1.5
Item No.	1111-ZK-	1111-ZK-	1111-ZK-
M4, M5, M6	20542	20543	20562
M8, M10, M12	20544	20545	20563



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

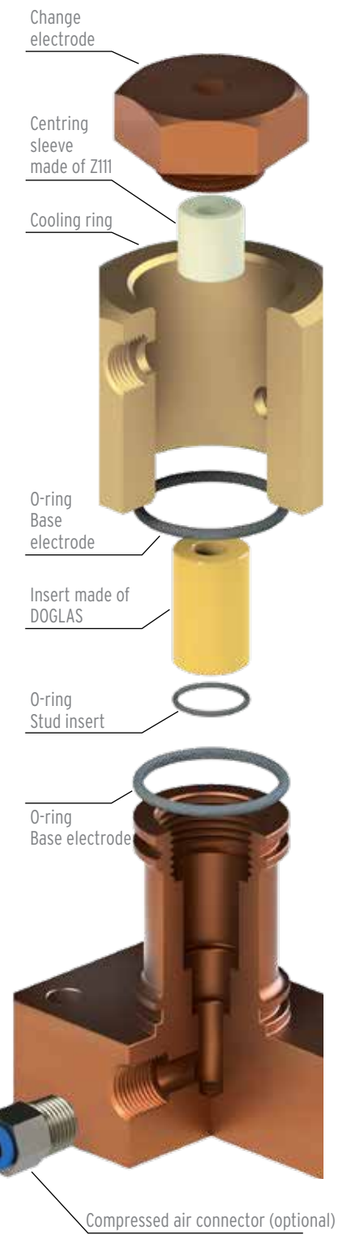
Cooling ring



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	

DO CERAM
ADVANCED CERAMIC SOLUTIONS

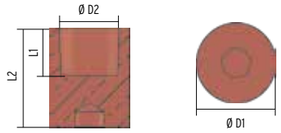
Perfect stud and sheet centring
with a sleeve made of VOLCERA



TOP ELECTRODES

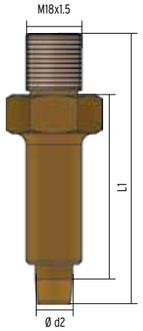
WELDING

Caps



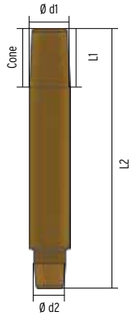
Ø D1 (in mm)	(mm)				Item No.
	Ø D2	L2	L1	For nut	1111-ZK-
13.0	10.0	18.0	8.0	M6	30000
13.0	10.0	18.0	8.0	M8	30001
13.0	10.0	18.0	8.0	M10	30002
16.0	12.0	20.0	9.5	M6	30003
16.0	12.0	20.0	9.5	M8	30004
16.0	12.0	20.0	9.5	M10	30005
16.0	12.0	20.0	9.5	M12	30006
20.0	15.0	22.0	11.5	M6	30007
20.0	15.0	22.0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



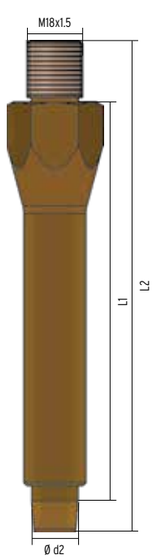
Length L2 (in mm)	(mm)		Item No.
	L1	Ø d2	1111-ZK-
48	20	12	31018
58	30	12	31019
68	40	12	31020
78	50	12	31021
88	60	12	31022
98	70	12	31023
108	80	12	31024
118	90	12	31025
128	100	12	31026
138	110	12	31027
148	120	12	31028
158	130	12	31029
168	140	12	31030
178	150	12	31031

Cone shafts with through-hole



Length L2 (in mm)	(mm)			(mm)		Item No.
	L1	Cone	Ø d1	Ø d2	1111-ZK-
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

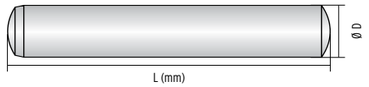
FIXTURE CONSTRUCTION

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

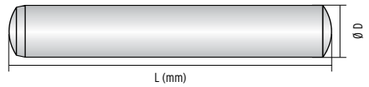
Z101



Tolerance h6
as per DIN 6325

Diameter (mm)	L	h6
Item No.		8221-ZK-
1.5	5	14012
2.0	6	14019
	10	14021
	12	14022
	14	14023
3.0	10	14037
	12	14038
	14	14039
	20	14042
	28	14044
4.0	10	14046
	12	14047
	16	14049
	18	14050
	20	14051
	28	14053
	32	14054
5.0	16	14059
	18	14060
	20	14061
	24	14062
	28	14063
	32	14064
	36	14065
6.0	14	14069
	18	14071
	20	14072

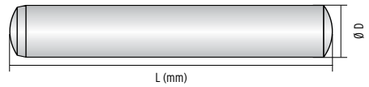
L	h6
	8221-ZK-
24	14073
28	14074
32	14075
36	14076
40	14077
50	14079
60	14081
8.0 18	14082
20	14083
24	14084
32	14086
40	14088
50	14090
60	14092
70	14093
10.0 24	14095
32	14097
40	14099
50	14101
60	14103
70	14104
90	14106
12.0 28	14108
40	14111
60	14115
14.0 40	14121
– –	–



Tolerance m5
as per DIN 6325

Diameter (mm)	L	m5
Item No.		8221-ZK-
1.5	5	15012
2.0	6	15019
	10	15021
	12	15022
	14	15023
3.0	10	15037
	12	15038
	14	15039
	20	15042
	28	15044
4.0	10	15046
	12	15047
	16	15049
	18	15050
	20	15051
	28	15053
	32	15054
5.0	16	15059
	18	15060
	20	15061
	24	15062
	28	15063
	32	15064
	36	15065
6.0	14	15069
	18	15071
	20	15072

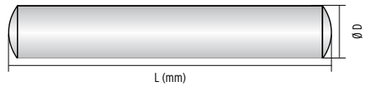
L	m5
	8221-ZK-
24	15073
28	15074
32	15075
36	15076
40	15077
50	15079
60	15081
8.0 18	15082
20	15083
24	15084
32	15086
40	15088
50	15090
60	15092
70	15093
10.0 24	15095
32	15097
40	15099
50	15101
60	15103
70	15104
90	15106
12.0 28	15108
40	15111
60	15115
14.0 40	15121
– –	–



Tolerance m6
as per DIN 6325

Diameter (mm)	L	m6
Item No.		8221-ZK-
1.5	5	13012
	6	13014
	10	13015
2.0	6	13019
	10	13021
	12	13022
	14	13023
3.0	10	13037
	12	13038
	14	13039
	18	13041
	20	13042
	28	13044
	32	13045
4.0	10	13046
	12	13047
	16	13049
	18	13050
	20	13051
	24	13052
	28	13053
	32	13054
5.0	16	13059
	18	13060
	20	13061
	24	13062
	28	13063
	32	13064
	36	13065
6.0	14	13069
	18	13071
	20	13072

L	m6
	8221-ZK-
24	13073
28	13074
32	13075
36	13076
40	13077
50	13079
60	13081
8.0 18	13082
20	13083
24	13084
32	13086
40	13088
50	13090
60	13092
70	13093
10.0 24	13095
32	13097
40	13099
50	13101
60	13103
70	13104
90	13106
12.0 28	13108
40	13111
60	13115
14.0 40	13121
– –	–



Tolerance m6
as per ISO 2338

Diameter (mm)	L	m6
Item No.		8221-ZK-
1.5	5	16012
2.0	6	16019
	10	16021
	12	16022
	14	16023
3.0	10	16037
	12	16038
	14	16039
	20	16042
	28	16044
4.0	10	16046
	12	16047
	16	16049
	18	16050
	20	16051
	28	16053
	32	16054
5.0	16	16059
	18	16060
	20	16061
	24	16062
	28	16063
	32	16064
	36	16065
6.0	14	16069
	18	16071
	20	16072

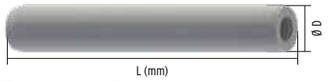
L	m6
	8221-ZK-
24	16073
28	16074
32	16075
36	16076
40	16077
50	16079
60	16081
8.0 18	16082
20	16083
24	16084
32	16086
40	16088
50	16090
60	16092
70	16093
10.0 24	16095
32	16097
40	16099
50	16101
60	16103
70	16104
90	16106
12.0 28	16108
40	16111
60	16115
14.0 40	16121
– –	–

PULL DOWEL PINS

FIXTURE CONSTRUCTION

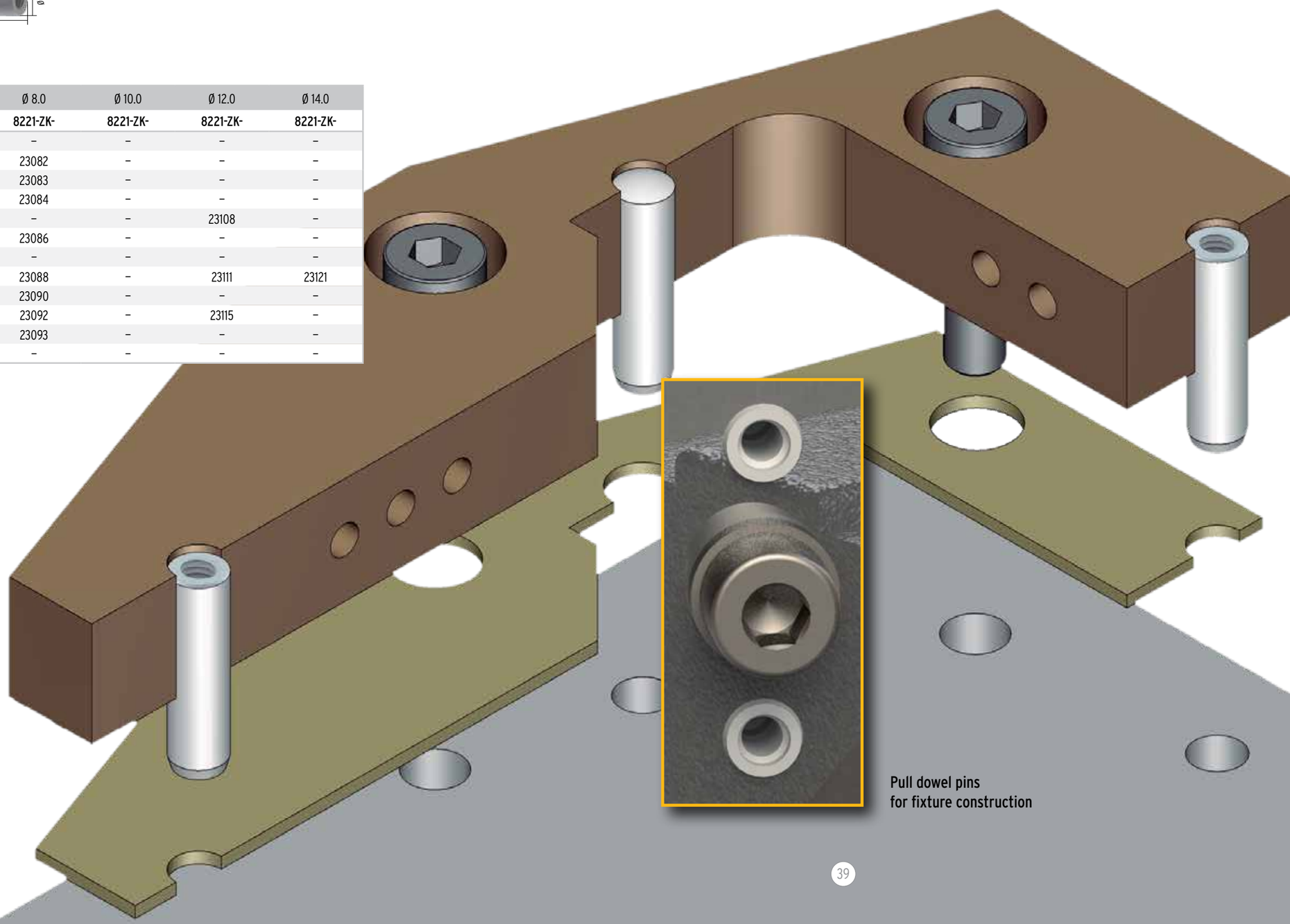
Dowel pins for fixture construction
made of high-performance ceramic

ZI01



Tolerance m6
as per DIN 7979-D

Length (mm)	Ø 6.0	Ø 8.0	Ø 10.0	Ø 12.0	Ø 14.0
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

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.

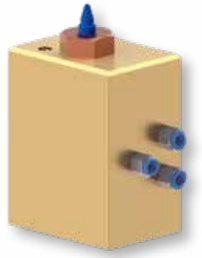
Quote by Tobias Lange (Application Engineer of DOCERAM® GmbH):
"This is unsurpassed with regard to flexibility and speed! All parts and components are available from stock and can be freely combined."

The comprehensive standard range includes:

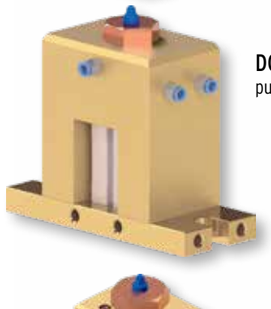
- Welding centring pins
- Complete electrodes
- Complete welding devices
- Positioning pins
- Dowel pins
- Screw head insulation
- MIG/MAG gas nozzles

Individual solutions can be supplied at short notice.
Your benefits include:

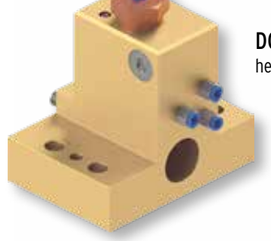
- No need for new designs
- Plug & Play solution due to 3D data
- Quick operational readiness on site
- Safe process based on our many years of experience



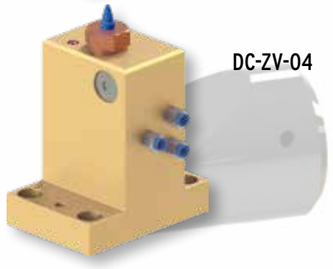
DC-ZV-01



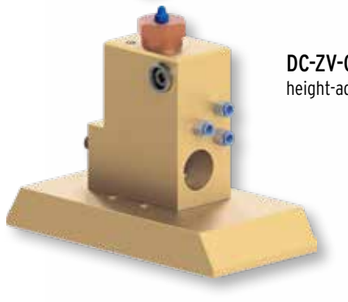
DC-ZV-02
pull version



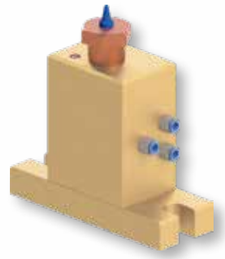
DC-ZV-03
height-adjustable



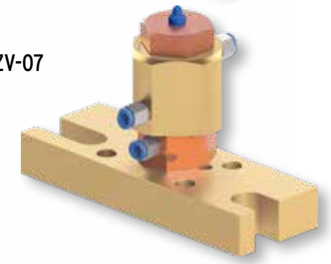
DC-ZV-04



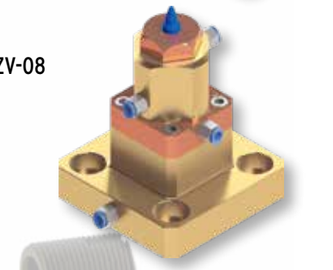
DC-ZV-05
height-adjustable



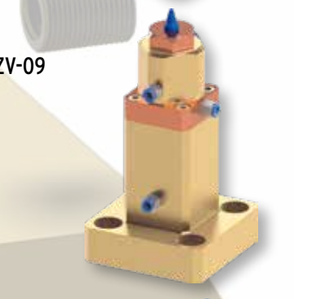
DC-ZV-06



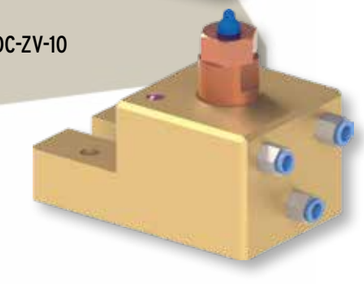
DC-ZV-07



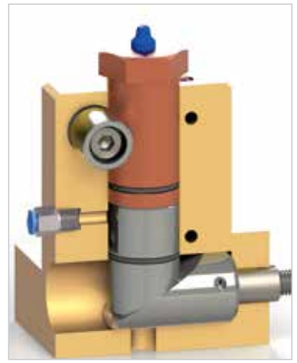
DC-ZV-08



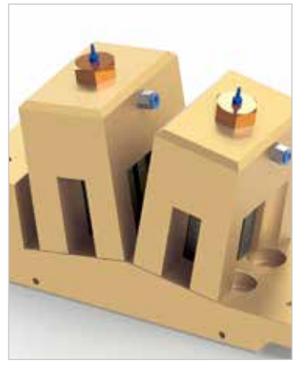
DC-ZV-09



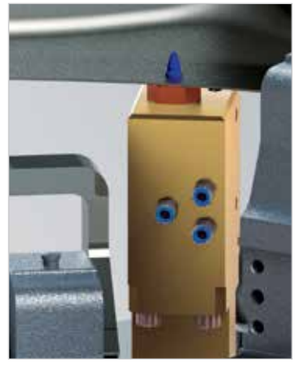
DC-ZV-10



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.

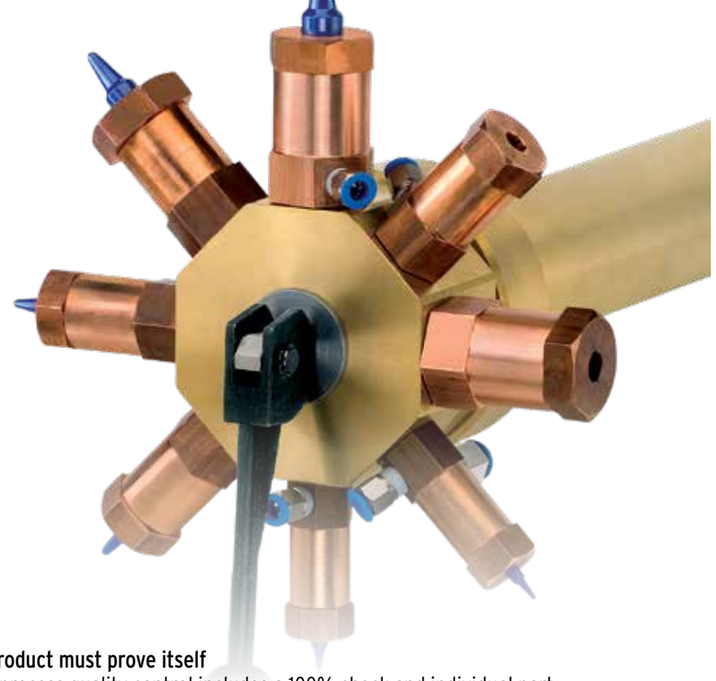
Our development engineers and application technicians are ideally placed to develop the right solution for you.

› **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.

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

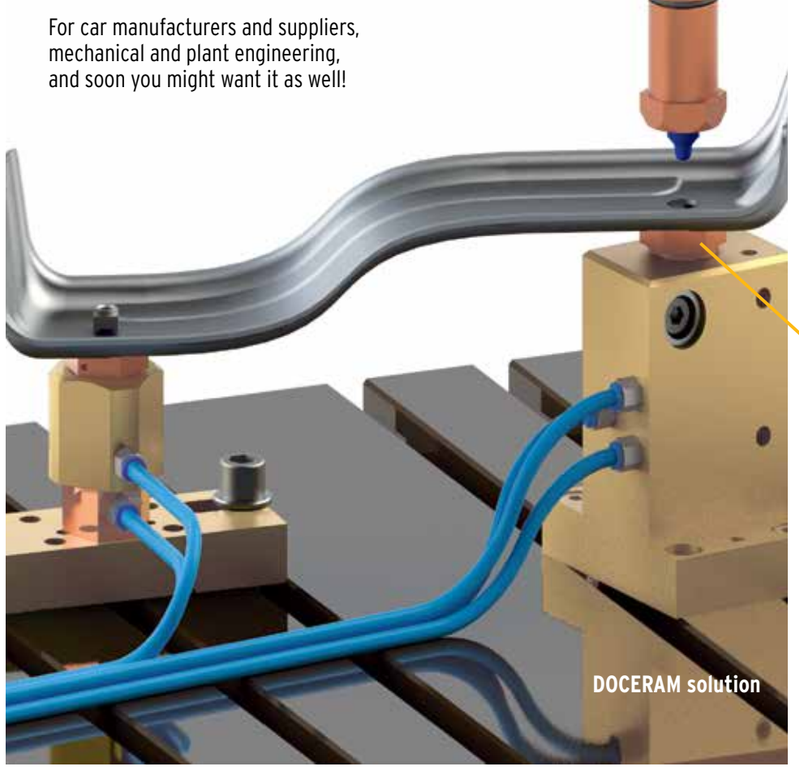


DOCERAM
ADVANCED CERAMIC SOLUTIONS

› **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.

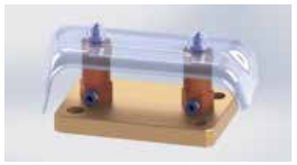
› **Your product is ready for use**
Your product, which has been manufactured according to your specifications, will quickly find its place in your production lines and ensure high-precision sequences and long production cycles subject to very small tolerances.

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

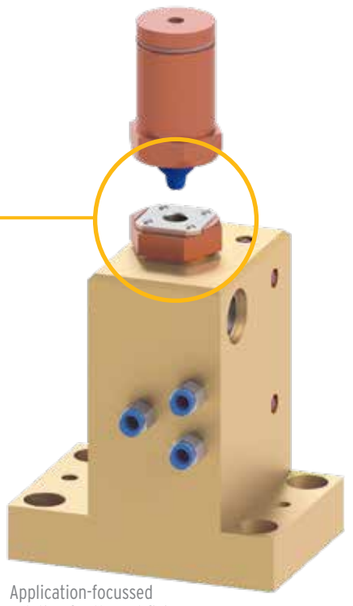


Customer-specific component request

Application solution by DOCERAM



Perfect photo-realistic display for a detailed overview



Application-focussed solution for the nut fixing

WELDING LABORATORY

ANALYSIS

- **Feasibility analysis**
- **Parameter determination**
- **Small-series production**

It is against this backdrop that DOCERAM offers its customers a welding laboratory. Here, welding tests on the customer's samples are carried out and prototypes are created, reviewed and documented.
The determined welding parameters provide important basic planning information for the machines and systems that you require.

Benefits

- Advance statement regarding the welding ability of components
- Determination of welding parameters for designing the welding equipment
- Determination of the welding pressure for designing welding cylinders and calculating the stability
- Preproduction batch (sample production)
- Time savings during the system commissioning
- Advance determination of the electrode geometry

Our close cooperation with our customers
with a detailed review of operators and machinery ensures a wholistic solution as well as

› Faster development cycles
› Optimised sequences
› Increased efficiency
› Innovative solutions

This is communicative engineering between application technicians and your own designers at the highest technical level.

Projection welding machine / technical data	
Transformer	MS Bosch PSG 3200.00.A
Converter	MS Bosch PSI 6200.750W1
Plate size	500 x 500 mm
Welding controller	Bosch BOS 6000
Stroke	100 mm
Pressure range	Level 1: 2.5 to 14 kN
	Level 2: 5 to 30 kN
Maximum welding current	approx. 32 kA at 200 ms

Tensile and compression test machine

Our tensile and compression test machine checks the welded components for their weld quality.
This destructive test is based on the quality requirements according to our customers' specifications.

A force range of up to 20 kN and a digitally calibrated pressure cell with a resolution of 0.01 kN allows the determination of precise compression forces.

This test unit is easy to transport and can therefore be used for the commissioning of the system on the customer's site.

In this way, a quick indication of the weld quality can be given during commissioning.

- **Parameter documentation**
  After a successful test, all data and parameters of the weld are logged. This document including an illustrated documentation is provided to the customer.
- **Reference welding**
  Numerous welding tests for our customers provide valuable information regarding the feasibility and set-up values for subsequent welding systems.

Sheet and projection weld nut in the welding machine

Welding process in the projection weld nut machine

Evaluation of the welding log

GAS NOZZLES

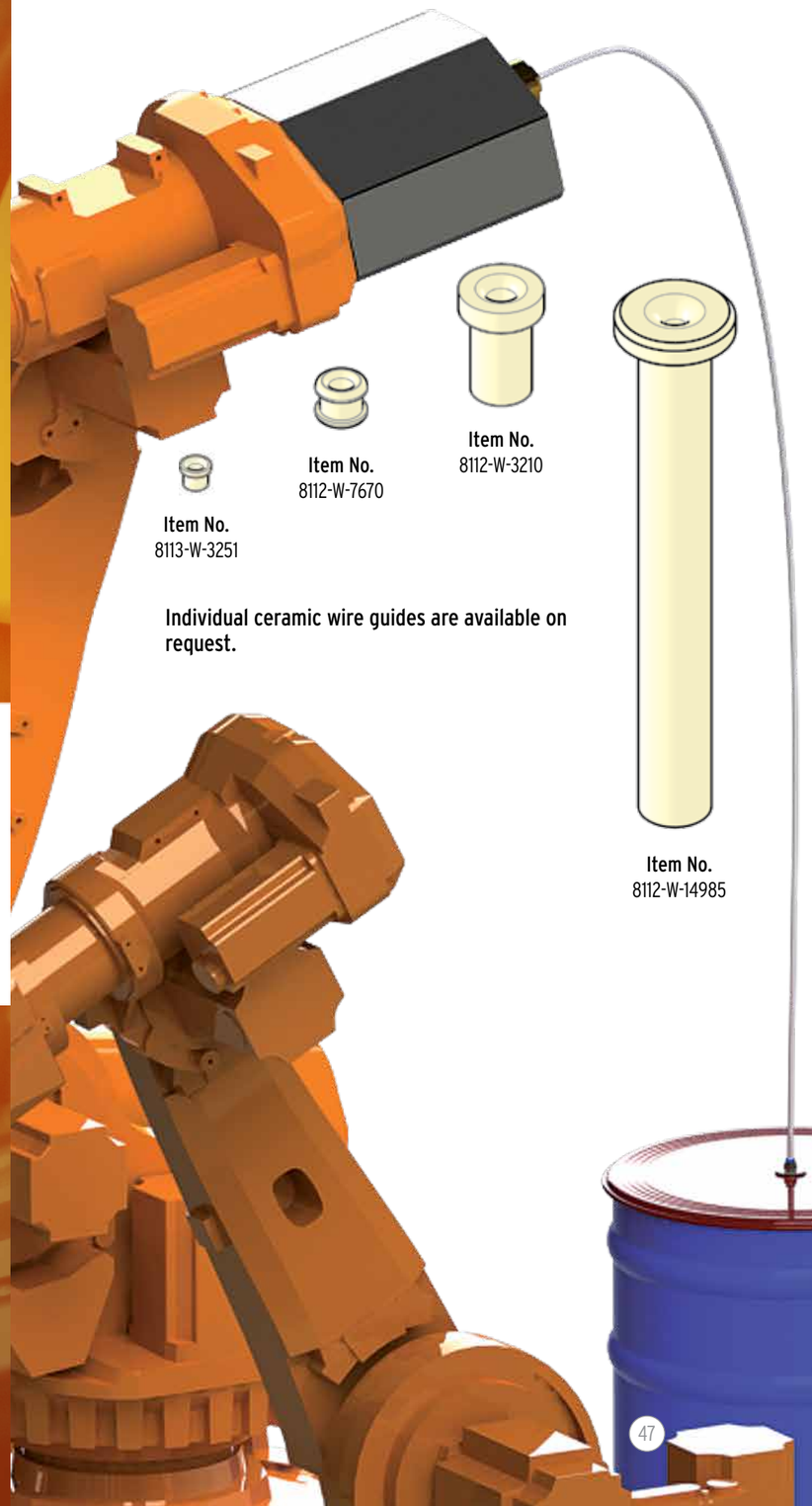
Item No.
8440-Z-35996

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

DO CERAM
ADVANCED CERAMIC SOLUTIONS



Item No.
8113-W-3251

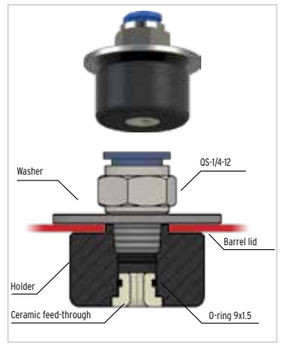
Item No.
8112-W-7670

Item No.
8112-W-3210

Item No.
8112-W-14985

Individual ceramic wire guides are available on request.

"Simple" ceramic feed-through at the wire core



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

A safe and durable solution for your barrel connector

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

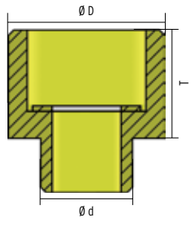
SCREW HEAD

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

DOGLAS® 180 G

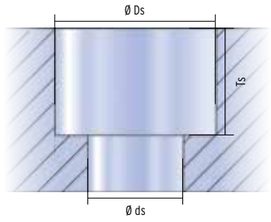
Screws insulating sockets

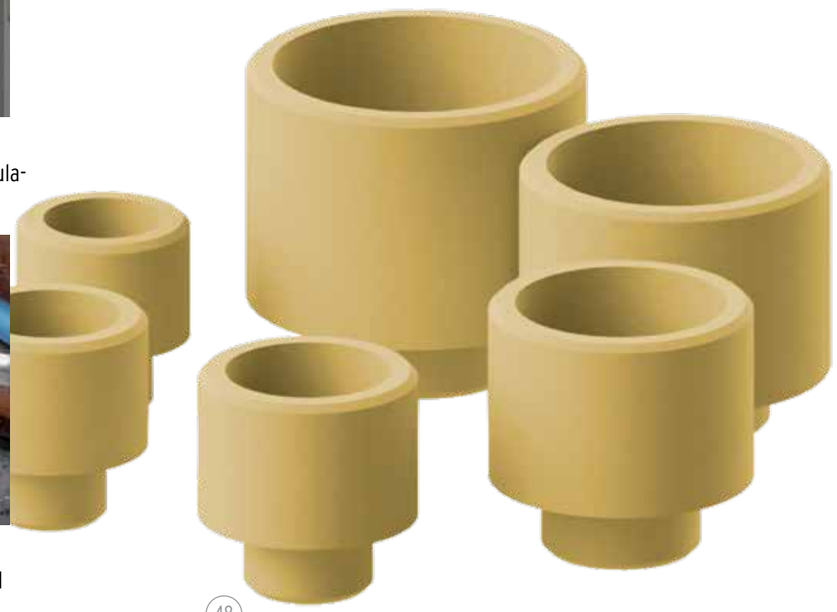
		(mm)			Item No.
		d	D	T	1462-Z
For screw	M5	7.5	13.0	9.0	93653
	M6	8.5	14.5	10.0	93655
	M8	10.5	17.5	12.0	93657
	M10	12.5	20.5	14.0	93658
	M12	14.5	22.5	16.0	93659



Recommendation for countersunk hole

		(mm)		
		ds	Ds	Ts
For insulating socket	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





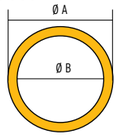
DO'CERAM
ADVANCED CERAMIC SOLUTIONS

TUBES

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

DOTEX® 120 DOTEX® 110 DOGLAS® 180 G

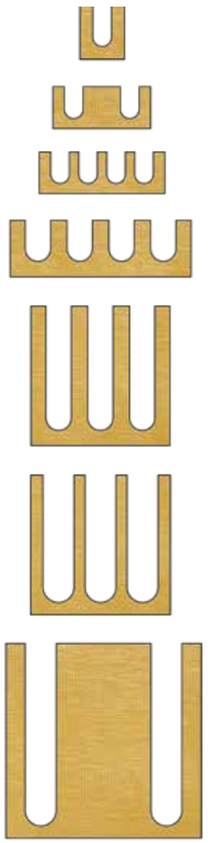
Insulating tubes



	(mm)		Item No.	(mm)	Item No.	(mm)	Item No.
	Ø A	Ø B	Length	1408-R	Length	1457-R	Length	1468-R
Dimensions (mm)	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

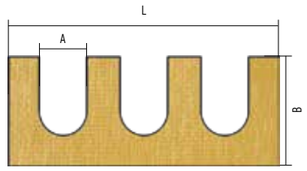
INSULATION

SHIMS / ADAPTER PLATES

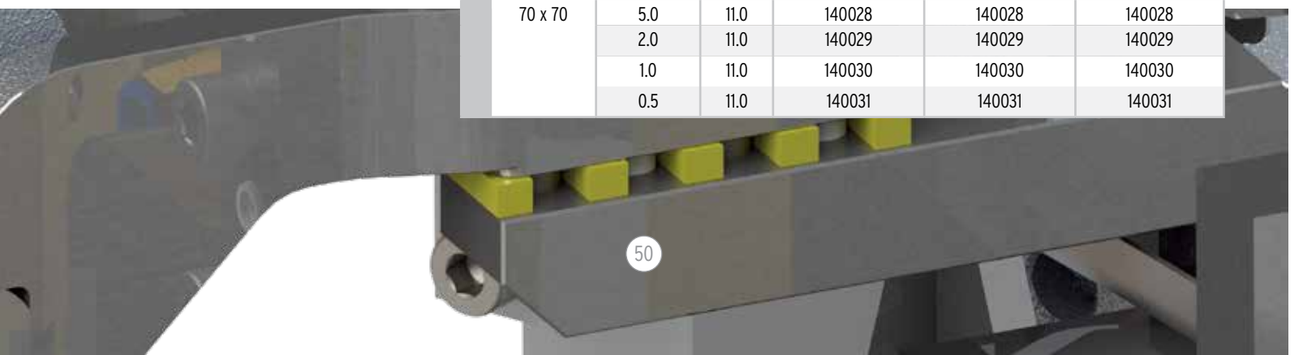


Adapter plates for fixture construction

Shims and adapter plates



			DOTEX® 120	DOTEX® 110	DOGLAS® 180 G
			Item No.	Item No.	Item No.
L x B (mm)	Thickness	A	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

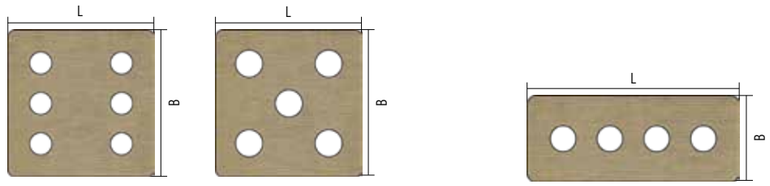


INSULATION

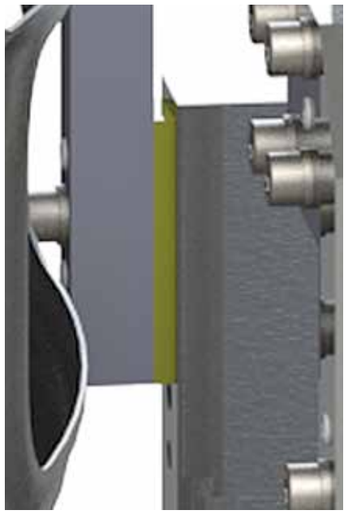
BOARDS

DOCERAM ADVANCED CERAMIC SOLUTIONS

Insulating boards with bores

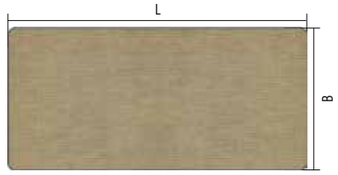


				DOTEX® 120	DOTEX® 110	DOGLAS® 180 G
				Item No.	Item No.	Item No.
L x B (mm)	Square design	Thickness	Bore	1400-F	1450-F	1462-F
	60 x 60	2.0	6 x Ø 9 mm	140034	140034	140034
	50 x 50	2.0	5 x Ø 9 mm	140035	140035	140035
	60 x 60	2.0	5 x Ø 11 mm	140036	140036	140036
	Rectangular design					
	60 x 30	2.0	3 x Ø 9 mm	140032	140032	140032
	75 x 30	2.0	4 x Ø 9 mm	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	
		Item No.		Item No.		Item No.
(in mm)	B x L	1450-BS	B x L	1400-BS	B x L	1462-BS
	1050 x 2050	0010	1050 x 2050	0010	1220 x 2440	10010
	1050 x 2050	0030	1050 x 2050	0030	1220 x 2440	10030
	1050 x 2050	0060	1050 x 2050	0060	1220 x 2440	10060
	1050 x 2050	0080	1050 x 2050	0080	1220 x 2440	10080
	1050 x 2050	0100	1050 x 2050	0100	1220 x 2440	10100
	1050 x 2050	0150	1050 x 2050	0150	1220 x 2440	10150
	1050 x 2050	0200	1050 x 2050	0200	1220 x 2440	10200
	1050 x 2050	0300	1050 x 2050	0250	1220 x 2440	10250
	1050 x 2050	0400	1050 x 2050	0300	1220 x 2440	10300
	1050 x 2050	0500	1050 x 2050	0350	1220 x 2440	10400
	1050 x 2050	0600	–	–	1220 x 2440	10500
	–	–	–	–	1220 x 2440	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.

			DOTEX® I10	DOTEX® I20	DOGLAS® I80 G
Material					
Material description			Coating material made of resin-bonded cotton fabric	Coating material made of resin-bonded paper	Coating material made of resin-bonded glass fabric
Colour			brown	brown	yellowish, brown
Applications			Electrical and thermal insulation parts for mechanical and plant engineering	Electrical and thermal insulation parts for mechanical and plant engineering	Electrical and thermal insulation parts for mechanical and plant engineering
Delivery formats			Boards, cut to size and components / assemblies acc. to drawing	Boards, cut to size and components / assemblies acc. to drawing	Boards, cut to size and components / assemblies acc. to drawing
Properties	**Test standard**	**Unit**	**Value**	**Value**	**Value**
Physical properties					
Density	ISO 1183	(g/m^3)	1.4	1.4	1.85
Water absorption	ISO 62	(%)	2.4	5.2	0.1
Thermal properties					
Application temperature, permanent	–	(°C)	110	120	180
Application temperature, temporary	–	(°C)	110	120	210
Linear expansion coefficient	DIN 51045	(10^{-6} x K^{-1})	30	30	15
Thermal conductivity	DIN 52612	(W/mK)	0.2	0.2	0.3
Mechanical properties					
Compression strength at 23°C	ISO 604	(N/mm^2)	320	300	600
Compression strength at 200°C	ISO 604	(N/mm^2)	–	–	260
Bending strength at 23°C	ISO 178	(N/mm^2)	100	135	450
E-modulus from bending tests	ISO 178	(N/mm^2)	7000	7000	20000
Tensile strength	ISO 527	(N/mm^2)	80	120	400
Splitting force	DIN 53463	(N)	3000	1900	3500
Electrical properties					
Creep resistance	IEC 112	–	CTI 100	CTI 100	CTI 350
Dielectric constant	DIN 53483	–	–	–	5.1
Electrical dielectric strength (⊥)	IEC 243-1	(kV/3 mm)	1.5	10	30
Electrical dielectric strength (∥)	IEC 243-1	(kV/25 mm)	1.0	10	36

DOCERAM
ADVANCED CERAMIC SOLUTIONS

We provide solutions for extreme thermal...

...electrical and mechanical...

stress every day.

JOINT PROJECTS

DOCERAM, DOTHERM AND STS FRICTION

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.

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

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.

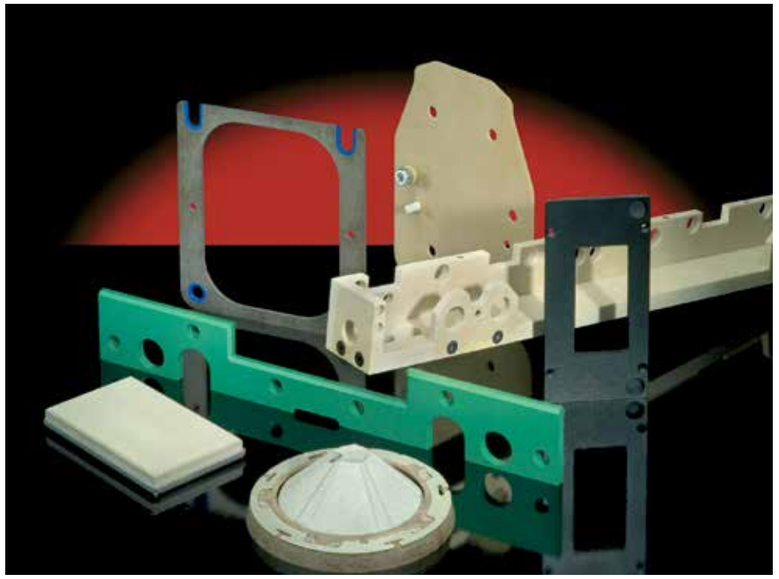
To us, the in-process quality assurance with subsequent 100% control of all items is just as much a requirement as the detailed dialogue with our customers.

DOCERAM ceramics for mechanical engineering

DOCERAM textile engineering

Broad application ranges require a comprehensive product range.

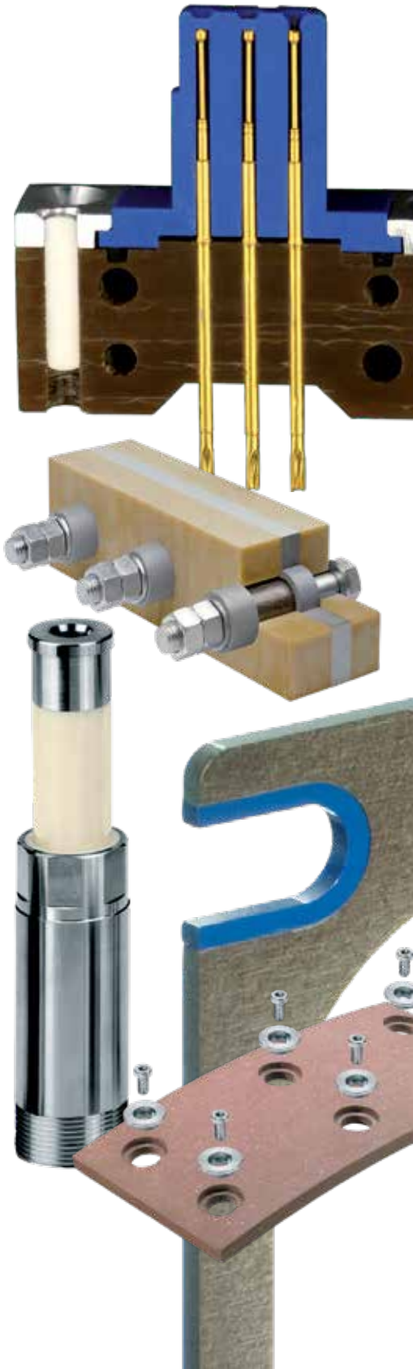
› Proven product groups have eventually become standard products.
› Today's individual solutions become the standards of tomorrow.
› Your future requirements are already realised by today's innovations.



DOTHERM high-temperature insulating technology

STS Friction

Cross-material total solutions by MOESCHTER GROUP



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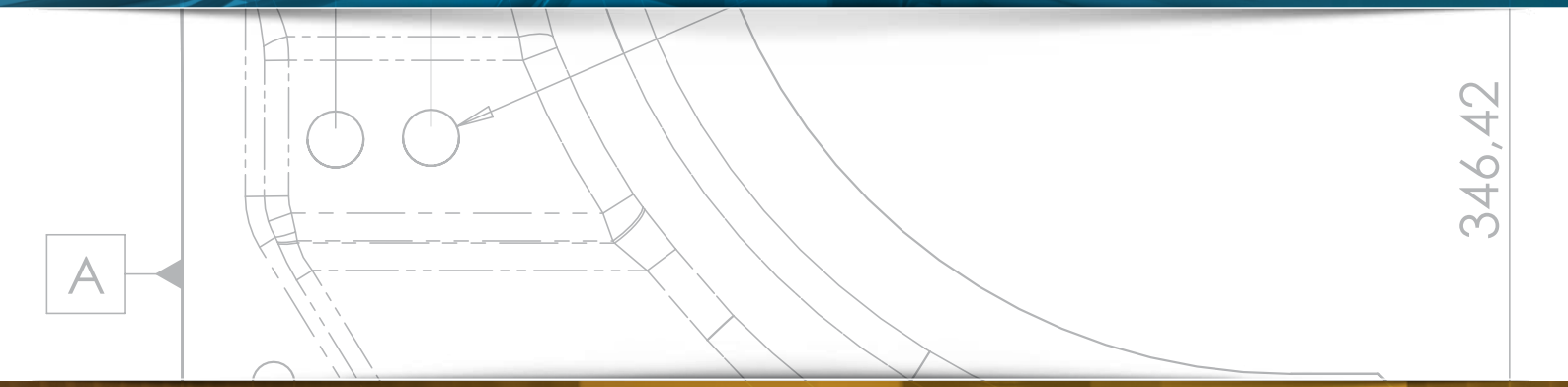

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