

STUD WELDING IN SHIPBUILDING



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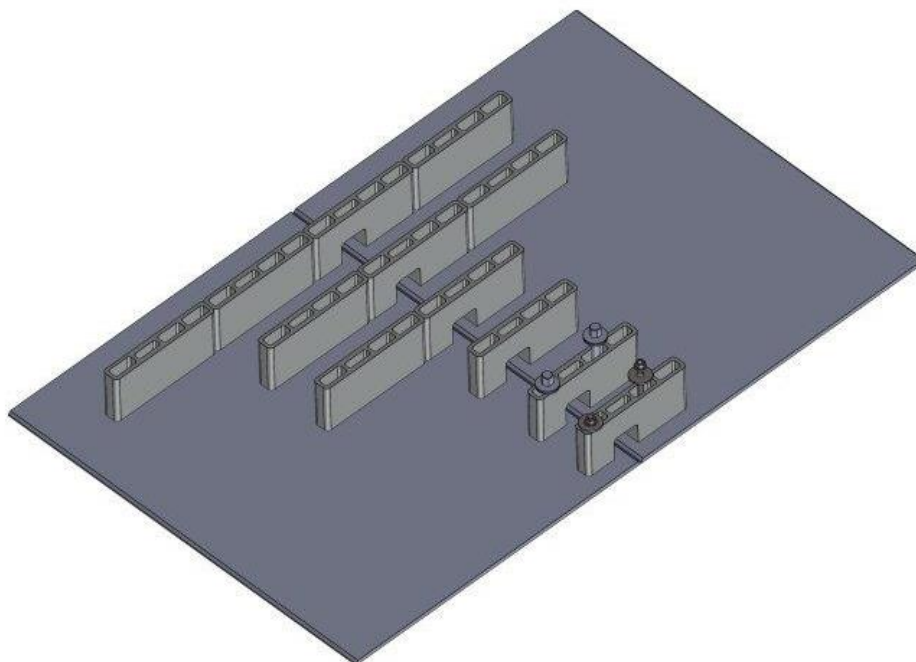


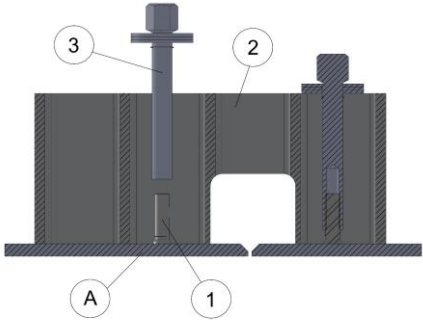
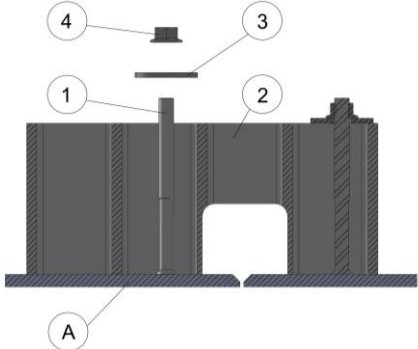
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1. Stud welding in shipbuilding

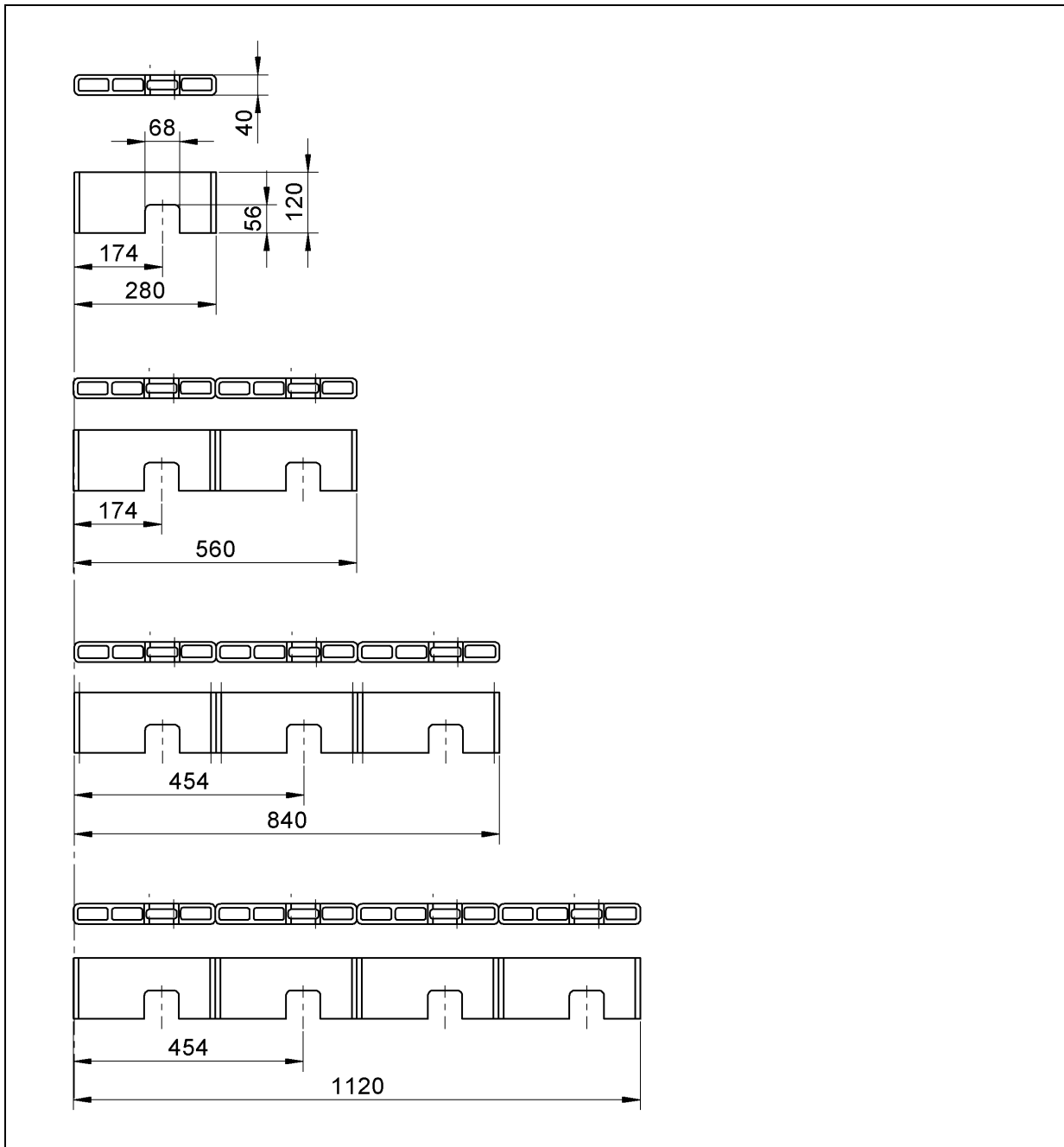
1.1 Levelling system

1.1.1 Overview, fastening alternatives



	
<p>Fastening alternative 1: short threaded studs, levelling tool</p> <ol style="list-style-type: none"> 1. Short threaded stud 2. Levelling bridge 3. Levelling tool <p>A. Sheet metal</p>	<p>Fastening alternative 2: long threaded studs, disk and nut</p> <ol style="list-style-type: none"> 1. Long threaded stud 2. Levelling bridge 3. Disk 4. Nut <p>A. Sheet metal</p>

1.1.2 Levelling bridge



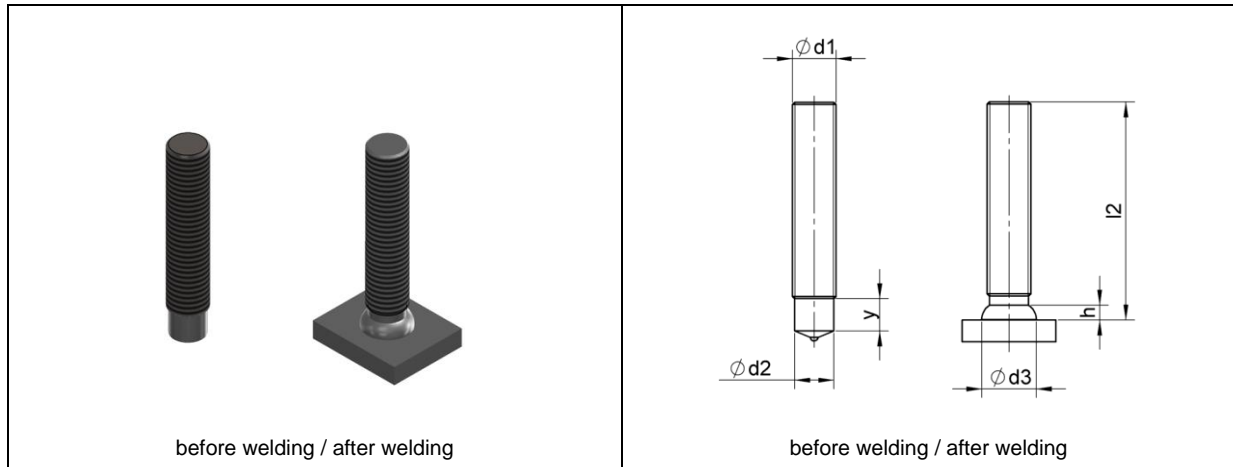
Material: aluminium

Length	Description	Item number
280	Levelling bridge 280x120x40	99-RS-280-120-F
560	Levelling bridge 560x120x40	99-RS-560-120-2F
840	Levelling bridge 840x120x40	99-RS-840-120-3F
1120	Levelling bridge 1120x120x40	99-RS-1120-120-4F

1.1.3 Fastening alternative 1: short threaded studs, levelling tool

1.1.3.1 Short threaded studs (type MD, FD or RD)

Threaded stud with practically complete thread (type MD acc. to DIN EN ISO 13918, before: type MPF)

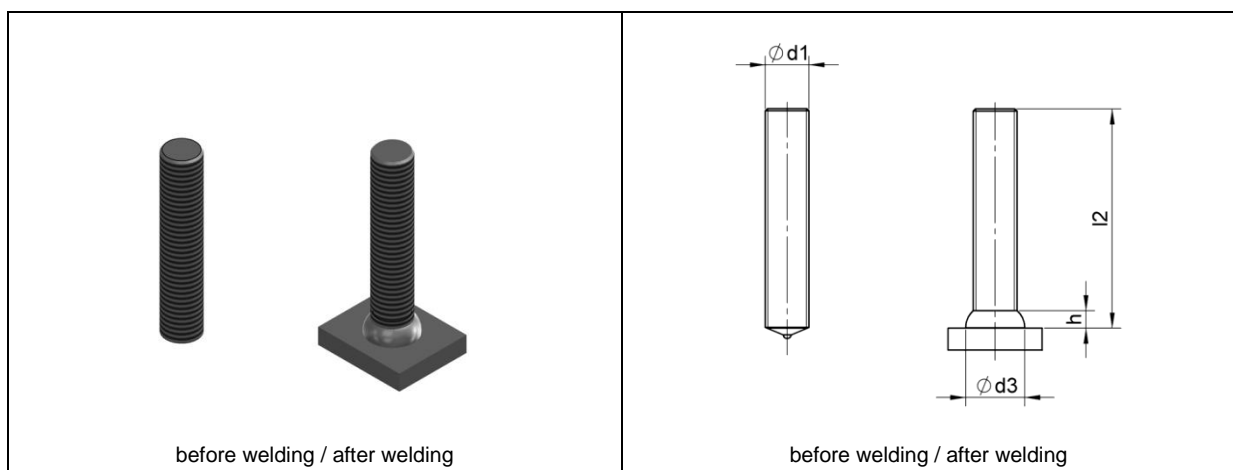


Material: steel 4.8 suitable for welding

Dimensions						Item number	Ceramic ferrule
d_1	l_2	y -0/+0,5	d_2 -0,1/0,1	d_3^*	h^*		
M10	40	6,5	8,95	12,5	3,4	46-10-040-MPF	KSP-F 10
M12	40	7,5	10,8	14,5	4,2	46-12-040-MPF	KSP-F 12
M16	40	11	14,6	17,8	5,8	46-16-040-MPF	KSP-F 16

* d_3 and h are approximate values.

Threaded stud with full thread (type FD acc. to DIN EN ISO 13918)

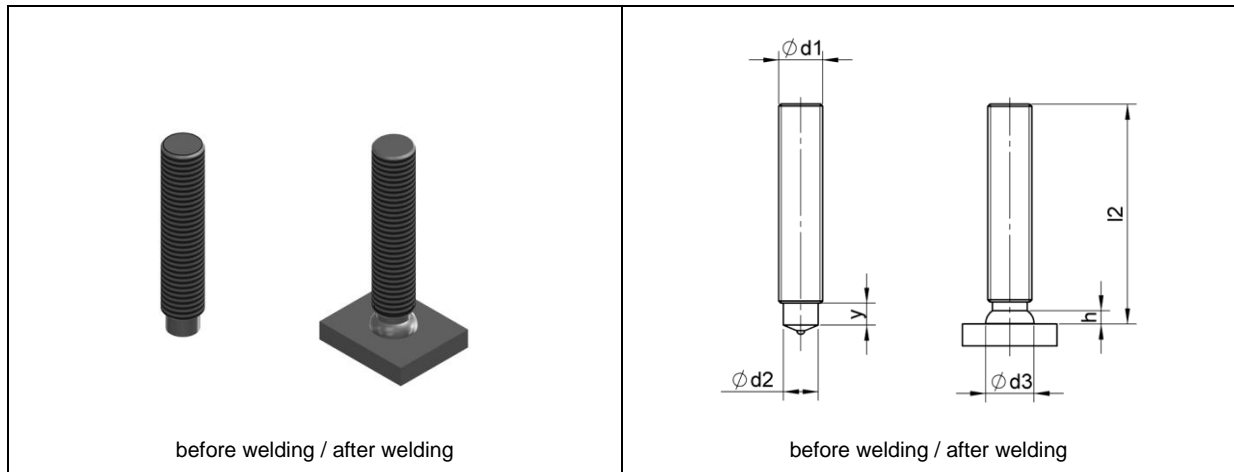


Material: steel 4.8 suitable for welding

Dimensions				Item number	Ceramic ferrule
d_1	l_2	d_3^*	h^*		
M10	40	13	4	44-10-040	UF 10
M12	40	16	5	44-12-040	UF 12
M16	40	21	7	44-16-040	UF 16

* d_3 and h are approximate values.

Threaded stud with reduced shaft (type RD acc. to DIN EN ISO 13918)



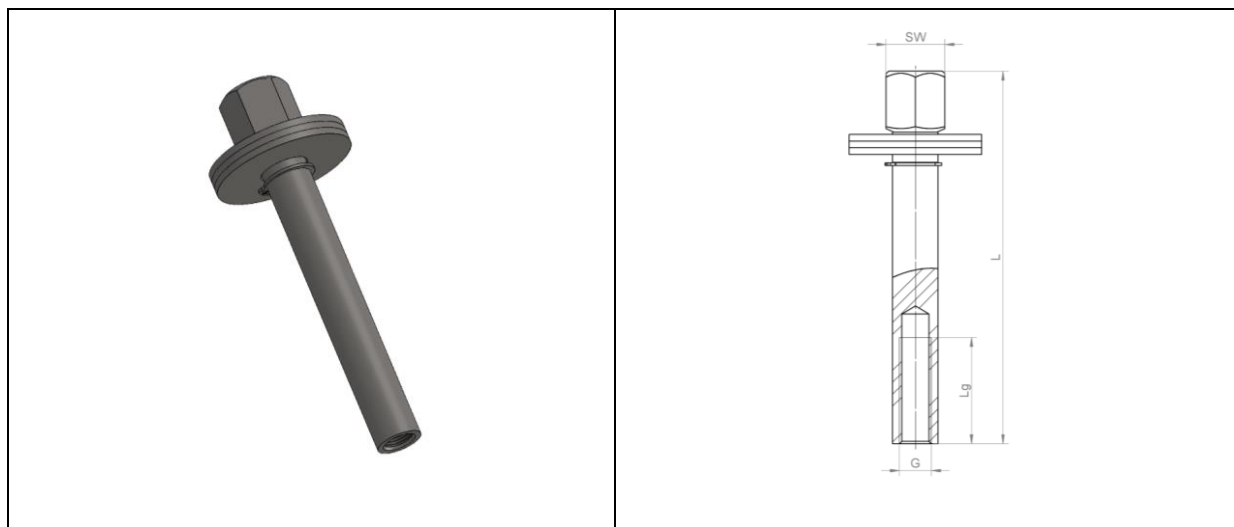
Material: steel 4.8 suitable for welding

Dimensions						Item number	Ceramic ferrule
d ₁	l ₂	y -0,2P ¹	d ₂ -0,1/0,1	d ₃ *	h*		
M10	40	5	7,9	11,5	3	41-10-040	RF 10
M12	40	6	9,5	13,5	4	41-12-040	RF 12
M16	40	7,5	13,2	16,8	5	41-16-040	RF 16

¹P = thread pitch acc. to DIN 13-1

*d₃ and h are approximate values.

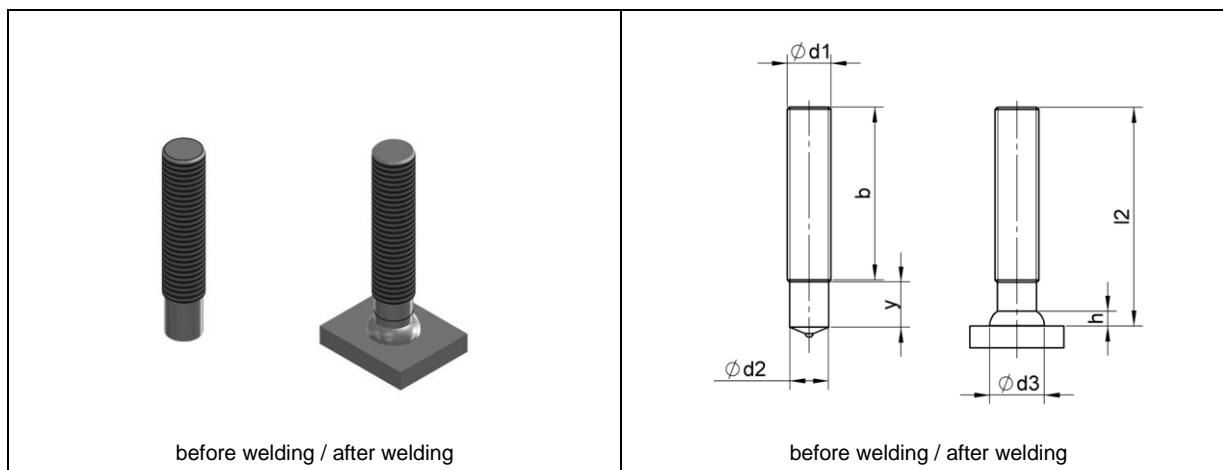
1.1.3.2 Levelling tool



Material: steel zinc-plated

Dimensions				Item number
G	L	Lg	SW	
M10	140	40	22	99-RW-M10
M12	140	40	22	99-RW-M12
M16	130	50	27	99-RW-M16

1.1.4 Fastening alternative 2: long threaded studs with partial thread (type PD acc. to DIN EN ISO 13918)



Material: steel 4.8 suitable for welding

Dimensions						Item number	Ceramic ferrule
d ₁	l ₂	b	d ₂ -0,1/0,1	d ₃ [*]	h [*]		
M10	140	80	8,95	12,5	4	46-10-140-80	PF 10
M12	140 160	80 80	10,8	15,5	4,5	46-12-140-80 46-12-160-80	PF 12
M16	140 160	80 80	14,6	19,5	6	46-16-140-80 46-16-160-80	PF 16

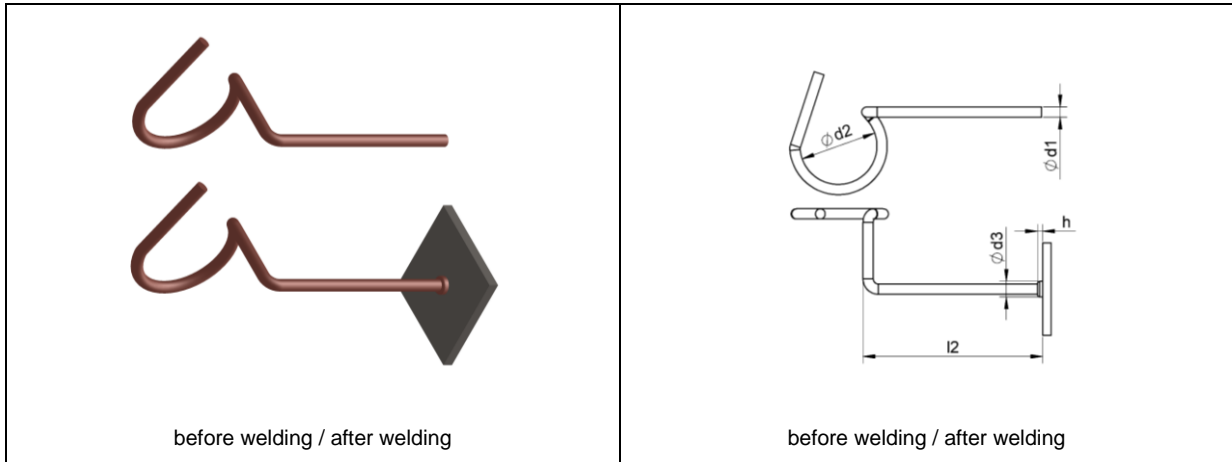
¹P = thread pitch acc. to DIN 13-1

*d₃ and h are approximate values.



1.2 Fixings for electro installation

1.2.1 Cable hanger



Material: steel 4.8 suitable for welding, surface: copper-plated

Dimensions					Item number	[Ceramic ferrule ¹]
d ₁	l ₂	d ₂	d ₃ *	h*		
6	60-250	45	8,5	4	77-06-XXX-ST	[UF 6 ¹]

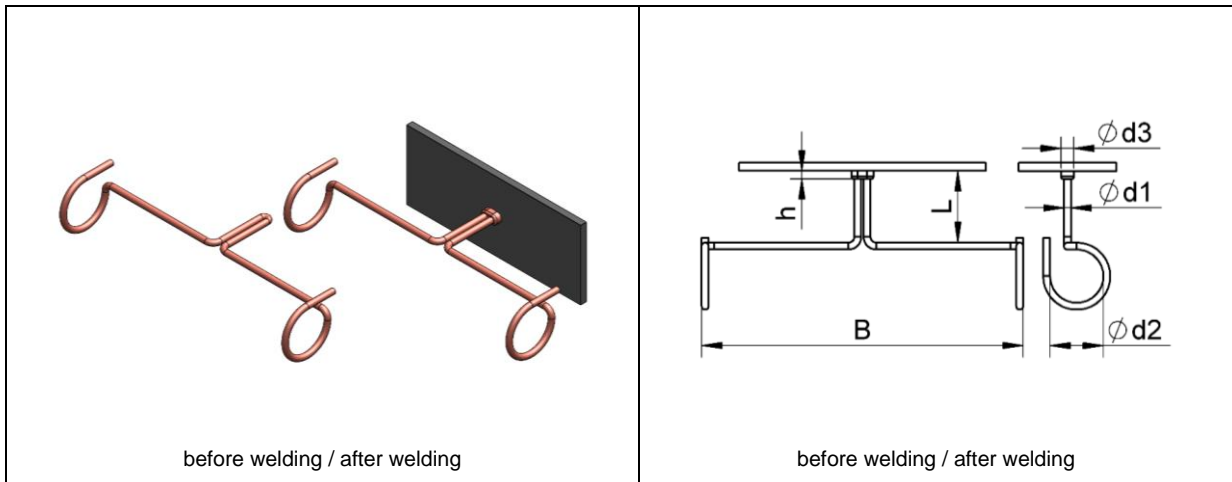
*d₃ and h are approximate values.

¹Cable hangers are generally welded without ceramic ferrules. Ceramic ferrules are only used for special applications.

In the item number **XXX** has to be replaced by the respective welding element length l₂ (e.g. 060 for 60 mm).

Not listed dimensions and materials available upon request.

1.2.2 Double cable hanger



Material: steel 4.8 suitable for welding, surface: copper-plated

Dimensions						Item number	Ceramic ferrule
d ₁	L	d ₂	B	d ₃ *	h*		
6	60-250	45	280	13	4	77-06-D-XXX-ST	KFW 13x6

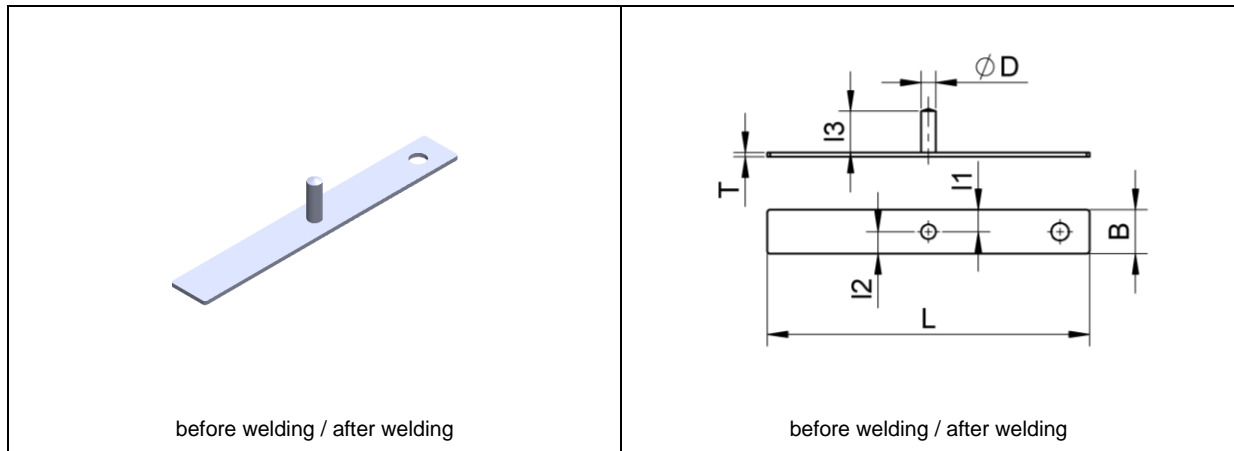
*d₃ and h are approximate values.

In the item number **XXX** has to be replaced by the respective welding element length l₂ (e.g. 060 for 60 mm).

Not listed dimensions and materials available upon request.



1.2.3 Electro flat bar (type HFS)

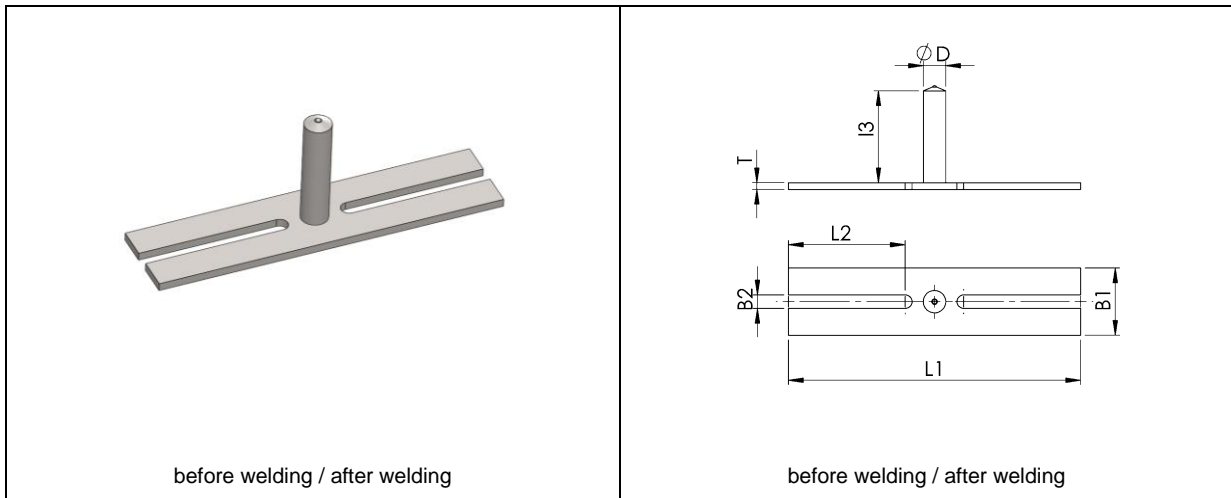


Material: steel 4.8 suitable for welding, surface: zinc-plated (A2K)

Dimensions							Item number	Ceramic ferrule
B	L	T	l ₁	l ₂	D	l ₃		
30	320	3	15	15	10	40	77-HFS-320X30X3-040	UF 10
30	320	3	15	15	10	120	77-HFS-320X30X3-120	UF 10
50	320	3	15	35	10	40	77-HFS-320X50X3-040	UF 10
50	320	3	15	35	10	120	77-HFS-320X50X3-120	UF 10

Not listed dimensions and materials available upon request.

1.2.4 Electro flat bar (type HFSG)

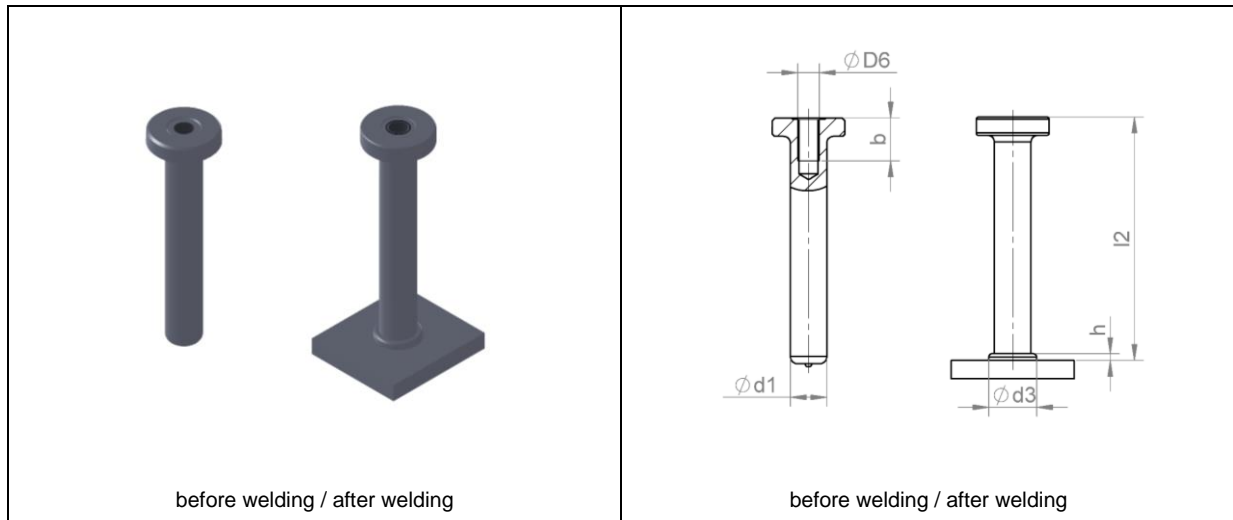


Material: steel 4.8 suitable for welding, surface: zinc-plated (A2K)

Dimensions							Item number	Ceramic ferrule
B ₁	B ₂	L ₁	L ₂	T	D	l ₃		
30	6	90	32	3	10	40	77-HFSG-090X30X3-040	UF 10
30	6	110	42	3	10	40	77-HFSG-110X30X3-040	UF 10
50	6	130	52	3	10	40	77-HFSG-130X30X3-040	UF 10
50	6	180	82	3	10	40	77-HFSG-180X30X3-040	UF 10

Not listed dimensions and materials available upon request.

1.2.5 Headed stud with internal thread (type KBMI)



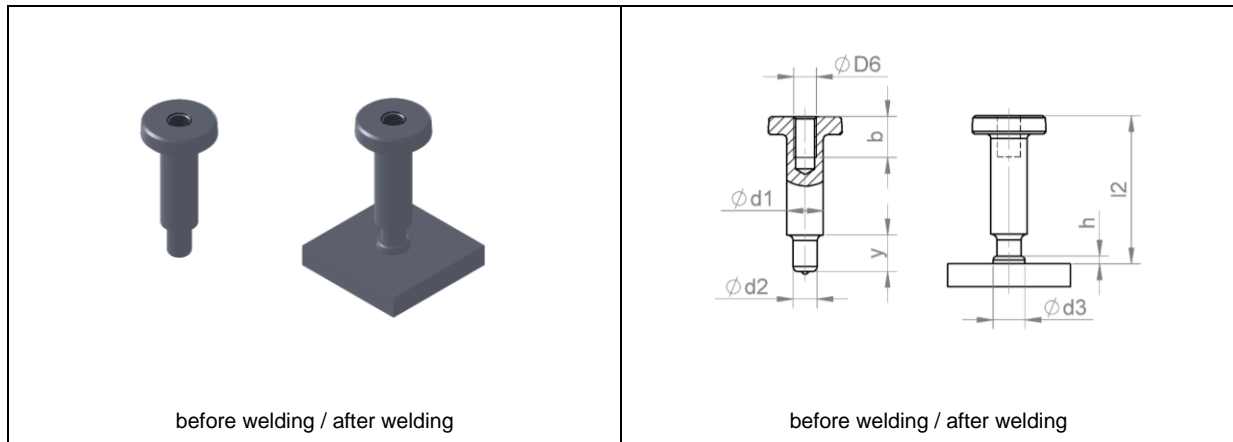
Dimensions						Material (item number)			Ceramic ferrule
D ₆	b	d ₁ -0,4/0,4	l ₂	d ₃ *	h*	Steel 4.8	Steel 4.8 zinc-plated (A2K)	Steel 4.8 zinc flake coated	
M6	9	10	35-200	13	2,5	75-10-XXX-M6X9	75-10-6XX-M6X9	75-10-6XX-M6X9-ZFC	UF 10
	12					75-10-XXX-M6X12	75-10-6XX-M6X12	75-10-6XX-M6X12-ZFC	
	16					75-10-XXX-M6X16	75-10-6XX-M6X16	75-10-6XX-M6X16-ZFC	
M8	12	13	50-200	17	3	75-13-XXX-M8X12	75-13-6XX-M8X12	75-13-6XX-M8X12-ZFC	UF 13
	16					75-13-XXX-M8X16	75-13-6XX-M8X16	75-13-6XX-M8X16-ZFC	
M10	16	16	50-200	21	4,5	75-16-XXX-M10X16	75-16-6XX-M10X16	75-16-6XX-M10X16-ZFC	UF 16

*d₃ and h are approximate values.

In the item number **XXX** has to be replaced by the respective welding element length l₂ (e.g. 050 for 50 mm).

Not listed dimensions and materials available upon request.

1.2.6 Reduced headed stud with internal thread (type KBMI-R)



Dimensions								Material (item number)			Ceramic ferrule
D ₆	b	d ₁ -0,4/0,4	l ₂	d ₂ -0,6/0,1	y	d ₃ *	h*	Steel 4.8	Steel 4.8 zinc-plated (A2K)	Steel 4.8 zinc flake coated	
M8	12 16	13	50- 200	10,6	13,5	17	3	75-13- XXX -ZG1 75-13- XXX -ZG2	75-13-6 XX -ZG1 75-13-6 XX -ZG2	75-13-6 XX -ZG1-ZFC 75-13-6 XX -ZG2-ZFC	PF 12
M10	16	16	50- 200	10,6	13,5	21	4,5	75-16- XXX -ZG1	75-16-6 XX -ZG1	75-16-6 XX -ZG1-ZFC	PF 12

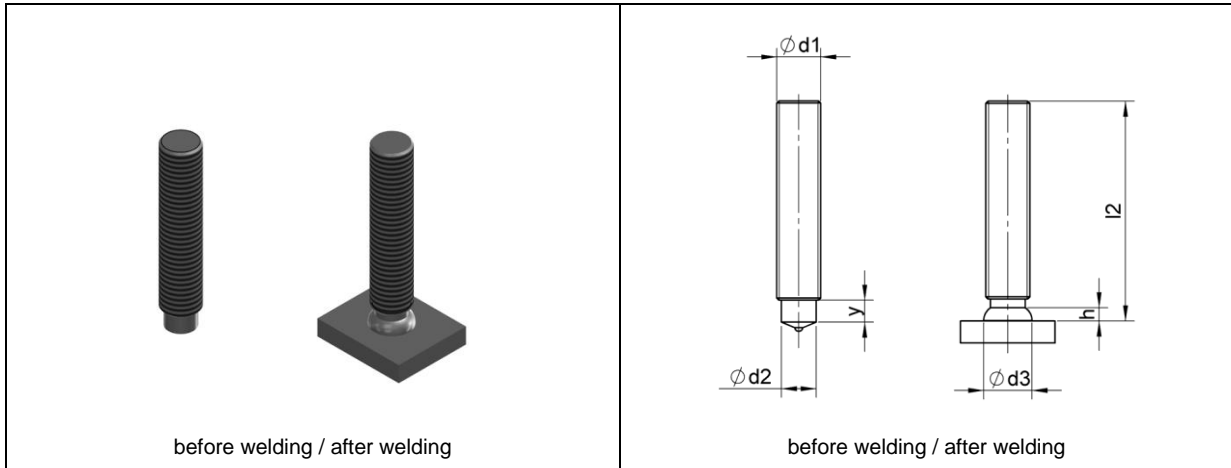
*d₃ and h are approximate values.

In the item number **XXX** has to be replaced by the respective welding element length l₂ (e.g. 050 for 50 mm).

Not listed dimensions and materials available upon request.

1.3 Threaded studs, internally threaded stud and non-threaded stud

1.3.1 Threaded stud with reduced shaft (type RD acc. to DIN EN ISO 13918)



The threaded stud type RD is threaded almost to the top of the welding tip which is reduced to about the core diameter of the thread. Thus the fillet diameter will only be slightly (0,5-1 mm) bigger than the external diameter of the thread. It is worthy of note that the reduction of the welding tip diminishes the bearing force of the stud by approximately 15% in comparison to the type MD/PD/FD. Thus - if necessary - the next bigger diameter should be chosen.

Dimensions						Material (item number)			Ceramic ferrule
d_1	l_2	y^1 -0,1/0,1	d_2 -0,1/0,1	d_3^*	h^*	Steel 4.8	A2-50	A5-50	
M6	15-100	4	4,7	7	2,5	41-06-XXX	42-06-XXX	43-06-XXX	RF 6
M8	15-100	4	6,2	9	2,5	41-08-XXX	42-08-XXX	43-08-XXX	RF 8 (KSR-F 8 ³)
M10	15-100	5	7,9	11,5	3	41-10-XXX	42-10-XXX	43-10-XXX	RF 10 (KSR-F 10 ³)
M12	20-100	6	9,5	13,5	4	41-12-XXX	42-12-XXX	43-12-XXX	RF 12
M16	25-100	7,5	13,2	16,8	5	41-16-XXX	42-16-XXX	43-16-XXX	RF 16
M16	25-100	11	13,2	16,1	5	41-16-XXX-LY	42-16-XXX-LY	43-16-XXX-LY	RF 16 (flat form)
M20	30-100	13	16,5	23	6	41-20-XXX	42-20-XXX	43-20-XXX	RF 20 (flat form)
M24	50-100	15	20	28	7	41-24-XXX	42-24-XXX	43-24-XXX	UF 20

¹Other y-dimensions available upon request.

²P = thread pitch acc. to DIN 13-1

³for $l_2 < 20$ mm

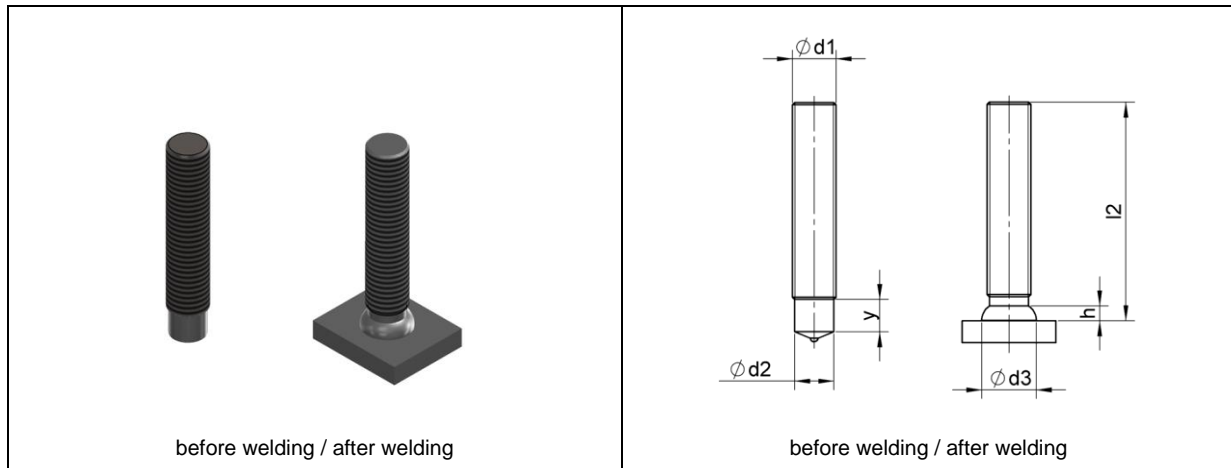
* d_3 and h are approximate values.

In the item number **XXX** has to be replaced by the respective welding element length l_2 (e.g. 030 for 30 mm).

Available surface treatments: galvanically zinc-plated, hot zinc dipped, zinc flake coated flZnnc-600h, galvanically copper-base-coated and nickel-plated, galvanically copper-plated (The coatings galvanically zinc-plated, hot zinc dipped and zinc flake coated flZnnc-600h are mechanically removed at the welding tip, so that the following tolerances result: diameter at the welding tip d_2 -0,6/+0,1, y -1/+0,5.)

Not listed dimensions and materials available upon request.

1.3.2 Threaded stud with practically complete thread (type MD acc. to DIN EN ISO 13918, before: type MPF)



With the revision of April 2018 the stud type MD was included into DIN EN ISO 13918:2018 for the first time. The stud type MD acc. to DIN EN ISO 13918:2018 is mostly identical to the not standardised stud type MPF which we already produced for many years. There are only deviations regarding the dimension y (non-threaded part) for M6 (before: 3 mm), M10 (before: 7 mm) and M12 (before: 8 mm).

The threaded stud type MD is threaded to approximately the top of the welding tip. The diameter of the unthreaded stud section on the welding tip corresponds to the pitch diameter of the thread. Thus the diameter of the weld-fillet is approximately 3-4 mm larger than the external diameter of the thread.

Dimensions						Material (item number)			Ceramic ferrule
d_1	l_2	y -0/+0,5	d_2 -0,1/0,1	d_3^*	h^*	Steel 4.8	A2-50	A5-50	
M6	15-100	5,5	5,3	8,5	4	46-06-XXX-MPF	47-06-XXX-MPF	48-06-XXX-MPF	UF 6
M8	15-100	6	7,1	10	3	46-08-XXX-MPF	47-08-XXX-MPF	48-08-XXX-MPF	KSP-F 8
M10	15-100	6,5	8,95	12,5	3,4	46-10-XXX-MPF	47-10-XXX-MPF	48-10-XXX-MPF	KSP-F 10
M12	20-100	7,5	10,8	14,5	4,2	46-12-XXX-MPF	47-12-XXX-MPF	48-12-XXX-MPF	KSP-F 12
M16	30-100	11	14,6	17,8	5,8	46-16-XXX-MPF	47-16-XXX-MPF	48-16-XXX-MPF	KSP-F 16
M20	35-100	13	18,3	22,5	6,6	46-20-XXX-MPF	47-20-XXX-MPF	48-20-XXX-MPF	KSP-F 20

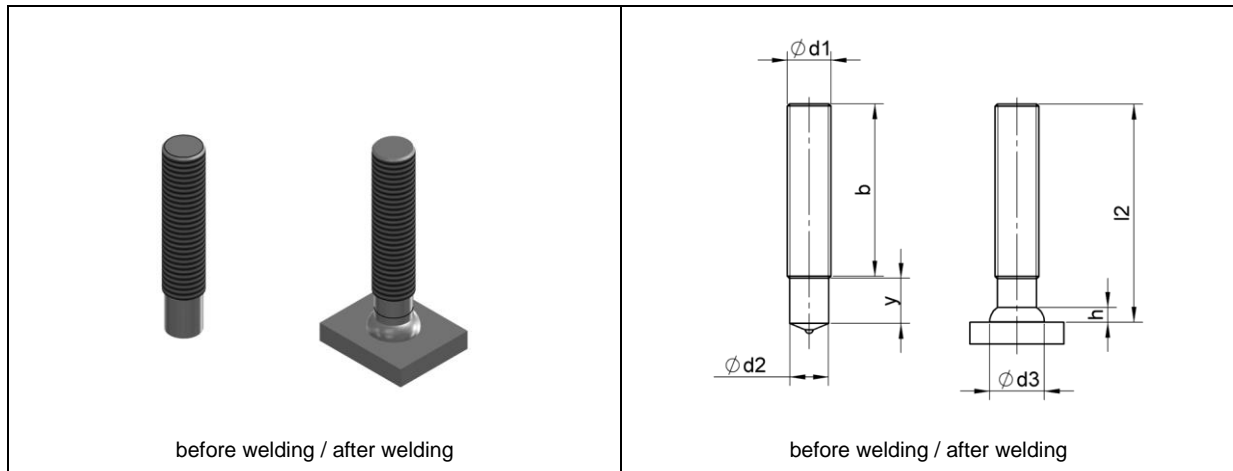
* d_3 and h are approximate values.

In the item number **XXX** has to be replaced by the respective welding element length l_2 (e.g. 030 for 30 mm).

Available surface treatments: galvanically zinc-plated, hot zinc dipped, zinc flake coated flZnnc-600h, galvanically copper-base-coated and nickel-plated, galvanically copper-plated (The coatings galvanically zinc-plated, hot zinc dipped and zinc flake coated flZnnc-600h are mechanically removed at the welding tip, so that the following tolerances result: diameter at the welding tip d_2 -0,6/+0,1, y -1/+0,5.)

Not listed dimensions and materials available upon request.

1.3.3 Threaded stud with partial thread (type PD acc. to DIN EN ISO 13918)



The threaded stud type PD has a partial thread. The diameter of the unthreaded stud section on the welding tip corresponds to the pitch diameter of the thread. Thus the diameter of the weld-fillet is approximately 3-4 mm larger than the external diameter of the thread.

Dimensions							Material (item number)			Ceramic ferrule
d ₁	l ₂	y -0/2P ¹	b	d ₂ -0,1/0,1	d ₃ *	h*	Steel 4.8	A2-50	A5-50	
M6	15 ≤ l ₂ < 35	9	-	5,3	8,5	3,5	46-06-XXX	47-06-XXX	48-06-XXX	PF 6
	35 ≤ l ₂ < 60	-	20							
	60 ≤ l ₂ < 160	-	40							
M8	20 ≤ l ₂ < 50	9	-	7,1	10	3,5	46-08-XXX	47-08-XXX	48-08-XXX	PF 8
	50 ≤ l ₂ < 160	-	40							
M10	20 ≤ l ₂ < 50	9,5	-	8,95	12,5	4	46-10-XXX	47-10-XXX	48-10-XXX	PF 10
	50 ≤ l ₂ < 140	-	40							
	140 ≤ l ₂ < 160	-	80							
M12	25 ≤ l ₂ < 50	11,5	-	10,8	15,5	4,5	46-12-XXX	47-12-XXX	48-12-XXX	PF 12
	50 ≤ l ₂ < 140	-	40							
	140 ≤ l ₂ < 160	-	80							
M16	30 ≤ l ₂ < 55	13,5	-	14,6	19,5	6	46-16-XXX	47-16-XXX	48-16-XXX	PF 16
	55 ≤ l ₂ < 100	-	40							
	100 ≤ l ₂ < 160	-	80							
M20	35 ≤ l ₂ < 50	15,5	-	18,3	24,5	7	46-20-XXX	47-20-XXX	48-20-XXX	KSP-F 20
	50 ≤ l ₂ < 55	-	35							
	55 ≤ l ₂ < 80	-	40							
	80 ≤ l ₂ < 100	-	50							
M24	50 ≤ l ₂ < 55	20	-	22	30	10	46-24-XXX	47-24-XXX	48-24-XXX	UF 22
	55 ≤ l ₂ < 60	-	30							
	60 ≤ l ₂ < 70	-	40							
	70 ≤ l ₂ < 100	-	50							
	100 ≤ l ₂ < 160	-	70							

¹P = thread pitch acc. to DIN 13-1

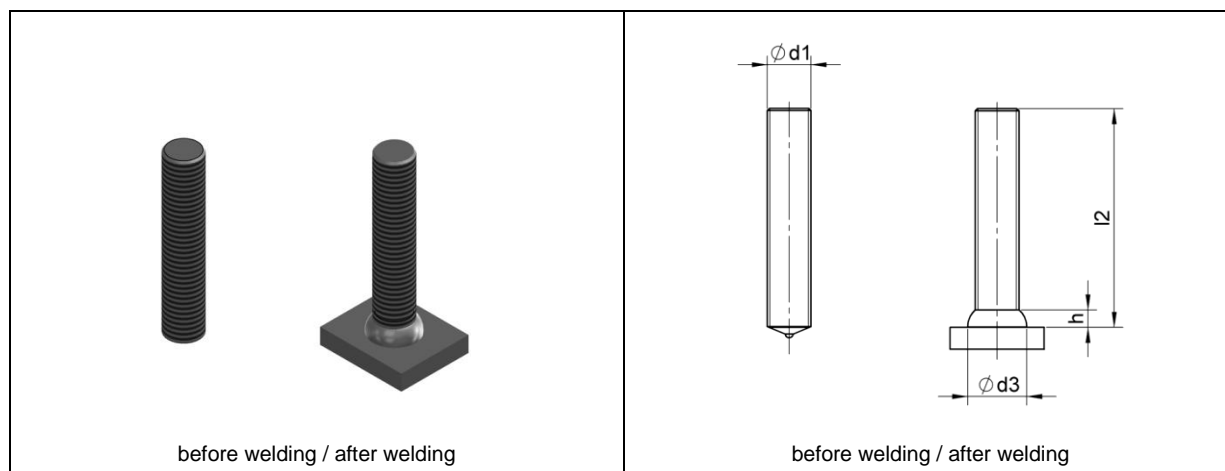
*d₃ and h are approximate values.

In the item number **XXX** has to be replaced by the respective welding element length l₂ (e.g. 030 for 30 mm).

Available surface treatments: galvanically zinc-plated, hot zinc dipped, zinc flake coated fIZnnc-600h, galvanically copper-base-coated and nickel-plated, galvanically copper-plated (The coatings galvanically zinc-plated, hot zinc dipped and zinc flake coated fIZnnc-600h are mechanically removed at the welding tip, so that the following tolerances result: diameter at the welding tip d₂ -0,6/+0,1, y -1/+0,5.)

Not listed dimensions and materials available upon request.

1.3.4 Threaded stud with full thread (type FD acc. to DIN EN ISO 13918)



The threaded stud type FD is threaded to the top of the welding tip. Thus after welding the stud is threaded up to the weld-fillet. The diameter of the weld-fillet is approximately 3-4 mm larger than the external diameter of the thread.

Dimensions				Material (item number)			Ceramic ferrule
d_1	l_2	d_3^*	h^*	Steel 4.8	A2-50	A5-50	
M6	15-100	8,5	4	44-06-XXX	54-06-XXX	54-1-06-XXX	UF 6
M8	15-100	11	4	44-08-XXX	54-08-XXX	54-1-08-XXX	UF 8
M10	15-100	13	4	44-10-XXX	54-10-XXX	54-1-10-XXX	UF 10
M12	20-100	16	5	44-12-XXX	54-12-XXX	54-1-12-XXX	UF 12
M16	25-100	21	7	44-16-XXX	54-16-XXX	54-1-16-XXX	UF 16
M20	30-100	26	7	44-20-XXX	54-20-XXX	54-1-20-XXX	UF 20

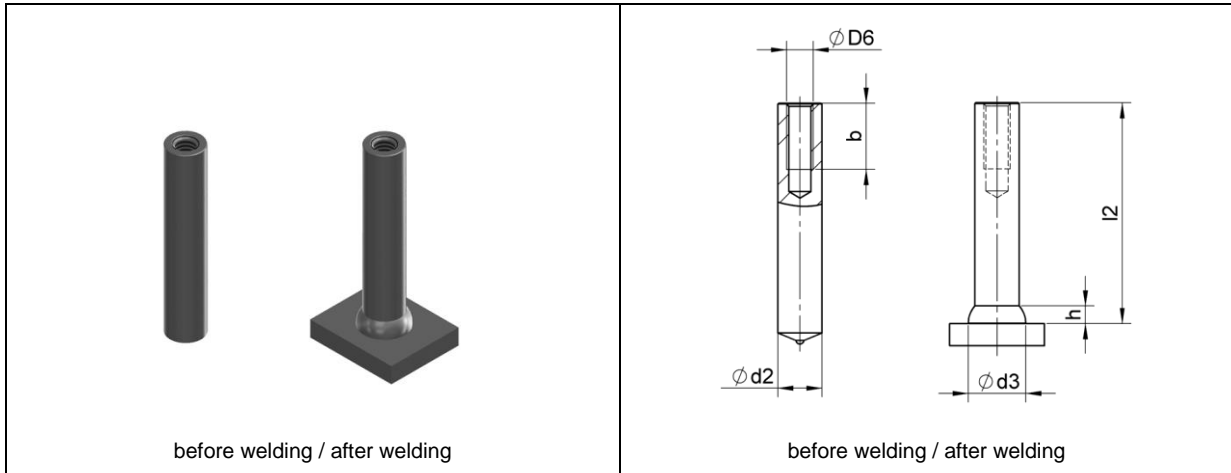
* d_3 and h are approximate values.

In the item number **XXX** has to be replaced by the respective welding element length l_2 (e.g. 030 for 30 mm).

Available surface treatments: galvanically copper-base-coated and nickel-plated, galvanically copper-plated

Not listed dimensions and materials available upon request.

1.3.5 Internally threaded stud (type ID acc. to DIN EN ISO 13918)



Dimensions						Material (item number)			Ceramic ferrule
D ₆	b _{+2P¹}	d ₂ _{-0,1/0,1}	l ₂	d ₃ [*]	h [*]	Steel 4.8	A2-50	A5-50	
M5	7	10	15-100	13	4	61-10-XXX-M5X7	62-10-XXX-M5X7	62-3-10-XXX-M5X7	UF 10 (KSN-F 10 ²)
M6	9 (7 ²)	10	15-100	13	4	61-10-XXX-M6X7 ² 61-10-XXX-M6X9	62-10-XXX-M6X7 ² 62-10-XXX-M6X9	62-3-10-XXX-M6X7 ² 62-3-10-XXX-M6X9	UF 10 (KSN-F 10 ²)
M8	12 (8 ²)	12	15-100	16	5	61-12-XXX-M8X8 ² 61-12-XXX-M8X12	62-12-XXX-M8X8 ² 62-12-XXX-M8X12	62-3-12-XXX-M8X8 ² 62-3-12-XXX-M8X12	UF 12 (KSN-F 12 ²)
M8	12 (8 ²)	14,6	15-100	18,5	6	61-14,6-XXX-M8X8 ² 61-14,6-XXX-M8X12	62-14,6-XXX-M8X8 ² 62-14,6-XXX-M8X12	62-3-14,6-XXX-M8X8 ² 62-3-14,6-XXX-M8X12	KSP-F 16
M10	15 (8 ³)	14,6	15-100	18,5	6	61-14,6-XXX-M10X8 ³ 61-14,6-XXX-M10X15	62-14,6-XXX-M10X8 ³ 62-14,6-XXX-M10X15	62-3-14,6-XXX-M10X8 ³ 62-3-14,6-XXX-M10X15	KSP-F 16
M10	15 (8 ³)	16	20-100	21	7	61-16-XXX-M10X8 ³ 61-16-XXX-M10X15	62-16-XXX-M10X8 ³ 62-16-XXX-M10X15	62-3-16-XXX-M10X8 ³ 62-3-16-XXX-M10X15	UF 16
M12	18	18,3	25-100	23	7	61-18,3-XXX-M12X18	62-18,3-XXX-M12X18	62-3-18,3-XXX-M12X18	KSP-F 20
M16	24	22	40-100	28	10	61-22-XXX-M16X24	62-22-XXX-M16X24	62-3-22-XXX-16X24	UF 22

¹P = thread pitch acc. to DIN 13-1

²for l₂ < 20 mm, ³for l₂ < 25 mm

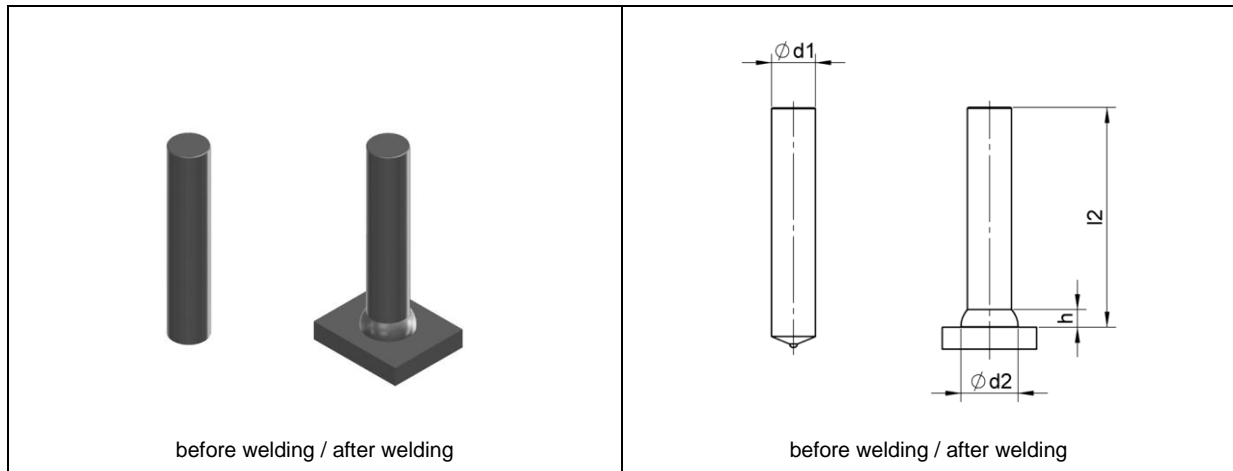
*d₃ and h are approximate values.

In the item number **XXX** has to be replaced by the respective welding element length l₂ (e.g. 030 for 30 mm).

Available surface treatments: galvanically zinc-plated, hot zinc dipped, zinc flake coated flZnnc-600h, galvanically copper-base-coated and nickel-plated, galvanically copper-plated (The coatings galvanically zinc-plated, hot zinc dipped and zinc flake coated flZnnc-600h are mechanically removed at the welding tip, so that the following tolerance results: diameter at the welding tip d₂ -0,6/+0,1.)

Not listed dimensions and materials available upon request.

1.3.6 Non-threaded stud (type UD acc. to DIN EN ISO 13918)



Dimensions				Material (item number)			Ceramic ferrule
d_1 -0,1/0,1	l_2	d_2^*	h^*	Steel 4.8	A2-50	A5-50	
6	15-100	8,5	4	56-06-XXX	57-06-XXX	58-06-XXX	UF 6
8	15-100	11	4	56-08-XXX	57-08-XXX	58-08-XXX	UF 8
10	15-100	13	4	56-10-XXX	57-10-XXX	58-10-XXX	UF 10 (KSN-F 10 ¹)
12	15-100	16	5	56-12-XXX	57-12-XXX	58-12-XXX	UF 12 (KSN-F 12 ¹)
14,6	20-100	18,5	6	56-14,6-XXX	57-14,6-XXX	58-14,6-XXX	KSP-F 16
16	30-100	21	7	56-16-XXX	57-16-XXX	58-16-XXX	UF 16
20	40-100	26	9	56-20-XXX	57-20-XXX	58-20-XXX	UF 20
22	40-100	28	10	56-22-XXX	57-22-XXX	58-22-XXX	UF 22

¹for $l_2 < 20$ mm

* d_2 and h are approximate values.

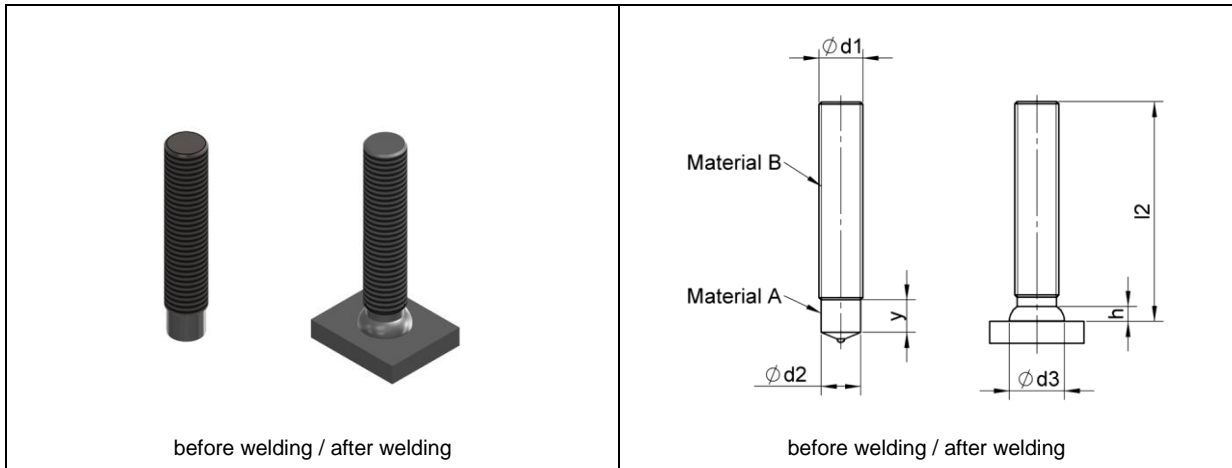
In the item number **XXX** has to be replaced by the respective welding element length l_2 (e.g. 030 for 30 mm).

Available surface treatments: galvanically zinc-plated, hot zinc dipped, zinc flake coated flZnnc-600h, galvanically copper-base-coated and nickel-plated, galvanically copper-plated (The coatings galvanically zinc-plated, hot zinc dipped and zinc flake coated flZnnc-600h are mechanically removed at the welding tip, so that the following tolerance results: diameter at the welding tip d_2 -0,6/+0,1.)

Not listed dimensions and materials available upon request.

1.4 Bimetallic studs (DUO studs)

1.4.1 Bimetallic threaded stud with practically complete thread (type MD-DUO, before: type MPF-DUO)



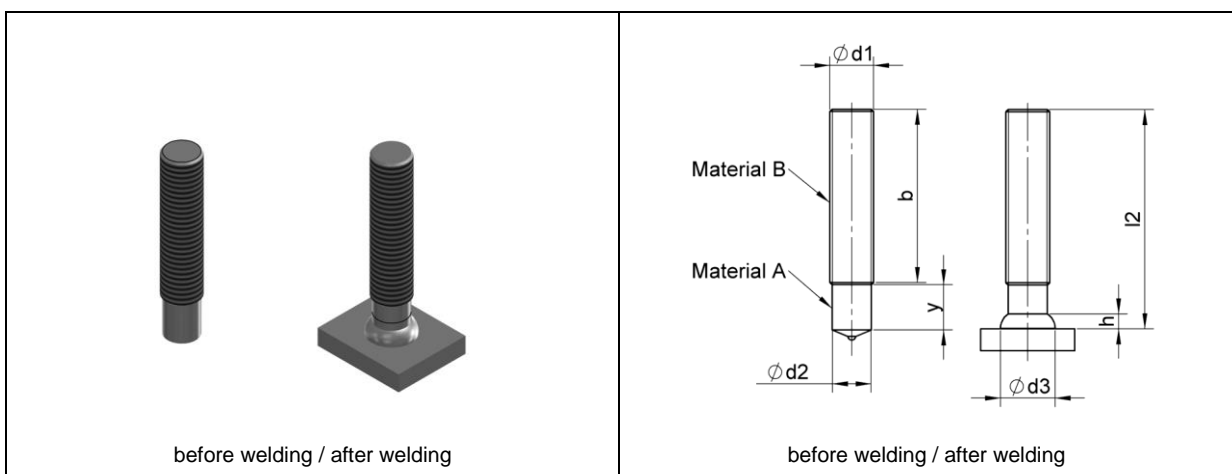
Dimensions						Material (item number)		Ceramic ferrule
d_1	l_2	y -0/+0,5	d_2 -0,1/0,1	d_3^*	h^*	A: Steel 4.8, B: A5-50	A: Steel 4.8, B: A2-50	
M8	15-100	6	7,1	10	3	78-14-08-XXX-PF	78-12-08-XXX-PF	KSP-F 8
M10	20-100	6,5	8,95	12,5	3,4	78-14-10-XXX-PF	78-12-10-XXX-PF	KSP-F 10
M12	20-100	7,5	10,5	14,5	4,2	78-14-12-XXX-PF	78-12-12-XXX-PF	KSP-F 12
M16	30-100	11	14,6	17,8	5,8	78-14-16-XXX-PF	78-12-16-XXX-PF	KSP-F 16

* d_3 and h are approximate values.

In the item number **XXX** has to be replaced by the respective welding element length l_2 (e.g. 030 for 30 mm).

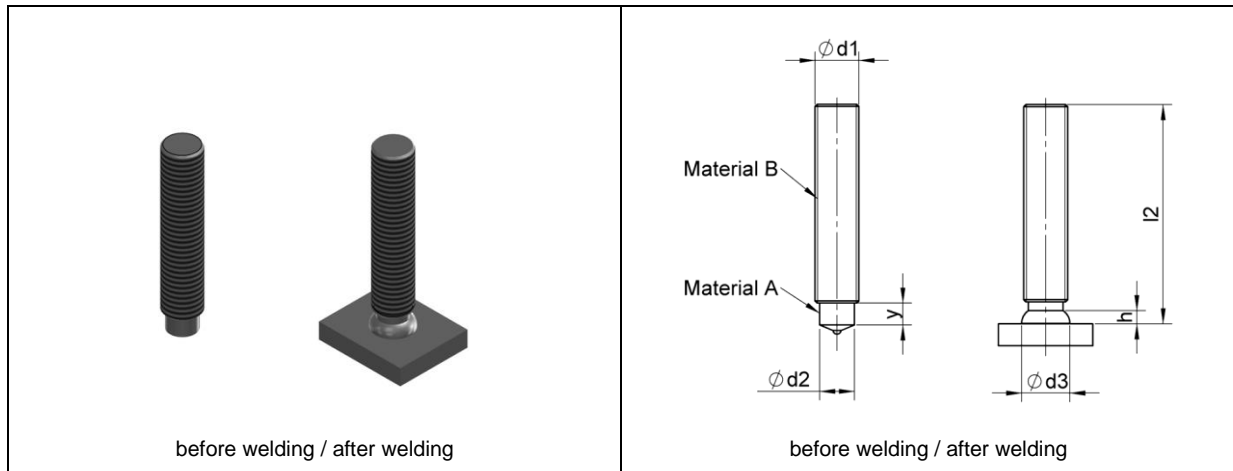
Not listed dimensions and materials available upon request.

1.4.2 Bimetallic threaded stud with partial thread (type PD-DUO)



Available dimensions and materials available upon request.

1.4.3 Bimetallic threaded stud with reduced shaft (type RD-DUO)



Dimensions						Material (item number)		Ceramic ferrule
d_1	l_2	y -0,2P ¹	d_2 -0,1/0,1	d_3^*	h^*	A: Steel 4.8, B: A5-50	A: Steel 4.8, B: A2-50	
M8	15-100	4	6,2	9	2,5	78-14-08-XXX-R	78-12-08-XXX-R	RF 8 (KSR-F 8 ³)
M10	20-100	5	7,9	11,5	3	78-14-10-XXX-R	78-12-10-XXX-R	RF 10
M12	20-100	6	9,5	13,5	4	78-14-12-XXX-R	78-12-12-XXX-R	RF 12
M16	25-100	7,5	13,2	16,8	5	78-14-16-XXX-R	78-12-16-XXX-R	RF 16
M16	25-100	11	13,2	16,1	5	78-14-16-XXX-R	78-12-16-XXX-R	RF 16 (flat form)

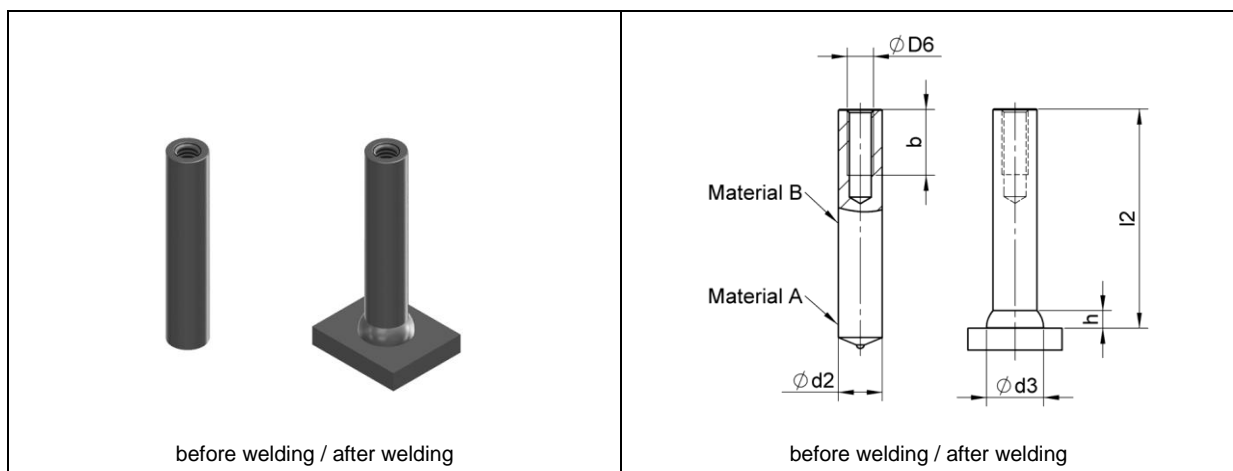
¹P = thread pitch acc. to DIN 13-1. ³for $l_2 < 20$ mm

* d_3 and h are approximate values.

In the item number **XXX** has to be replaced by the respective welding element length l_2 (e.g. 030 for 30 mm).

Not listed dimensions and materials available upon request.

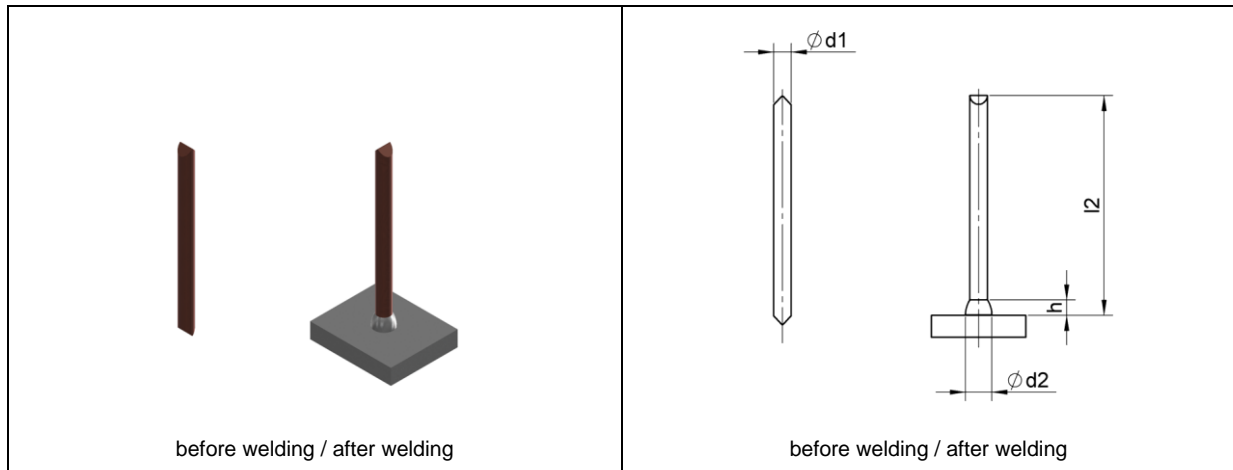
1.4.4 Bimetallic internally threaded stud (type ID-DUO)



Available dimensions and materials available upon request.

1.5 Insulation pins and clips

1.5.1 Insulation pin (type ISMS)



Insulation pin - two-sided with chisel tip

Dimensions				Material (item number)		[Ceramic ferrule ¹]
d ₁	l ₂	d ₂ *	h*	Steel 4.8 copper-plated	1.4571	
3	20-450	6	3,5	66-03-XXX-MS	74-03-XXX-MS	[UF 4 ¹ / K 5 ¹]
4	60-450	6	3,5	66-04-XXX-MS	74-04-XXX-MS	[UF 4 ¹ / K 5 ¹]
5	60-120	8	3,5	66-05-XXX-MS	74-05-XXX-MS	[UF 5 ¹ / K 5 ¹]

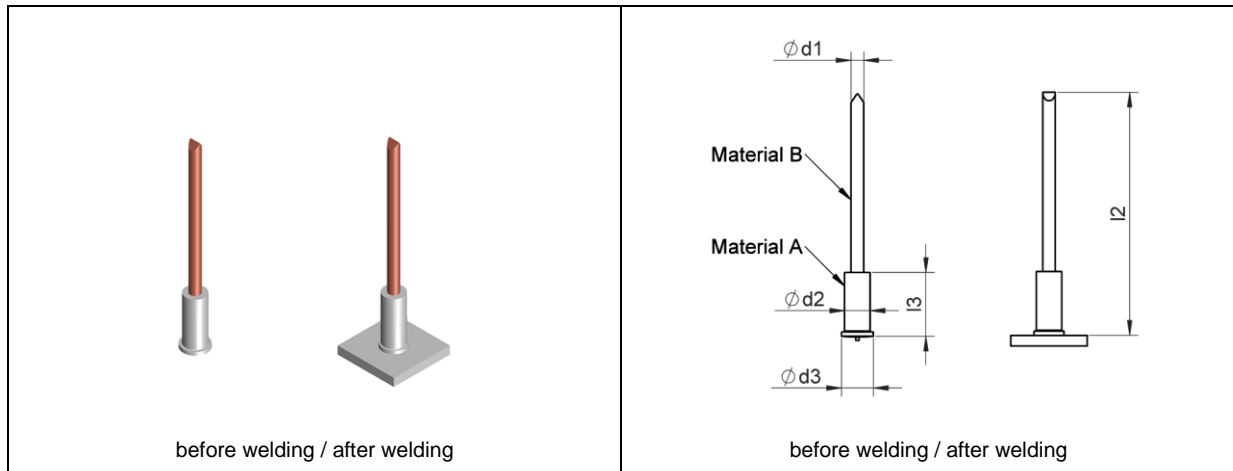
*d₂ and h are approximate values.

¹Insulation pins are generally welded without ceramic ferrules. Ceramic ferrules are only used for special applications. If ceramic ferrules shall be used, either type UF or type K can be chosen.

In the item number **XXX** has to be replaced by the respective welding element length l₂ (e.g. 030 for 30 mm).

Not listed dimensions and materials available upon request.

1.5.2 Bimetallic insulation pin (type VBS-MS)



The bimetallic insulation pin VBS consists of an aluminium tapped blind hole stud with a pressed-in insulation pin one-sided with grinded tip.

Application area: insulation on aluminium base material

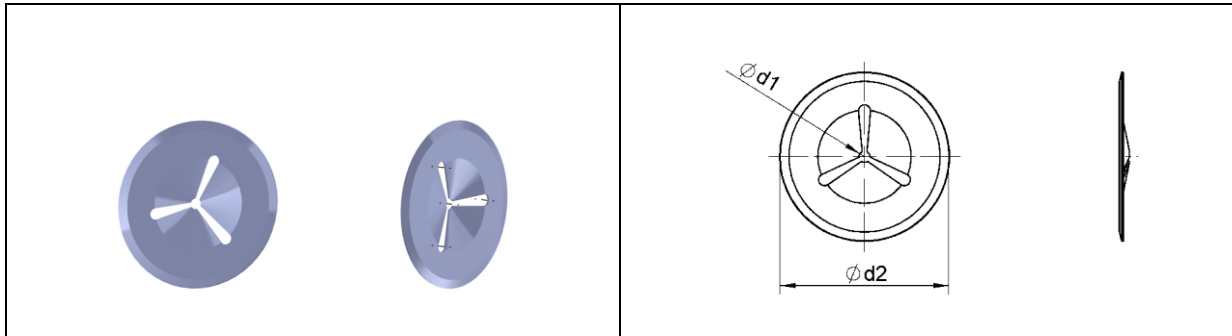
Dimensions					Material (item number)	
d_1	l_2	d_2	l_3	d_3	A: AlMg3, B: Steel 4.8 copper-plated	A: AlMg3, B: 1.4571
3	30-200	6	15	7,5	241-03-XXX-MS	247-03-XXX-MS

In the item number **XXX** has to be replaced by the respective welding element length l_2 (e.g. 030 for 30 mm).

Not listed dimensions and materials available upon request.



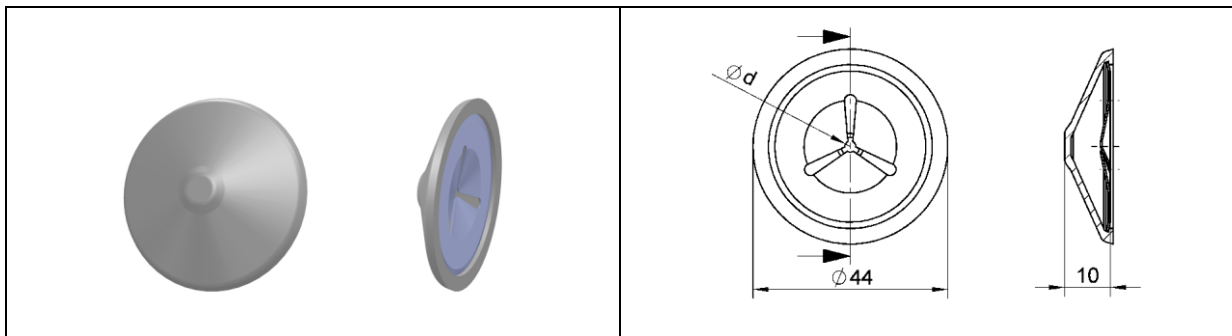
1.5.3 Clip for insulation pin (type R)



Dimensions		Material (item number)	
d ₁	d ₂	Steel zinc-plated	1.4571
3	38	49-13-003	49-33-003
4	38	49-14-004	49-34-004
5	38	49-15-005	49-35-005

Not listed dimensions and materials available upon request.

1.5.4 Clip with plastic cap for insulation pin (type W)



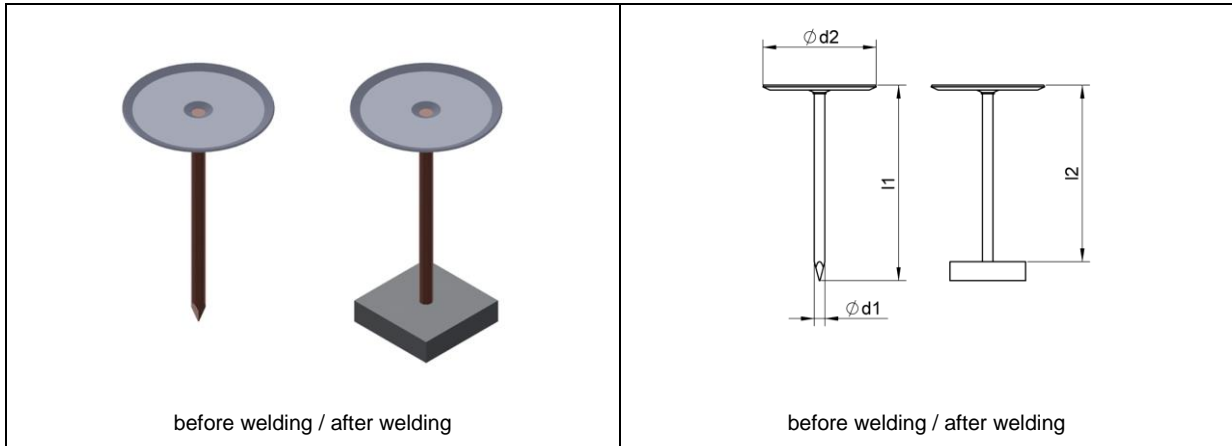
Dimensions	Material (item number)	
	Steel zinc-plated with plastic cap (white)	1.4571 with plastic cap (white)
d		
3	49-53-003	49-73-003
4	49-54-004	49-74-004
5	49-55-005	49-75-005

Plastic cap: halogen free, self-extinguishing

Not listed dimensions and materials available upon request.

1.6 Cupped head pins

1.6.1 Cupped head pin



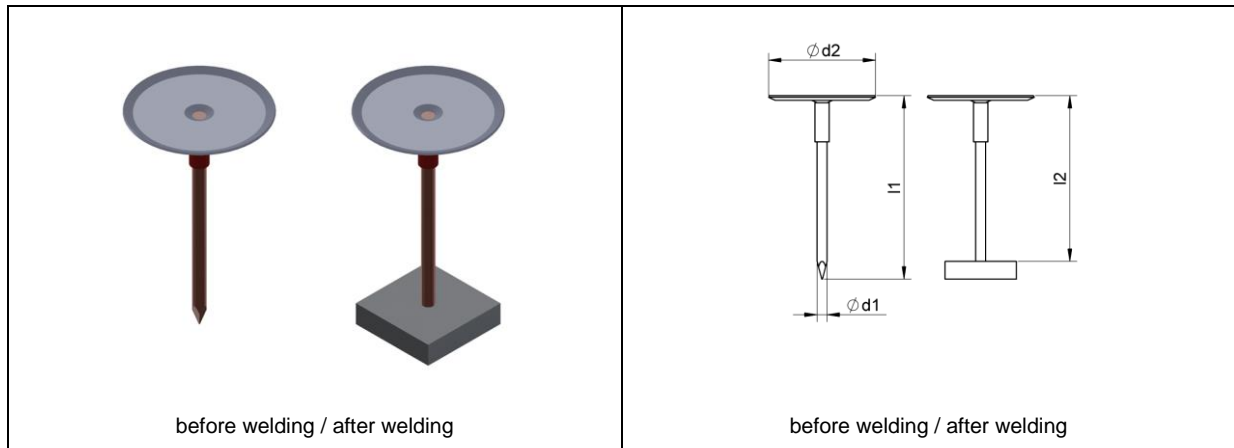
Dimensions			Material (item number)	
d_1	l_1	d_2	Shaft: steel 4.8 copper-plated head: steel zinc-plated	Shaft: 1.4301 head: steel zinc-plated
2,7	14,5-152,4	30	41-02,7-XXX	42-02,7-XXX

In the item number **XXX** has to be replaced by the respective welding element length l_2 (e.g. 028,5 for 28,5 mm).

Not listed dimensions and materials available upon request.



1.6.2 Cupped head pin insulated



The shaft of the cupped head pin is insulated. Insulated cupped head pins are used for fixing insulating mats with aluminum lamination resp. wire gauze. In connection with the downholder of the stud welding gun the insulation prevents that a short circuit with the aluminum lamination resp. the wire gauze occurs during welding.

Dimensions			Material (item number)	
d_1	l_1	d_2	Shaft: steel 4.8 copper-plated head: steel zinc-plated	Shaft: 1.4301 head: steel zinc-plated
2,7	14,5-152,4	30	41-02,7-XXX-S	42-02,7-XXX-S

In the item number **XXX** has to be replaced by the respective welding element length l_2 (e.g. 028,5 for 28,5 mm).

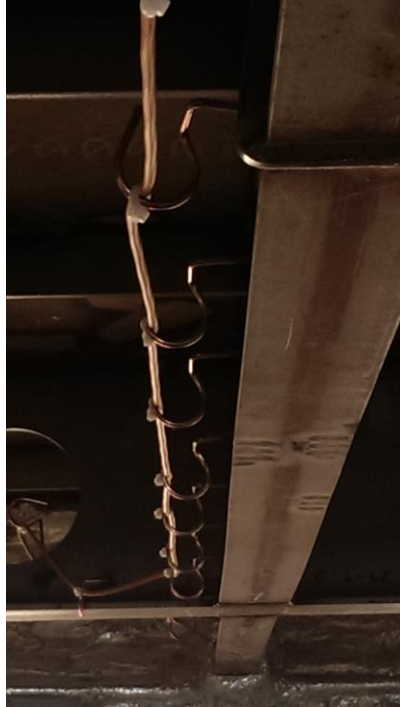
Not listed dimensions and materials available upon request.

2. Application examples

2.1 Levelling system



2.2 Cable hangers



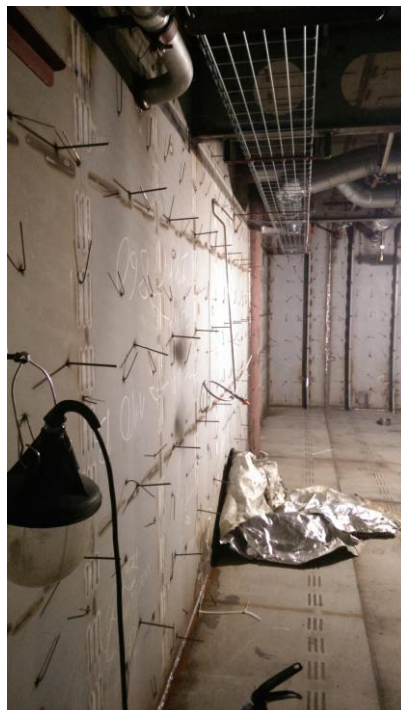
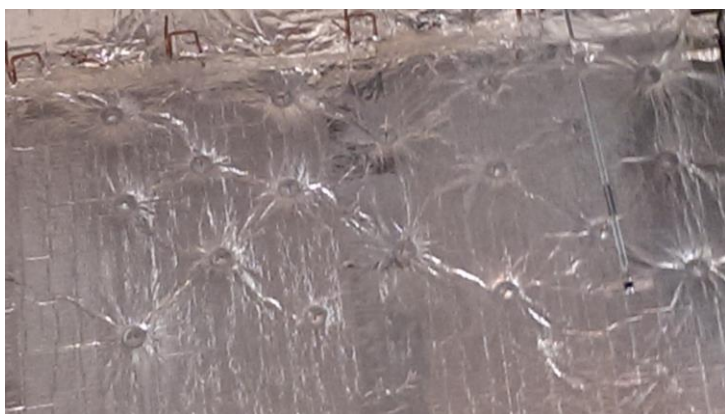
2.3 Threaded studs



2.4 Internally threaded studs



2.5 Insulation pins





Annex: Accessories and wear parts for stud welding guns

3. Accessories and wear parts for stud welding guns

3.1 Cable hanger

For welding without ceramic ferrules:

Stud dimensions		Gun accessories		
d ₁	L	Chuck (item number)	Teflon insert (item number)	Foot piece (Gun type: item number)
6	L ≥ 60	83-72-000	67-09-22	PHM-12, GD 12/15: 83-43-000-KH PHM-160/161, GD 16/19/22/25: 83-42-000-KH

For welding with ceramic ferrules type UF:

Stud dimensions		Gun accessories	
d ₁	L	Chuck (item number)	Foot piece/ferrule grip (Gun type: item number)
6	L ≥ 60	83-72-000	PHM-12, GD 12/15: 83-43-007-MS PHM-160/161, GD 16/19/22/25: 83-42-007-MS

3.2 Double cable hanger

Stud dimensions		Gun accessories	
d ₁	L	Chuck (item number)	Foot piece/ferrule grip (Gun type: item number)
6	L ≥ 60	83-72-005	PHM-12, GD 12/15: 83-43-011-MS PHM-160/161, GD 16/19/22/25: 83-42-011-MS

3.3 Electro flat bar (type HFS, HFSG)

Stud dimensions		Gun accessories	
D	l ₃	Chuck (item number)	Foot piece/ferrule grip (Gun type: item number)
10	l ₃ ≥ 40	83-72-010	PHM-12, GD 12/15: 83-43-009-MS PHM-160/161, GD 16/19/22/25: 83-42-009-MS

3.4 Headed stud with internal thread (type KBMI)

Stud dimensions		Gun accessories		
d ₁	l ₂	Chuck (item number)	Ferrule grip (item number)	Foot piece (Gun type: item number)
10	l ₂ ≥ 35	83-65-190	83-45-165	PHM-12, GD 12/15: 83-43-029 PHM-160/161, GD 16/19/22/25: 83-42-029
13	l ₂ ≥ 50	83-65-254	83-45-199	GD 15: 83-41-029 PHM-160/161, GD 16/19/22/25: 83-42-044
16	l ₂ ≥ 50	83-65-317 ¹ / 83-71-317 ²	83-45-261	PHM-160/161, GD 16/19/22/25: 83-42-044

¹Chuck made of steel nickel-plated, ²chuck made of copper

3.5 Reduced headed stud with internal thread (type KBMI-R)

Stud dimensions		Gun accessories	
d ₁	l ₂	Chuck (item number)	Foot piece/ferrule grip (Gun type: item number)
13	l ₂ ≥ 50	83-65-254	PHM-12, GD 12/15: 83-43-010-MS PHM-160/161, GD 16/19/22/25: 83-42-010-MS
16	l ₂ ≥ 50	83-65-317 ¹ / 83-71-317 ²	PHM-12, GD 12/15: 83-43-010-MS PHM-160/161, GD 16/19/22/25: 83-42-010-MS



¹Chuck made of steel nickel-plated, ²chuck made of copper

3.6 Threaded stud (type RD, RD-DUO)

Stud dimensions		Gun accessories		
d ₁	l ₂	Chuck (item number)	Ferrule grip (item number)	Foot piece (Gun type: item number)
M6	l ₂ < 20	83-50-006-4	65-07-00	PHM-12, GD 12/15: 83-41-022 PHM-160/161, GD 16/19/22/25: 83-40-022
	l ₂ ≥ 20	83-50-006		
M8	l ₂ < 20	83-50-008	65-09-00	PHM-12, GD 12/15: 83-41-022 PHM-160/161, GD 16/19/22/25: 83-40-022
	l ₂ ≥ 20		65-08-00	
M10	l ₂ < 20	25-30-00	65-09-00	PHM-12, GD 12/15: 83-41-022 PHM-160/161, GD 16/19/22/25: 83-40-022
	l ₂ ≥ 20	83-50-010		
M12	l ₂ < 20	25-31-00	65-10-00	PHM-12, GD 12/15: 83-41-022 PHM-160/161, GD 16/19/22/25: 83-40-022
	l ₂ ≥ 20	83-55-012		
M16 (y ≥ 7,5)	l ₂ < 30	25-99-00	65-11-00	PHM-12, GD 12/15: 83-41-029 PHM-160/161, GD 16/19/22/25: 83-40-029
	l ₂ ≥ 30	83-55-016		
M16 (y ≥ 11)	l ₂ < 30	25-99-00	65-12-00	PHM-12, GD 12/15: 83-41-029 PHM-160/161, GD 16/19/22/25: 83-40-029
	l ₂ ≥ 30	83-55-016		
M20	l ₂ ≥ 30	83-55-020	65-12-00	GD 19/22/25: 83-40-029
M24	l ₂ ≥ 50	25-46-00	65-12-00	GD 22/25: 83-40-029

3.7 Threaded stud (type MD, MD-DUO)

Stud dimensions		Gun accessories		
d ₁	l ₂	Chuck (item number)	Ferrule grip (item number)	Foot piece (Gun type: item number)
M6	l ₂ < 20	83-50-006-4	65-07-00	PHM-12, GD 12/15: 83-41-022 PHM-160/161, GD 16/19/22/25: 83-40-022
	l ₂ ≥ 20	83-50-006		
M8	l ₂ < 20	25-29-00	65-09-00	PHM-12, GD 12/15: 83-41-022 PHM-160/161, GD 16/19/22/25: 83-40-022
	l ₂ ≥ 20	83-50-008		
M10	l ₂ < 20	25-30-00	65-10-00	PHM-12, GD 12/15: 83-41-022 PHM-160/161, GD 16/19/22/25: 83-40-022
	l ₂ ≥ 20	83-50-010		
M12	l ₂ < 25	25-31-00	65-11-00	PHM-12, GD 12/15: 83-41-029 PHM-160/161, GD 16/19/22/25: 83-40-029
	l ₂ ≥ 25	83-55-012		
M16	l ₂ ≥ 30	83-55-016	65-12-00	GD 15: 83-41-029
				PHM-160/161, GD 16/19/22/25: 83-40-029
M20	l ₂ ≥ 35	83-55-020	65-13-00	GD 19/22/25: 83-40-044



3.8 Threaded stud (type PD, PD-DUO)

Stud dimensions		Gun accessories		
d ₁	l ₂	Chuck (item number)	Ferrule grip (item number)	Foot piece (Gun type: item number)
M6	> 15	83-50-006	65-07-00	PHM-12, GD 12/15: 83-41-022 PHM-160/161, GD 16/19/22/25: 83-40-022
M8	> 20	83-50-008	65-08-00	PHM-12, GD 12/15: 83-41-022 PHM-160/161, GD 16/19/22/25: 83-40-022
M10	> 20	83-50-010	65-09-00	PHM-12, GD 12/15: 83-41-022 PHM-160/161, GD 16/19/22/25: 83-40-022
M12	> 25	83-55-012	65-10-00	PHM-12, GD 12/15: 83-41-022 PHM-160/161, GD 16/19/22/25: 83-40-022
M16	> 30	83-55-016	65-11-00	GD 15: 83-41-029 PHM-160/161, GD 16/19/22/25: 83-40-029
M20	> 35	83-55-020	65-13-00	GD 19/22/25: 83-40-044
M24	> 50	25-46-00	65-13-00	GD 22/25: 83-40-044

3.9 Threaded stud (type FD)

Stud dimensions		Gun accessories		
d ₁	l ₂	Chuck (item number)	Ferrule grip (item number)	Foot piece (Gun type: item number)
M6	15-100	83-50-006	65-07-00	PHM-12, GD 12/15: 83-41-022 PHM-160/161, GD 16/19/22/25: 83-40-022
M8	15-100	83-50-008	65-08-00	PHM-12, GD 12/15: 83-41-022 PHM-160/161, GD 16/19/22/25: 83-40-022
M10	15-100	83-50-010	65-09-00	PHM-12, GD 12/15: 83-41-022 PHM-160/161, GD 16/19/22/25: 83-40-022
M12	20-100	83-55-012	65-10-00	PHM-12, GD 12/15: 83-41-022 PHM-160/161, GD 16/19/22/25: 83-40-022
M16	25-100	83-55-016	65-12-00	PHM-160/161, GD 16/19/22/25: 83-40-029
M20	30-100	83-55-020	65-12-00	GD 19/22/25: 83-40-029



3.10 Internally threaded stud (type ID, ID-DUO), non-threaded stud (type UD)

Stud dimensions		Gun accessories		
d ₁	l ₂	Chuck (item number)	Ferrule grip (item number)	Foot piece (Gun type: item number)
6	l ₂ < 20 l ₂ ≥ 20	83-50-006-4 83-50-006	65-07-00	PHM-12, GD 12/15: 83-41-022 PHM-160/161, GD 16/19/22/25: 83-40-022
8	l ₂ < 20 l ₂ ≥ 20	83-50-008-4 83-50-008	65-08-00	PHM-12, GD 12/15: 83-41-022 PHM-160/161, GD 16/19/22/25: 83-40-022
10	l ₂ < 20 l ₂ ≥ 20	25-97-00 83-50-010	65-09-00	PHM-12, GD 12/15: 83-41-022 PHM-160/161, GD 16/19/22/25: 83-40-022
12	l ₂ < 25 l ₂ ≥ 25	25-31-00 83-55-012	65-10-00	PHM-12, GD 12/15: 83-41-022 PHM-160/161, GD 16/19/22/25: 83-40-022
14,6	l ₂ < 30 l ₂ ≥ 30	26-90-00 26-48-00	65-12-00	GD 15: 83-41-029 PHM-160/161, GD 16/19/22/25: 83-40-029
16	l ₂ < 30 l ₂ ≥ 30	25-99-00 83-55-016	65-12-00	PHM-160/161, GD 16/19/22/25: 83-40-029
18,3	l ₂ < 30 l ₂ ≥ 30	83-55-018-5 83-55-018	65-13-00	GD 19/22/25: 83-40-044
20	l ₂ ≥ 40	83-55-020	65-12-00	GD 22/25: 83-40-044
22	l ₂ ≥ 40	25-15-00	65-13-00	GD 22/25: 83-40-044

3.11 Insulation pin (type ISMS)

For welding without ceramic ferrules:

Stud dimensions		Gun accessories			
d ₁	l ₂	Chuck (item number)	Supporting tube (item number)	Teflon insert (item number)	Foot piece (Gun type: item number)
3	20 ≤ l ₂ < 65 65 ≤ l ₂ < 110 l ₂ ≥ 110	83-25-003 83-45-003 83-90-003	80-11-002	80-11-003	PHM-12, GD 12/15: 83-41-035 PHM-160/161, GD 16/19/22/25: 83-40-035
4	50 ≤ l ₂ < 110 l ₂ ≥ 110	83-25-004 83-85-004	80-11-002	80-11-003	PHM-12, GD 12/15: 83-41-035 PHM-160/161, GD 16/19/22/25: 83-40-035
5	50 ≤ l ₂ < 65 65 ≤ l ₂ < 110 l ₂ ≥ 110	83-25-005 83-40-005 83-85-005	80-11-002	80-11-003	PHM-12, GD 12/15: 83-41-035 PHM-160/161, GD 16/19/22/25: 83-40-035

For welding with ceramic ferrules type UF:

Stud dimensions		Gun accessories		
d ₁	l ₂	Chuck (item number)	Ferrule grip (item number)	Foot piece (Gun type: item number)
3	20 ≤ l ₂ < 65 65 ≤ l ₂ < 110 l ₂ ≥ 110	83-25-003 83-45-003 83-90-003	65-06-00	PHM-12, GD 12/15: 83-41-022 PHM-160/161, GD 16/19/22/25: 83-40-022
4	50 ≤ l ₂ < 110 l ₂ ≥ 110	83-25-004 83-85-004	65-06-00	PHM-12, GD 12/15: 83-41-022 PHM-160/161, GD 16/19/22/25: 83-40-022
5	50 ≤ l ₂ < 65 65 ≤ l ₂ < 110 l ₂ ≥ 110	83-25-005 83-40-005 83-85-005	65-07-00	PHM-12, GD 12/15: 83-41-022 PHM-160/161, GD 16/19/22/25: 83-40-022



For welding with permanent ceramic ferrules type K:

Stud dimensions		Gun accessories		
d ₁	l ₂	Chuck (item number)	Ferrule grip (item number)	Foot piece (Gun type: item number)
3	20 ≤ l ₂ < 65 65 ≤ l ₂ < 110 l ₂ ≥ 110	83-25-003 83-45-003 83-90-003	65-31-01	PHM-12, GD 12/15: 83-41-022-M22
4	50 ≤ l ₂ < 110 l ₂ ≥ 110	83-25-004 83-85-004	65-31-01	PHM-12, GD 12/15: 83-41-022-M22
5	50 ≤ l ₂ < 65 65 ≤ l ₂ < 110 l ₂ ≥ 110	83-25-005 83-40-005 83-85-005	65-31-01	PHM-12, GD 12/15: 83-41-022-M22

3.12 Bimetallic insulation pin (type VBS-MS)

Stud dimensions		Gun accessories			
d ₁	l ₂	Chuck (item number)	Supporting tube (item number)	Teflon insert (item number)	Foot piece (Gun type: item number)
3	20 ≤ l ₂ < 65 65 ≤ l ₂ < 110 l ₂ ≥ 110	83-25-003 83-45-003 83-90-003	80-11-002	80-11-003	PHM-12, GD 12/15: 83-41-035 PHM-160/161, GD 16/19/22/25: 83-40-035

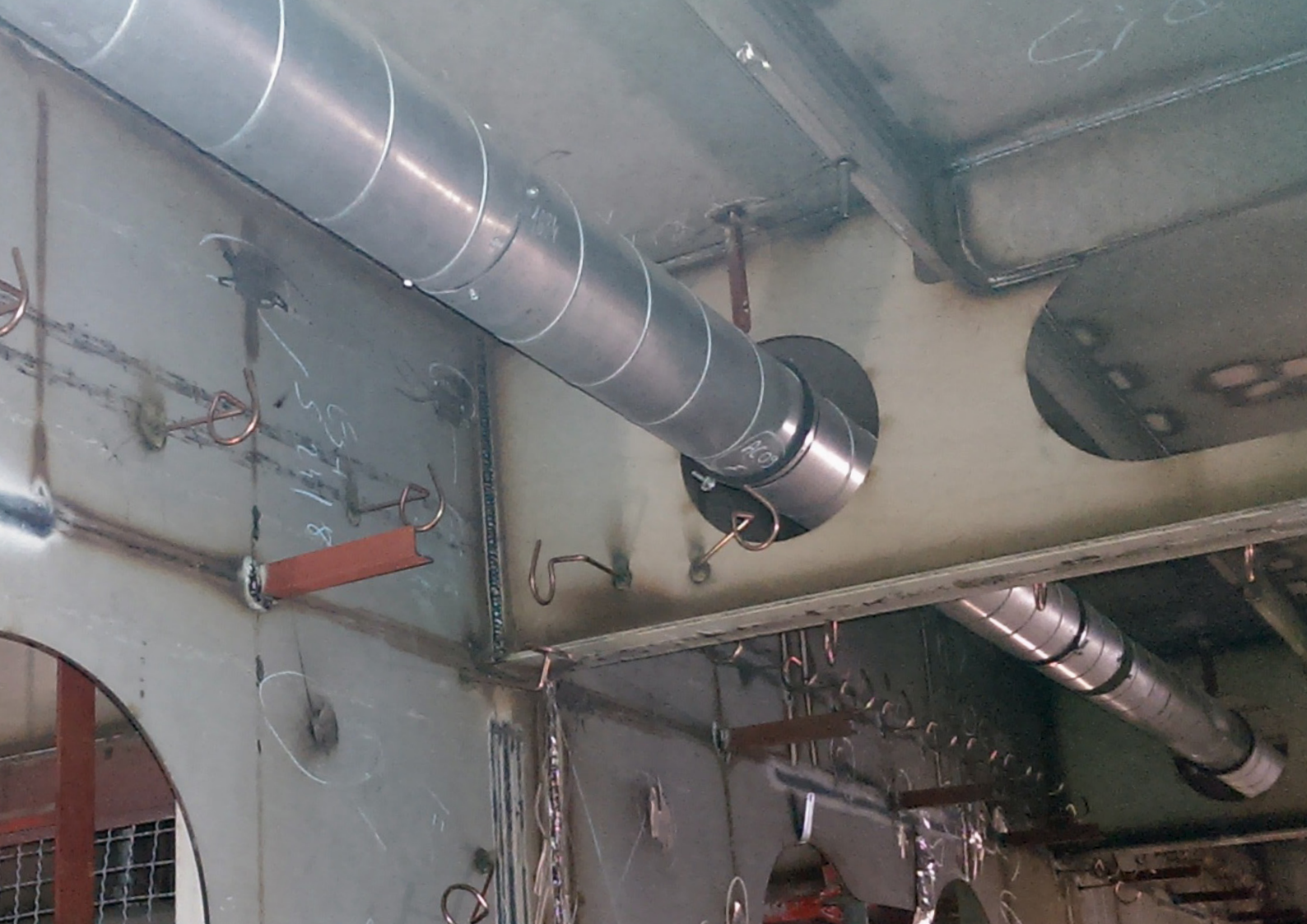
3.13 Cupped head pin, cupped head pin insulated

For stud welding gun PIM-1B:

Stud dimensions			Gun accessories
d ₁	d ₂	l ₁	Chuck (item number)
2,7	30	l ₂ ≥ 9,5	82-50-0311

For stud welding gun PIM-1K:

Stud dimensions			Gun accessories
d ₁	d ₂	l ₁	Chuck (item number)
2,7	30	l ₂ ≥ 9,5	B-80-35-1368



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