



# Stud Welding Fasteners

## Product survey



The five major welding processes of capacitor discharge, drawn arc, short cycle, insulation and MARC have been designed to cover a wide range of applications. They are most commonly utilized for: vehicle construction, automotive supply industry, steel construction, mechanical engineering, electrical engineering, apparatus / casing construction, control panel, cabinet construction, commercial kitchens, laboratory and health techniques, food industry, household appliances, information technology, metal fittings, curtain walling, steel construction, ventilation construction, insulating techniques, fire-proof insulation of power and combustion plants, vessel construction, shipbuilding etc.

## HBS – The Best Solutions

Our products are made and based on over 30 years of development experience and know how in stud welding technology. HBS welding elements match this technology. Use of HBS welding elements guarantees a continuous high level weld quality.

With HBS stud and equipment products and technology, major benefits are realized from finding every thing from one source. As a complete system provider you have one supplier, cost effective, fast delivery along with sustained high quality. This also applies to a variation in studs e.g. threaded studs, pins, ground clips, pads. Additionally we supply individual welding elements to customer requirements.

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Technical data are valid at the time of printing. Data subject to modification.

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## Stud flange

The stud flange is designed acc. to DIN EN ISO 13918. Its diameter is larger than the diameter of the stud. During welding, it prevents the arc from moving to the cylindrical part of the stud and simultaneously increases the welding area. As a result, the welded joint is stronger.

The flange is also used for automatic feeding with HBS feeding units. Depending on requirement, welding studs with varying flange dimension or without flange can be used.

## Threads

Non coated threaded studs are provided with a thread acc. to DIN ISO 724, DIN EN ISO 4759-1, product class A, tolerance 6g. Galvanized threaded studs acc. to DIN EN ISO 4042, tolerance 6h.

If the thread is cold worked, the cold worked thread has the following advantages: No disruption of the grain flow, improved strength of the surface, decreased surface roughness thus higher corrosion resistance.

## Surface treatment

Studs, pins and tapped pads made of steel (4.8<sup>1)</sup> are generally protected against corrosion by a galvanic copper coating (DIN EN ISO 4042). The coating thickness is between 3 to 5 µm (C1E).

## Quality level / Tolerances

HBS welding studs are supplied acc. to DIN EN ISO 3269 with quality level (AQL) 1,5 and to DIN EN ISO 2768 in tolerance class m (medium).

<sup>1)</sup> = suitable for welding

## Technical Data

Stud types	Codes	Material	Standards	Mechanical characteristics	
Capacitor discharge stud welding with tip ignition	Threaded stud	PT	Steel (4.8 <sup>1)</sup> copper plated	ISO 898-1	$R_m \geq 420 \text{ N/mm}^2 / R_{p0.2} \geq 340 \text{ N/mm}^2 A_s \geq 14\%$
			1.4301/03 (A2-50 <sup>1)</sup> )	ISO 3506-1	$R_m \geq 500 \text{ N/mm}^2 / R_{p0.2} \geq 210 \text{ N/mm}^2 / A_s \geq 0,6d$
	Pin	UT	CuZn37 (Ms63)	EN 12166	$R_m \geq 370 \text{ N/mm}^2$
			EN AW-Al99,5	EN 573-3	$R_m \geq 100 \text{ N/mm}^2$
			EN AW-AlMg3	EN 1301-2	$R_m \geq 230 \text{ N/mm}^2$
Tapped pad	IT				

## Stud types, codes, material, standards, mechanical characteristics to DIN EN ISO 13918

<sup>1)</sup> = suitable for welding

Stud material	Base material				
	ISO/TR 15608 material groups 1 to 6, 11.1	ISO/TR 15608 material groups 1 to 6, 11.1 and galvanized and metal coated steel sheet, max. thickness 25 µm of coating	ISO/TR 15608 material group 8	Copper and lead-free copper alloys, e.g. CuZn37 (CW508L)	ISO/TR 15608 material groups 21 and 22
Steel (4.8 <sup>1)</sup> copper plated	1	2	1	2	-
1.4301/03 (A2-50 <sup>1)</sup> )	1	2	1	2	-
CuZn37 (Ms63)	2	2	2	1	-
EN AW-Al99,5	-	-	-	-	2
EN AW-AlMg3	-	-	-	-	1

## Material combinations

Acc. to DIN EN ISO 14555 (Stud and basic material should be of the same or similar kind)

- 1 = good suitability for any application, e.g. force transmission
- 2 = suitable, limited force transmission
- = not weldable

<sup>1)</sup> = suitable for welding

Welding tests of other material combinations upon request

Threaded studs	Steel (4.8 <sup>1)</sup> $\mu = 0.18$ $R_{p0.2} = 340 \text{ N/mm}^2$		1.4301/03 (A2-50 <sup>1)</sup> $\mu = 0.18$ $R_{p0.2} = 210 \text{ N/mm}^2$		AlMg3 F23 $\mu = 0.18$ $R_{p0.2} = 170 \text{ N/mm}^2$		CuZn37 (Ms63) $\mu = 0.18$ $R_{p0.2} = 250 \text{ N/mm}^2$	
	Mounting pre-load (kN)	Torque (Nm)	Mounting pre-load (kN)	Torque (Nm)	Mounting pre-load (kN)	Torque (Nm)	Mounting pre-load (kN)	Torque (Nm)
M3	1.1	0.8	0.7	0.5	0.5	0.4	0.8	0.6
M4	1.8	1.8	1.1	1.1	1	0.9	1.4	1.3
M5	3	3.6	1.9	2.3	1.6	1.9	2.3	2.7
M6	4.3	6.1	2.7	3.8	2.2	3.1	3.2	4.5
M8	8	15	4.9	9.5	4	7.5	6	11
M10	13	30	7.8	19				

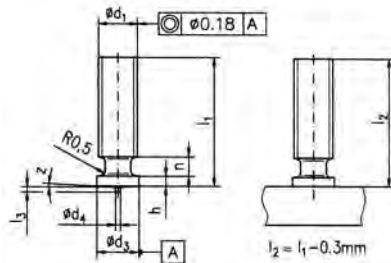
## Mounting pre-load (tie load) and torque

Values correspond to DVS-Merkblatt 0904

All given values are indications of the minimum tie load and minimum torque (for 90% of minimum yield stress) of a weld without permanent deformation of parts to be joined. Parts to be joined must have sufficient wall thickness. Values apply for cold worked threaded studs with standard thread without surface protection and without thread lubrication. Throughout the entire stud length, at least the stressed cross section must be present. Values apply for indicated yield strengths.

<sup>1)</sup> = suitable for welding

## Threaded studs Type PT



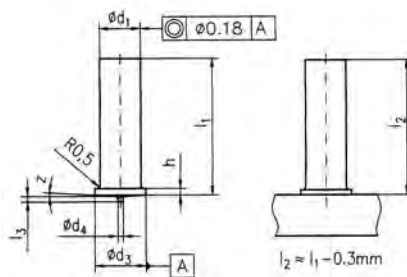
$d_1$	$l_1$ + 0.6	$d_3$ $\pm 0.2$	$d_4$ $\pm 0.08$	$l_3$ $\pm 0.05$	$h$	$n$ max	$l_2$	$z$ $\pm 1$
M3	6-30	4.5	0.6	0.55	0.7	1.5	= $l_1$ -0.3	3°
M4	6-40	5.5	0.65	0.55	1.4	1.5		
M5	6-45	6.5	0.75	0.8	0.8 - 1.4	2		
M6	8-55	7.5	0.75	0.8		2		
M8	10-50	9	0.75	0.85	3			
M10	20-50	10.7	0.75	0.75	1.2-1.8	3		

M10 according to DIN EN ISO 13918 and only with the materials steel (4.8) copper plated and 1.4301/03 (A2-50)

**Recommended power units:** CD 1501, CD 2301, CD 3101, CDM 2401, CDM 3201, SCD 3201  
**Recommended welding guns:** C 08, CA 08  
**Recommended automatic welding guns/heads:** PAH-1, KAH 412, KAH 412 LA

**Materials:** Steel (4.8) copper plated, 1.4301/03 (A2-50), EN AW-AMg3, CuZn37 (Ms63)

## Pins Type UT



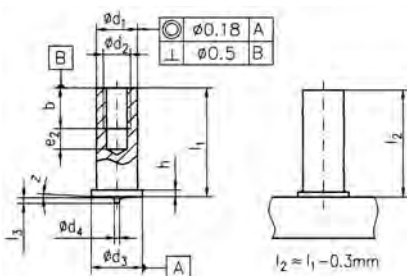
$d_1$ $\pm 0.1$	$l_1$ + 0.6	$d_3$ $\pm 0.2$	$d_4$ $\pm 0.08$	$l_3$ $\pm 0.05$	$h$	$l_2$	$z$ $\pm 1$
Dia. 3	6-30	4.5	0.6	0.55	0.7	= $l_1$ -0.3	3°
Dia. 4	6-40	5.5	0.65	0.55	1.4		
Dia. 5	6-40	6.5	0.75	0.8	0.8 - 1.4		
Dia. 6	8-50	7.5	0.75	0.8			
Dia. 7.1	10-55	8.5-9.0	0.82	0.9			

Dia. 7.1 according to DIN EN ISO 13918

**Recommended power units:** CD 1501, CD 2301, CD 3101, CDM 2401, CDM 3201, SCD 3201  
**Recommended welding guns:** C 08, CA 08  
**Recommended automatic welding guns/heads:** PAH-1, KAH 412, KAH 412 LA

**Materials:** Steel (4.8) copper plated, 1.4301/03 (A2-50), EN AW-AMg3, CuZn37 (Ms63)

## Tapped pads Type IT



$d_1$ $\pm 0.1$	$d_2$	$l_1$ + 0.6	$b$ + 0.5	$e_2$ min.	$d_3$ $\pm 0.2$	$d_4$ $\pm 0.08$	$l_3$ $\pm 0.05$	$h$	$l_2$	$z$ $\pm 1$
Dia. 5	M3	6-30	5	2.5	6.5	0.75	0.8	0.8 - 1.4	= $l_1$ -0.3	3°
Dia. 6	M3	8-30	6	3	7.5		0.8			
Dia. 6	M4	8-30	6	3	7.5		0.8			
Dia. 7.1	M5	10-30	7.5	3	9		0.85			

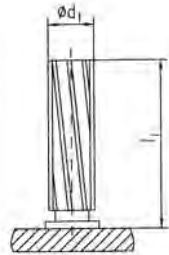
Thread depth b for  $l_1$  6-8 mm = 4 mm

Dia. 6 M3 according to DIN EN ISO 13918: applies only to steel (4.8) copper plated.

**Recommended power units:** CD 1501, CD 2301, CD 3101, CDM 2401, CDM 3201, SCD 3201  
**Recommended welding guns:** C 08, CA 08  
**Recommended automatic welding guns/heads:** PAH-1, KAH 412, KAH 412 LA

**Materials:** Steel (4.8) copper plated, 1.4301/03 (A2-50), EN AW-AMg3, CuZn37 (Ms63)

## Paint clearing studs



d <sub>1</sub>	l <sub>1</sub>
M4	8-40
M5	
M6	10-50
M8	

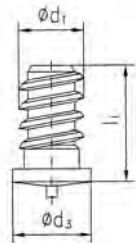
**Recommended power units:** CD 1501, CD 2301, CD 3101, CDM 2401, CDM 3201, SCD 3201

**Recommended welding guns:** C 08, CA 08

**Recommended automatic welding guns/heads:** PAH-1, KAH 412, KAH 412 LA

**Materials:** Steel (4.8) copper plated, 1.4301/03 (A2-50), CuZn37 (Ms63)

## Christmas tree studs



d <sub>1</sub>	l <sub>1</sub>	d <sub>3</sub>
5	9	6.3 (± 0.2)
	14.2	
	18	
	25	

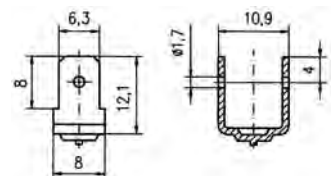
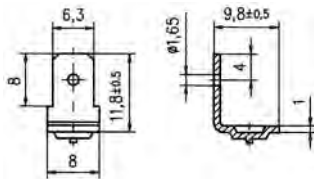
**Recommended power units:** CD 1501, CD 2301, CD 3101, CDM 2401, CDM 3201, SCD 3201

**Recommended welding guns:** C 08, CA 08

**Recommended automatic welding guns/heads:** PAH-1, KAH 412, KAH 412 LA

**Materials:** Steel (4.8) copper plated, 1.4301/03 (A2-50)

## Single ground clips /dual ground clips



**Recommended power units:** CD 1501, CD 2301, CD 3101, CDM 2401, CDM 3201, SCD 3201

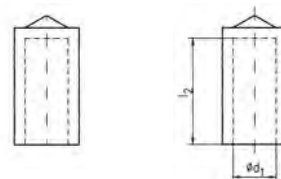
**Recommended welding guns:** C 08, CA 08

**Materials:** Steel (4.8) copper plated, 1.4301/03 (A2-50), CuZn37 (Ms63\*), EN AW-ALMg3

\*only ground clips

## Silicon covers

Silicon-rubber caps are used to cover the welding elements, (e.g. threaded studs, tapped pads, ground clips etc.). They protect mechanically important parts of the welding element during painting, powder coating, and during heat treatment processes. Permanent temperature of up to 210 °C – short term temperature up to 300 °C.



Length 10 mm for M 3 up to M 8, length 20 mm for M 8.

## HVAC – Fasteners for heating, ventilation, air-conditioning and fire insulation mats

To fasten HVAC mats, ISO-PLUS cupped head pins as well as insulation pins and clips are used.

### ISO-PLUS cupped head pins

Work with the fastening method using ISO-PLUS cupped head pins, the insulation mat is fixed in a single work process (replacing several complicated working steps).

Also Conlit fire-insulation mats can be fastened with cupped head pins (this only requires a spring force adjustment in the welding gun).

### ISO-PLUS cupped head pins – not insulated

To fasten insulation mats without aluminum foil.

### ISO-PLUS cupped head pins – insulated

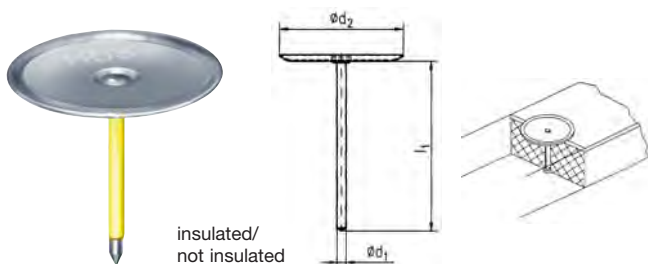
To fasten insulation mats with aluminum foil. The insulation of the pin which is **patented** by HBS, prevents a short-circuit with the aluminum foil during welding, thus preventing an energy loss.

### Insulation pins with clips

Insulation pins with clips are preferably used with pre-assemblies, e.g. fire-protection mats or mats with wire meshing.

Ask for our special insulation technique catalogue.

## ISO-Plus cupped head pins



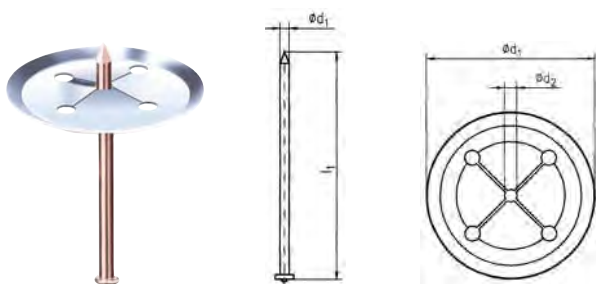
insulated/  
not insulated

d <sub>1</sub>	Length	d <sub>2</sub>
Dia. 2.0	9.5-54	30
Dia. 2.7	9.5-152.4	38

**Recommended power unit:** CD 1501  
**Recommended welding gun:** CI 03

**Material head:** Steel galvanized  
**Materials pin:** Steel (4.8), (1.4301/03 on request)

## Insulation pins and clips



**Recommended power unit:** CD 1501  
**Recommended welding gun:** C 08

### Pins:

d <sub>1</sub>	Length
Dia. 2	20-100
Dia. 3	30-100

### Clips:

d <sub>2</sub>	d <sub>1</sub>	Slotted
St2k70 galvanized		
2	38	6-times
3		6-times
2		4-times
3		3-times
1.4301/03 (A2-50)		
2	30	6-times
2		4-times
3		3-times

Plastic covered insulation clips of dia. 3 mm on request

**Materials pins:** Steel (4.8), 1.4301/03 (A2-50)  
**Materials clips:** St2k70 galvanized, 1.4301/03 (A2-50)

## FRI – fire-resistant insulation

Application areas of fire-resistant insulation are e.g. power stations, long-distance energy lines, waste incineration plants, industrial furnaces, chemical and petrochemical industry.

## Pins and clips

HBS supplies pins and clips of any material suitable to fasten fire-resistant insulation for steel constructions to protect against high temperatures (up to 1250 C°) and corrosion.

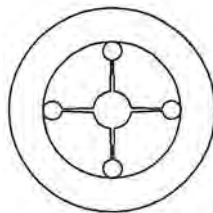
Ask for our special catalogue of fire-resistant insulations.



## ARC-Insulation pins and clips



Insulation-Pin



Insulation-Clip

	Pin	Clip
Diameter	3-6	3-6
Length	30-400	

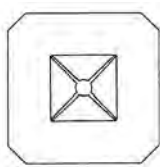
**Recommended power units:** SC 2401, ARC 500, IT 1002  
**Recommended welding guns:** AI 06, A 12, A 16

**Materials pin:** Steel (4.8), 1.4301/03, 16Mo3, 1.4841  
**Materials clip:** St2k70 galvanized, 1.4301/03, 1.4841

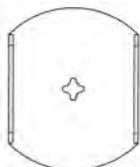
## ARC-Fiberfix pins and clips



ARC  
Fiberfix  
Pin



Mounting  
washer



Lock washer  
LFF-040



Lock washer  
LFF-060

	ARC-Fiberfix	Mounting washer	Lock washer LFF-040	Lock washer LFF-060
Diameter	5	5	5	5
Length	75-550			

**Recommended power units:** SC 2401, ARC 500, IT 1002  
**Recommended welding guns:** AI 06, A 12, A 16

**Materials ARC Fiberfix pin:** 1.4301/03, 1.4841, 1.4864  
**Materials mounting washer:** Steel, 1.4301/03  
**Materials lock washer LFF-040/-060:** Steel, 1.4841, alternatively 1.4301/03, 1.4864

## Flux (aluminum ball/ aluminum spray coating)

The stud tip is supplied with flux in the form of a press-fitted aluminum ball or with aluminum spray coating. This can be dispensed with in the case of stainless-steel studs and diameters  $\leq 10$  mm and stud welding with inert gas.

## Surface treatment

The studs will be supplied without surface protection. Other versions on request.

## Quality level

HBS welding studs are supplied acc. to DIN EN ISO 3269 with quality level (AQL) 1,5 and to DIN EN ISO 2768 in tolerance class m (medium).

## Threads

Threads of the studs are acc. to DIN ISO 724, tolerance position 6g.

## Type of stud

The **RD stud** is partially threaded. The base is not threaded and reduced to the core of the thread. The welding fillet is approx. 0,5 to 1 mm larger than the outside diameter of the stud. Maximum preload is approx. 15% below a standard 4.8 stud.

The **PD stud** is partially threaded. The **DD stud** has full thread. After welding the total length of thread is utilizable. The welding fillet is approx. 3 to 4 mm larger than the outside diameter of the stud.

<sup>1)</sup> = suitable for welding

## Technical Data

Stud types		Code (ceramic ferrule)	Materials	Standards	Mechanical characteristics
Drawn arc stud welding with ceramic ferrule or shielding gas	Threaded stud	PD (PF)	Steel (4.8 <sup>1)</sup> blank	EN 20898-1 ISO 898-1	$R_m \geq 420$ N/mm <sup>2</sup> $R_{eH} \geq 340$ N/mm <sup>2</sup> $A_5 \geq 14\%$
	Threaded stud with reduced shaft	RD (RF)			
	Pin	UD (UF)	1.4301/03 (A2-50 <sup>1)</sup>	EN ISO 3506-1	$R_m \geq 500$ N/mm <sup>2</sup> $R_{p0.2} \geq 210$ N/mm <sup>2</sup> $A_L \geq 0,6d$
	Concrete anchor	SD (UF)	Steel blank (S235J2G3+C450)	EN 10025 ISO/TR 15608	$R_m \geq 450$ N/mm <sup>2</sup> $R_{eH} \geq 350$ N/mm <sup>2</sup> , $A_5 \geq 15\%$
1.4301/03			EN 10088-1	$R_m \geq 540-780$ N/mm <sup>2</sup> $R_{p0.2} \geq 350$ N/mm <sup>2</sup>	

## Stud types, codes, materials, standards, mechanical characteristics to DIN EN ISO 13918

<sup>1)</sup> = suitable for welding

Stud material	Base material			
	ISO/TR 15608 material groups 1 and 2.1	ISO/TR 15608 material groups 2.2, 3 to 6	ISO/TR 15608 material groups 8 and 10	ISO/TR 15608 material groups 21 and 22
S235 Steel (4.8 <sup>1)</sup> blank 16Mo3	1	2	2 <sup>2)</sup>	-
1.4301/03 (A2-50 <sup>1)</sup> 1.4401 1.4541 1.4571	2/1 <sup>3)</sup>	2	1	-
EN AW-AlMg3	-	-	-	2

## Material combinations

Acc. to DIN EN ISO 14555 (Where possible select the stud material such that the same or similar materials are welded)

1 = good suitability for any application, e.g. force transmission  
2 = suitable, limited force transmission  
- = not weldable

<sup>1)</sup> = suitable for welding

<sup>2)</sup> = only short cycle welding with drawn arc

<sup>3)</sup> = up to 10 mm dia. and shielding gas in position PA

Other material combinations are tested for weldability on request.

Threaded studs	Steel (4.8 <sup>1)</sup> $\mu = 0,18$ $R_{p0.2} = 340$ N/mm <sup>2</sup>		1.4301/03 (A2-50 <sup>1)</sup> $\mu = 0,18$ $R_{p0.2} = 210$ N/mm <sup>2</sup>		AlMg3 F23 $\mu = 0,18$ $R_{p0.2} = 170$ N/mm <sup>2</sup>		CuZn37 (Ms63) $\mu = 0,18$ $R_{p0.2} = 250$ N/mm <sup>2</sup>	
	Mounting pre-load (kN)	Torque (Nm)	Mounting pre-load (kN)	Torque (Nm)	Mounting pre-load (kN)	Torque (Nm)	Mounting pre-load (kN)	Torque (Nm)
M6	4.3	6.1	2.7	3.8	2.2	3.1	3.2	4.5
M8	8	15	4.9	9.5	4	7.5	6	11
M10	13	30	7.8	19				
M12	19	53	12	33				
M16	35	135	22	82				

## Mounting pre-load (tie load) and torque

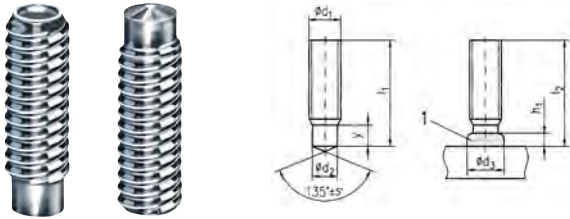
Values correspond to DVS-Merkblatt 0904

All given values are indications of the minimum tie load and minimum torque (for 90% of minimum yield stress) of a weld without permanent deformation of parts to be joined. Parts to be joined must have sufficient wall thickness. Values apply for cold worked threaded studs with standard thread without surface protection and without thread lubrication. Throughout the entire stud length, at least the stressed cross section must be present. Values apply for indicated yield strengths.

<sup>1)</sup> = suitable for welding



## Threaded studs Type RD



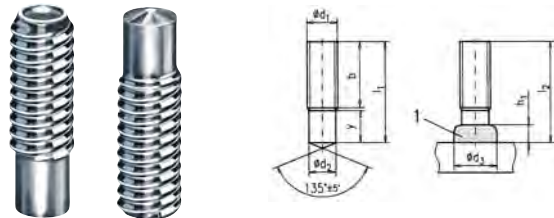
**Recommended power units:** ARC 500, ARC 800, ARC 1550, IT 1002, IT 2002, IT 3002, IT 90, IT 130  
**Recommended welding guns:** CA 08, A 12, A 16, A 22, A 25  
**Recommended automatic welding guns/heads:** PAH-1, KAH 412, KAH 412 LA

d <sub>1</sub>	l <sub>2</sub> <sup>2)</sup>	d <sub>2</sub>	d <sub>3</sub> <sup>1)</sup>	y <sub>min</sub>	h <sub>1</sub> <sup>1)</sup>
M6	15-40	4.7	7	4	2.5
M8	15-50	6.2	9	4	2.5
M10	20-55	7.9	11.5	5	3
M12	25-60	9.5	13.5	6	4
M16	30-65	13.2	18	7.5	5

<sup>1)</sup> Guidance values for welding position PA (ISO 6947)  
<sup>2)</sup> l<sub>2</sub> is the design value. By proper control of the welding parameter it is possible to keep variations in l<sub>2</sub> within ± 1 mm

**Materials:** Steel (4.8) blank, 1.4301/03 (A2-50)

## Threaded stud Type PD



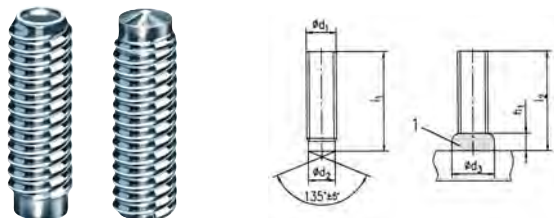
**Recommended power units:** ARC 500, ARC 800, ARC 1550, IT 1002, IT 2002, IT 3002, IT 90, IT 130  
**Recommended welding guns:** CA 08, A 12, A 16, A 22, A 25  
**Recommended automatic welding guns/heads:** PAH-1, KAH 412, KAH 412 LA

d <sub>1</sub>	l <sub>2</sub> <sup>2)</sup>	d <sub>2</sub>	d <sub>3</sub> <sup>1)</sup>	y <sub>min</sub>	h <sub>1</sub> <sup>1)</sup>
M6	15-40	5.35	8.5	9	3.5
M8	15-50	7.19	10	9	3.5
M10	20-55	9.03	12.5	9.5	4
M12	20-60	10.86	15.5	11.5	4.5
M16	30-65	14.7	19.5	13.5	6

<sup>1)</sup> Guide values  
<sup>2)</sup> l<sub>2</sub> is the design value. By proper control of the welding parameter it is possible to keep variations in l<sub>2</sub> within ± 1 mm

**Materials:** Steel (4.8) blank, 1.4301/03 (A2-50)

## Threaded stud Type DD



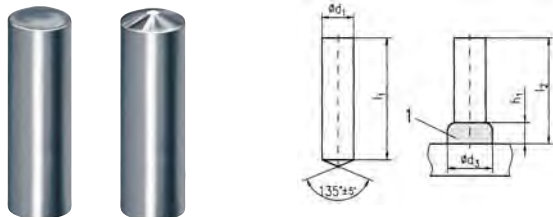
**Recommended power units:** ARC 500, ARC 800, ARC 1550, IT 1002, IT 2002, IT 3002, IT 90, IT 130  
**Recommended welding guns:** CA 08, A 12, A 16, A 22, A 25  
**Recommended automatic welding guns/heads:** PAH-1, KAH 412, KAH 412 LA

d <sub>1</sub>	l <sub>2</sub> <sup>2)</sup>	d <sub>2</sub>	d <sub>3</sub> <sup>1)</sup>	h <sub>1</sub> <sup>1)</sup>
M6	15-40	5.35	8.5	3.5
M8	15-50	7.19	10	3.5
M10	20-55	9.03	12.5	4
M12	25-60	10.86	15.5	4.5
M16	30-65	14.7	19.5	6

<sup>1)</sup> Guide values  
<sup>2)</sup> l<sub>2</sub> is the design value. By proper control of the welding parameter it is possible to keep variations in l<sub>2</sub> within ± 1 mm

**Materials:** Steel (4.8) blank, 1.4301/03 (A2-50)

## Pins Type UD



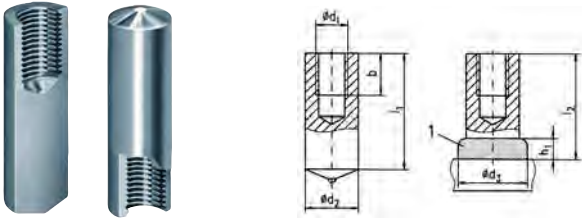
**Recommended power units:** ARC 500, ARC 800, ARC 1550, IT 1002, IT 2002, IT 3002, IT 90, IT 130  
**Recommended welding guns:** CA 08, A 12, A 16, A 22, A 25  
**Recommended automatic welding guns/heads:** PAH-1, KAH 412, KAH 412 LA

d <sub>1</sub>	l <sub>2</sub> <sup>2)</sup>	d <sub>2</sub>	h <sub>1</sub> <sup>1)</sup>
6	20-50	8.5	4.0
8	20-50	11.0	4.0
10	20-80	13.0	4.0
12	20-80	16.0	5.0
16	20-80	21.0	7.0

<sup>1)</sup> Guide values  
<sup>2)</sup> l<sub>2</sub> is the design value. By proper control of the welding parameter it is possible to keep variations in l<sub>2</sub> within ± 1 mm

**Materials:** Steel (4.8) blank, 1.4301/03 (A2-50)

## Tapped pads Type ID



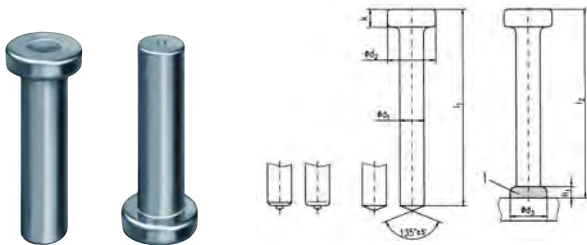
d <sub>2</sub>	l <sub>2</sub> <sup>2)</sup>	d <sub>1</sub>	d <sub>3</sub> <sup>1)</sup>	b	h
10	15-40	M6	13	7-9	4
12	15-50	M8 <sup>3)</sup>	16	9.5-15	5
16.2	20-50	M10 <sup>3)</sup>	21	15	3

**Recommended power units:** ARC 800, ARC 1550, IT 1002, IT 2002, IT 3002, IT 90, IT 130  
**Recommended welding guns:** CA 08, A 12, A 16, A 22, A 25  
**Recommended automatic welding guns/heads:** PAH-1, KAH 412, KAH 412 LA

<sup>1)</sup> Guide values  
<sup>2)</sup> l<sub>2</sub> is the design value. By proper control of the welding parameter it is possible to keep variations in l<sub>2</sub> within ± 1 mm  
<sup>3)</sup> other tapped pads on request

**Materials:** Steel (4.8) blank, 1.4301/03 (A2-50)

## Concrete anchors/shear connectors Type SD



d <sub>1</sub> - 0.4 <sup>1)</sup>	l <sub>2</sub> <sup>2)</sup>	d <sub>2</sub> ± 0.3	d <sub>3</sub> <sup>3)</sup>	h <sub>1</sub> <sup>3)</sup>	k ± 0.5
10 (3/8")	50-175	19	13	2.5	7
13 (1/2")	50-200	25	17	3	8
16 (5/8")	50-250	32	21	4.5	8
19 (3/4")	50-350	32	23	6	10
22 (7/8")	50-350	35	29	6	10
25 (1")	50-350	40	31	7	12

**Recommended power units:** ARC 800, ARC 1550, IT 1002, IT 2002, IT 3002, IT 90, IT 130  
**Recommended welding guns:** A 12, A 16, A 22, A 25  
**Recommended automatic welding head:** KAH 412, KAH 412 LA

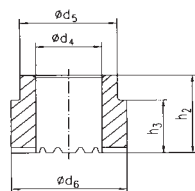
<sup>1)</sup> Diameter excess or manufacturing marks are permissible on the shaft area below the head up to 0.5 mm, provided that they do not impede the plunging movement <sup>2)</sup> l<sub>2</sub> is a design value. With special applications, e.g. through-deck-welding, l<sub>2</sub> will be shorter <sup>3)</sup> Guide values. With special applications, e.g. through-weld techniques, the measures may differ

**Materials:** Steel (S235J2G3 + C 450) blank, 1.4301/03

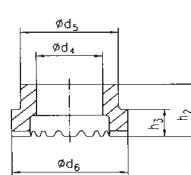
## Ceramic ferrules



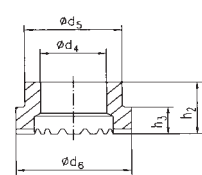
Type RF (for RD type studs)



Type PF (for PD type studs)



Type UF (for SD, UD, ID type studs)



Dimensions according to DIN EN ISO 13918

# SC - Short cycle

## Technical Data

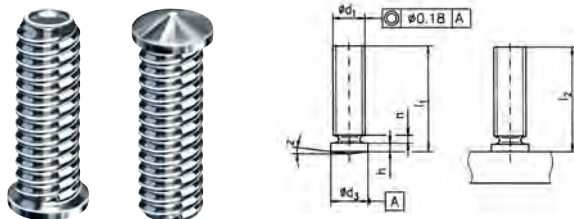
Stud types	Code	Materials	Standards	Mechanical characteristics
Short cycle stud welding with drawn arc	PS Threaded studs with flange	Steel (4.8 <sup>1)</sup> ) copper plated	ISO 898-1	R <sub>m</sub> ≥ 420 N/mm <sup>2</sup> R <sub>eh</sub> ≥ 340 N/mm <sup>2</sup>
		1.4301/03 (A2-50 <sup>1)</sup> )	ISO 3506-1	R <sub>m</sub> ≥ 500 N/mm <sup>2</sup> R <sub>p0.2</sub> ≥ 210 N/mm <sup>2</sup> , A <sub>L</sub> ≥ 0.6

**Stud types, codes, materials, standards, mechanical characteristics to DIN EN ISO 13918 Material combinations and mounting pre-load look at ARC - Drawn Arc**

<sup>1)</sup> = suitable for welding

Other dimensions and materials on request. All values are metric (mm). Technical changes reserved. BR 0808E50

## Threaded studs Type PS



$d_1$	$L_1$ $+0.6$ $0$	$d_3$ $\pm 0.2$	$h$	$n_{max}$	$z$ $\pm 0.1$
M5	8-30	6	0.8-1.4	2	7°
M6	10-45	7	0.8-1.4	2	
M8	10-45	9	0.8-1.4	2	

**Recommended power units:**

SCD 3201, ARC 500, ARC 800, ARC 1550, IT 1002, IT 90, IT 130

**Recommended welding guns:** CA 08, A 12, AI 06, A 16

**Recommended automatic welding guns/heads:** PAH-1, KAH 412, KAH 412 LA

**Materials:** Steel (4.8) copper plated, 1.4301/03 (A2-50)

## Christmas tree studs



$d_1$	$l$	$d_3$
5	9	6 ( $\pm 0.15$ )
	14.2	
	18	
	25	

**Recommended power units:**

SCD 3201, ARC 500, ARC 800, ARC 1550, IT 1002, IT 90, IT 130

**Recommended welding guns:** CA 08, A 12, AI 06

**Recommended automatic welding guns/heads:** PAH-1, KAH 412, KAH 412 LA

**Materials:** Steel (4.8) copper plated, 1.4301/03 (A2-50)

## Collar studs with cap



$d_1$	$l_1$	$l_2$	$d_2$	$d_3$	$h_1$	$h_2$
M6	15.5	12	8	14	2	2.5
M6	18.5	15	8	14	2	2.5
M8	18.5	11	9	14	2	2.5
M8	18.5	15.5	9	14	2	2.5

**Recommended power units:** SCD 3201, ARC 500, ARC 800, ARC 1550, IT 1002, IT 90, IT 130

**Recommended welding guns:** A 12, AI 06

**Recommended automatic welding guns/heads:** PAH-1, KAH 412, KAH 412 LA

Special types on request  
Cap: Plastic or metal

**Materials:** Steel (8.8) galvanized, 1.4016 stainless A2

## Tapped pads, T-stud, paint clearing stud

# MARC - Pad welding and nut welding

### HBS-pads



Patent-Nr.: DE 10 028 786  
EP 00 112 671.3

**Dimension:** M6 – M18

**Material:** 1.4301 (A2-50)

**Recommended automatic machine:** PC-M3

### Hexagon nut according to DIN



**Dimension:** M6 – M12

**Material:** A2-50/70

**Recommended manual system:** MARC 1



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