



STUD WELDING IN SHIP CONSTRUCTION

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technical info

Our welding studs are made from materials suitable for stud welding. Dimensions and design of our standard products conform to EN ISO 13918; any non-standard products supplied will be produced to correspond to the norm. If you wish to use a type of stud other than those listed, please send us your enquiry and consult our specialists about your welding task.

Welding studs are available in different materials. Upon request the properties of each can be documented by test report 2.2. or inspection certificate 3.1 or 3.2 (EN 10204)

Non-alloy structural steel:

Non-alloy structural steel welding studs are manufactured from S235 according to EN 10025:2005 with more stringent requirements for carbon content, degree of purity, grain size and surface properties. This makes the material ideally suited for stud welding.

For threaded studs, pins, tapped studs and similar products, we guarantee mechanical properties according to EN ISO 898-1, property class 4.8.

We supply shear connectors of our partner Köco, manufactured from S235J2+C470 or S355 according to EN 10025:2005 with the following mechanical properties:

Tensile strength R_m	$\geq 470\text{N/mm}^2$
Tensile strength $R_m\text{S355}$	$\geq 510\text{N/mm}^2$
Yield strength R_{el}	$\geq 375\text{N/mm}^2$
Elongation A_5	$\geq 14\%$

Shear connectors exceed the requirements of EN ISO 13918. The CE-conformity with the European Technical Approval ETA-03/0039 dated May 31, 2010 by Deutsches Institut für Bautechnik (DIBt German

Institute for Building Engineering)) has been demonstrated

Stainless steel:

We supply threaded studs, pins, tapped studs and similar products made from A2-50 according to DIN EN ISO 3506-1.

Welding studs made from stainless and acid-resistant steels such as 1.4541, 1.4571, 1.4401, 1.4404 in various property classes are available upon request. We supply Köco stainless steel shear connectors made of 1.4301 in accordance with EN 10088:2005 with the following mechanical properties:

Tensile strength R_m	540-780N/mm ²
Yield point $R_{p0,2}$	$\geq 350\text{N/mm}^2$

The CE-conformity with the European Technical Approval ETA-03/0039 dated May 31, 2010 by Deutsches Institut für Bautechnik (DIBt, German Institute for Building Engineering has been demonstrated

Heat- and scale-resistant welding studs are manufactured from 1.4713, 1.4742, 1.4762, 1.4828, 1.4841, 2.4851 or 2.4856, Other materials are available upon request.

Stud dimensions:

Generally, the nominal length is the length of the stud "after welding". The studs delivered are 1 to 5mm longer than their specified nominal length (except KKS boiler tube studs and KHS concave pins). This enables the welding parameters to be checked by measuring the stud length after welding.

Threads:

The threads of studs are cold rolled and manufactured in accordance with DIN 13-20, tolerance 6g; non-standard threads are available upon request.

Flux:

Studs for welding with ceramic ferrules are provided with an aluminium tip as required by the welding process, to facilitate the ignition of the arc, to stabilize the arc, and to deoxidize the welding pool. The correct amount of flux used is an essential factor in obtaining perfect welding results.

Surface protection:

Unless specified otherwise, welding studs are delivered uncoated.

Non-alloy structural steel	4.8
Stainless steel	A2-50
Stainless steel	A4-70
Heat resistant steel	1.4828
Zinc-plated	4.8 A2K
Copper-plated	4.8 C2E
Nickel-plated on copper base	4.8 G2E
Zinc-flake coating	4.8 zI
Aluminium	AlMg

In the case of zinc-plated studs, the zinc coating is removed at the welding tip to prevent contamination of the welding pool.

Ceramic ferrules

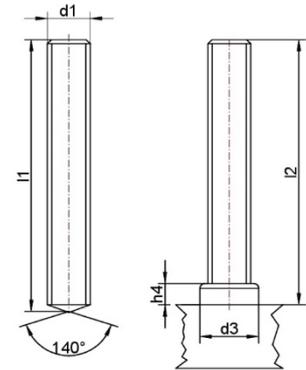
The ceramic ferrules can be used only once. The ferrules required for welding are generally included in the delivery of the studs. Ceramic ferrules are not available without studs.

Weld collar:

In the course of stud welding a weld collar is formed where the stud is joined to the work-piece, its dimensions depend on the welding parameters as well as the ceramic ferrule used. In this area threads, for example, cannot be utilized.

K2024-2-studs

Drawn arc stud welding with ceramic ferrule
fully-threaded stud type FD M6-M10 (EN ISO 13918)



dimension (d1x l2)	h ₄	d ₃	Kg/100 *	unit	ceramic ferrule	
M 6x15	4	8,5	0,28	500	UF6	
M 6x20			0,38	500		
M 6x25			0,45	500		
M 6x30			0,55	500		
M 6x35			0,64	200		
M 6x40			0,73	200		
M 8x15		11	11	0,51	500	UF8
M 8x20				0,69	500	
M 8x25				0,84	500	
M 8x30				1,00	500	
M 8x35				1,16	200	
M 8x40				1,32	200	
M 8x45				1,48	200	
M 8x50				1,64	200	
M 8x70				2,23	200	
M 10x20				13	13	
M 10x25		1,34	500			
M 10x30		1,57	500			
M 10x35		1,84	200			
M 10x40		2,09	200			
M 10x50	2,60	200				
M 10x55	2,85	200				
M 10x60	3,08	200				
M 10x70	3,60	200				

material: 4.8, A2, A4,

Surface coating: A2K (galvanized), z1 (Zinc flake coating)

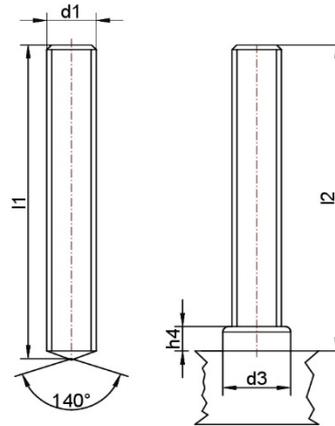
Further dimensions on request

*are values for 4.8 bolts

K2024-3-studs

Hilbig GmbH ● Postweg 204 ● 21218 Seevetal ● Germany

fully-threaded stud type FD M12-M20
(EN ISO 13918)



dimension (d1x l2)	h ₄	d ₃	Kg/100*	unit	ceramic ferrule
M 12x25	5	16	1,95	500	UF12
M 12x30			2,31	500	
M 12x35			2,64	200	
M 12x40			3,04	200	
M 12x45			3,40	200	
M 12x50			3,76	200	
M 12x60			4,49	200	
M 12x70			5,22	100	
M 16x40	7	21	5,60	100	UF16
M 16x50			6,93	100	
M 16x60			8,26	100	
M 16x70			9,59	100	
M 20x40	7	26	8,80	100	UF20
M 20x50			10,67	100	
M 20x60			12,97	100	

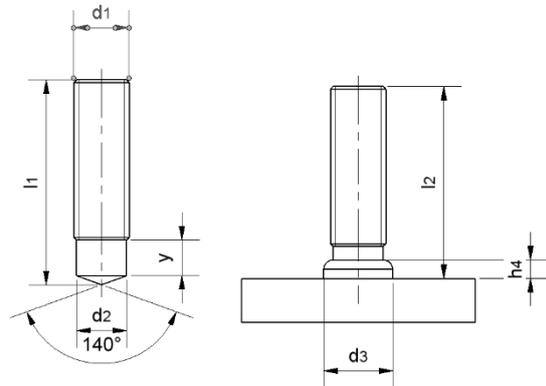
material: 4.8, A2, A4,

Surface coating: A2K (galvanized), z1 (Zinc flake coating)

Further dimensions on request

*are values for 4.8 bolts

virtually fully-threaded stud type MD
(EN ISO 13918)



dimension (d1x l2)	h	d2	d3	y	Kg/100*	unit	ceramic ferrule
M 6x30	3,5	5,35	9	5,5	0,52	500	MF6
M 6x40					0,69	200	
M 6x50					0,87	200	
M 8x20	3	7,19	9,9	6	0,61	500	MF8
M 8x25					0,77	500	
M 8x30					0,93	500	
M 8x40					1,25	500	
M 8x50					1,57	500	
M 10x30	3,4	9,03	12,5	6,5	1,46	500	MF8
M 10x40					1,97	200	
M 12x40	4,2	10,86	14,5	7,5	2,83	200	MF12
M 12x45					3,20	200	
M 12x50					3,56	200	
M 16x30	5,8	14,6	17,8	11	3,81	100	MF16
M 16x40					5,14	100	

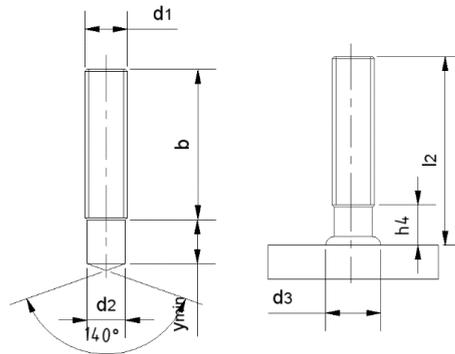
material: 4.8, A2, A4,

Surface coating: A2K (galvanized), zl (Zinc flake coating)

Further dimensions on request

*are values for 4.8 bolts

partially threaded stud type PD M6-M10
(EN ISO 13918)



dimension (d1x l2)	d2	d3	y	b	h4	Kg/100*	unit	ceramic ferrule
M 6x20	5,35	8,5	9	•	3,5	0,38	500	PF6
M 6x25				•		0,45	500	
M 6x30				•		0,55	500	
M 6x35				•		0,64	200	
M 6x40				•		0,73	200	
M 6x50				•		0,91	200	
M 6x60				•		1,08	200	
M 8x20	7,19	10	9	•	3,5	0,69	500	PF8
M 8x25				•		0,84	500	
M 8x30				•		1,00	500	
M 8x35				•		1,16	200	
M 8x40				•		1,32	200	
M 8x45				•		1,48	200	
M 8x50				•		1,64	200	
M 8x55				•		1,80	200	
M 8x60	•	1,96	200					
M 10x20	9,03	12,5	9,5	•	4	1,09	500	PF10
M 10x25				•		1,34	500	
M 10x30				•		1,57	500	
M 10x35				•		1,84	200	
M 10x40				•		2,09	200	
M 10x50				•		2,60	200	
M 10x55				•		2,85	200	
M 10x60				•		3,08	200	
M 10x80	•	4,10	100					

material: 4.8, A2, A4,

Surface coating: A2K (galvanized), zl (Zinc flake coating)

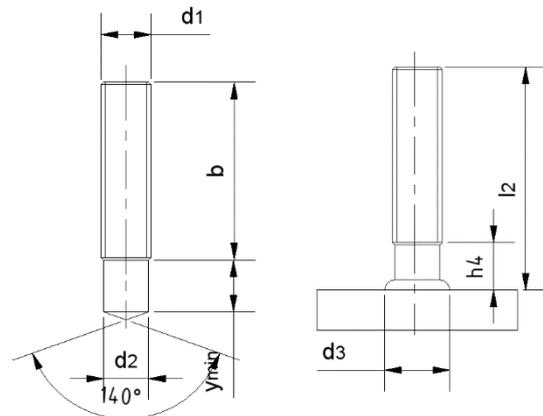
Further dimensions on request

*are values for 4.8 bolts

K2024-6-studs

Hilbig GmbH ● Postweg 204 ● 21218 Seevetal ● Germany

partially threaded stud type PD M12-M16
(EN ISO 13918)



dimension (d1x12)	d ₂	d ₃	y	b	h ₄	Kg/100*	unit	ceramic ferrule	
M 12x25	10,86	15,5	11,5	•	4,5	1,95	500	PF12	
M 12x30				•		2,31	500		
M 12x35				•		2,64	200		
M 12x40				•		3,04	200		
M 12x45				•		3,40	200		
M 12x50			•	3,76	200				
M 12x60			40	•	4,49	200			
M 12x70				•	5,22	200			
M 12x80				•	5,94	100			
M 16x30				14,6	19,5	13,5	•		6
M 16x35	•	4,81					100		
M 16x40	•	5,60	100						
M 16x45	•	6,26	100						
M 16x50	•	6,93	100						
M 16x55	40	•	7,60			100			
M 16x60		•	8,26			100			
M 16x65		•	8,93			50			
M 16x70		•	9,59			50			
M 16x75		•	10,04			50			
M 16x80	50	•	10,93	50					

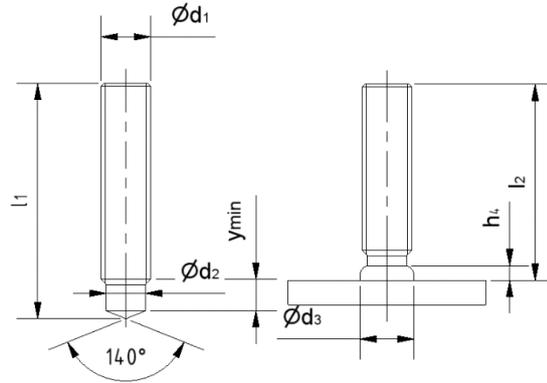
material: 4.8, A2, A4,

Surface coating: A2K (galvanized), zl (Zinc flake coating)

Further dimensions on request

*are values for 4.8 bolts

threaded stud with reduced shaft type
RD M6-M10 (EN ISO 13918)



dimension (d1xl2)	h	d2	d3	y	Kg/100*	unit	ceramic ferrule
M 6x20	3	4,7	7	4	0,34	500	RF6
M 6x25					0,43	500	
M 6x30					0,52	500	
M 6x35					0,60	200	
M 6x40					0,69	200	
M 6x50					0,87	200	
M 6x60					1,05	200	
M 8x20	3	6,2	9	4	0,61	500	RF8/9
M 8x25					0,77	500	
M 8x30					0,93	500	
M 8x35					1,09	500	
M 8x40					1,25	500	
M 8x45					1,41	500	
M 8x50					1,57	500	
M 8x55					1,73	200	
M 8x60					1,89	200	
M 10x20	3	7,9	12	5	0,96	500	RF10
M 10x25					1,21	500	
M 10x30					1,46	500	
M 10x35					1,72	200	
M 10x40					1,97	200	
M 10x50					2,47	200	
M 10x55					2,72	200	
M 10x60					2,95	200	

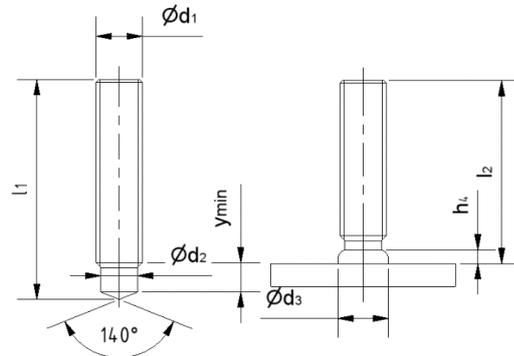
material: 4.8, A2, A4,

Surface coating: A2K (galvanized), zl (Zinc flake coating)

Further dimensions on request

*are values for 4.8 bolts

threaded stud with reduced shaft type
RD M12-M20
(EN ISO 13918)



dimension (d1x l2)	h	d2	d3	y	Kg/100*	unit	ceramic ferrule
M 12x25	4	9,5	14	6	1,74	500	RF12
M 12x30					2,11	500	
M 12x35					2,47	200	
M 12x40					2,83	200	
M 12x45					3,20	200	
M 12x50					3,56	200	
M 12x60					4,29	200	
M 12x70					5,02	200	
M 16x30	6	13	18	11	3,81	100	RF16, flach
M 16x35					4,48	100	
M 16x40					5,14	100	
M 16x45					5,81	100	
M 16x50					6,48	100	
M 16x55					7,14	100	
M 16x60					7,81	100	
M 16x70					9,14	50	
M 20x35	7	17	23	13	7,09	100	SR20F
M 20x40					8,00	100	
M 20x45					9,04	100	
M 20x50					10,80	100	
M 20x60					12,16	100	
M 20x65					13,20	100	
M 20x70					14,25	100	
M 20x80					16,33	100	

material: 4.8, A2, A4,

Surface coating: A2K (galvanized), zl (Zinc flake coating)

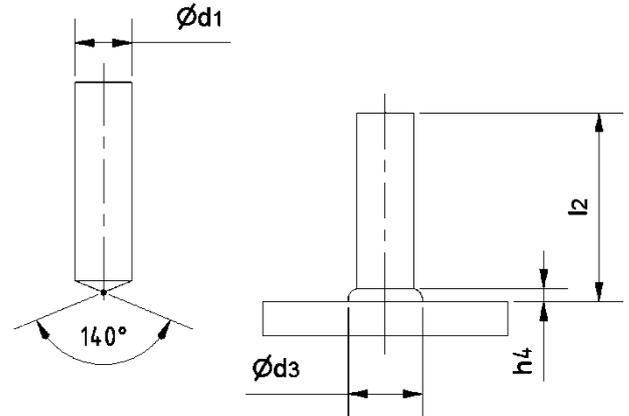
Further dimensions on request

*are values for 4.8 bolts

K2024-9-studs

Hilbig GmbH ● Postweg 204 ● 21218 Seevetal ● Germany

unthreaded stud type UD (EN ISO 13918)



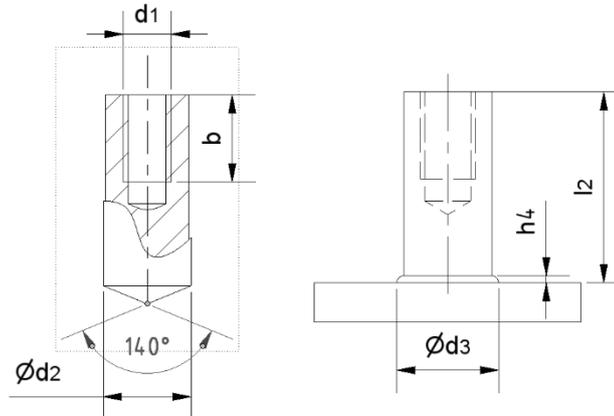
$d_{1\pm}$	6	8	10	12	14,6	16
d_3	8,5	11	13	16	18,5	17,8
h_4	3,5	3	3,4	4,2	6	5,8
ceramic ferrule	UF6	UF8	UF10	UF12	PF16	UF16
l_2	on request	on request				

material: 4.8, A2, A4,

Surface coating: A2K (galvanized), zl (Zinc flake coating)

Further dimensions on request

stud with internal thread type ID
(EN ISO 13918)



dimension d1xb-d2xl2	d3	h4	Kg/100*	unit	ceramic ferrule
M6x9-10x20			1,10	500	UF10
M6x9-10x30			1,71	500	
M6x9-10x40			2,33	200	
M6x9-10x50			2,95	200	
M6x9-10x60			3,56	200	
M8x12-12x20			1,43	500	UF12
M8x12-12x25			1,87	500	
M8x12-12x30			2,32	500	
M8x12-12x50			4,10	200	
M8x12-12x60			4,98	200	
M8x12-14,6x22	19	6	2,60	200	PF16
M8x12-14,6x30			3,65	200	
M8x12-14,6x40			4,97	100	
M10x15-16x25	21	7	3,30	100	UF16
M10x15-16x30			4,09	100	
M10x15-16x40			5,66	100	
M10x15-16x50			7,24	100	
M10x15-16x60			8,82	100	
M12x18-18,2x25	23	7	3,94	250	PF20
M12x18-18,2x30			4,96	250	
M12x18-18,2x50			9,05	200	
M12x18-18,2x60			11,09	200	

material: 4.8, A2, A4,

Surface coating: A2K (galvanized), z1 (Zinc flake coating)

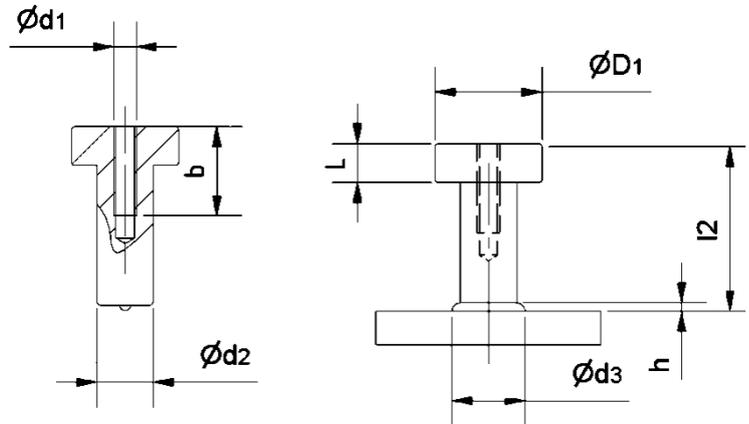
Further dimensions on request

*are values for 4.8 bolts

K2024-11-studs

Hilbig GmbH ● Postweg 204 ● 21218 Seevetal ● Germany

stud type KBMI



example description: d2xl2-d1xb-235JR-A2K

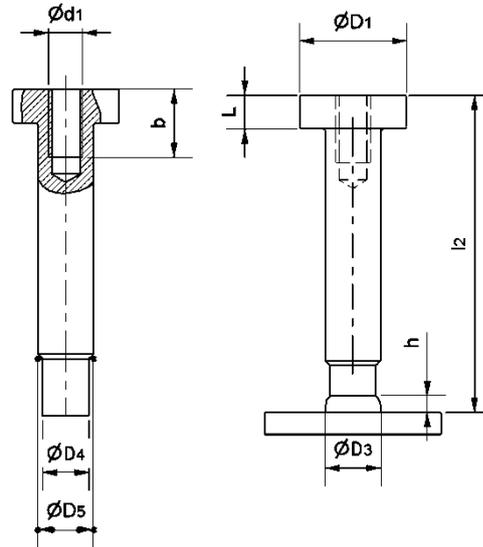
d2	l2	d1	b	D1	L1	d3	h	Ceramic ferrule
10	30	M4	10	19	7	13	4	UF10
		M5	16					
	M6	50						
		75						
		100						
175								
12	30	M8	20	25	8	16	5	UF12
13	50							17
	75							
	100							
16	50	M10	32	21	7	UF16		
19	50	M12	20	32	10	26	9	UF19

material: 4.8, A2, A4,

Surface coating: A2K (galvanized), zl (Zinc flake coating)

Further dimensions on request

stud type KBMI reduced



example description: D4/D5xL2-d1xb-235JR-A2K

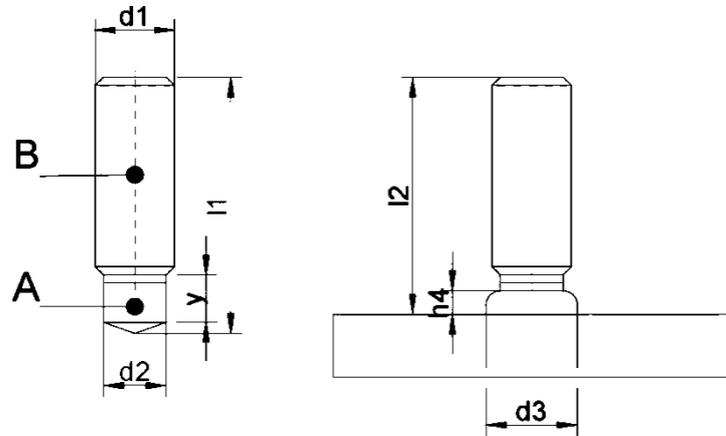
D4	D5	L2	d1	b	D1	D3	h	ceramic ferrule
10,8	13	35	M8	12	25	17	5	PF12
		50						
		75						
		100						
	16	40	M10	18	32	21	7	
		50						
		60						
		90						
		100						
	19	50	M12	20	32	26	9	

material: 4.8, A2, A4,

Surface coating: A2K (galvanized), zI (Zinc flake coating)

Further dimensions on request

DUO-threaded stud with
reduced shaft type RD

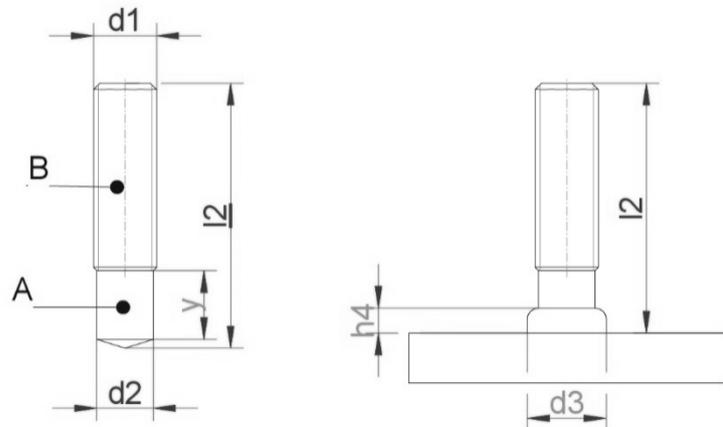


d ₁	M6	M8	M10	M12	M16	M20
d ₂	4,7	6,2	7,9	9,5	13,2	<i>on request</i>
d ₃	7	9	11,5	13,5	18	
h ₄	2,5	2,5	3	4	5	
y	5	5	7	8	11	
Ceramic ferrule	RF6	RF8	RF10	RF12	RF16 flach	
l ₂	15-100	15-100	15-100	20-100	25-100	

material: A= 4.8 B=1.4571

Further dimensions on request

DUO-partially threaded stud
type PD

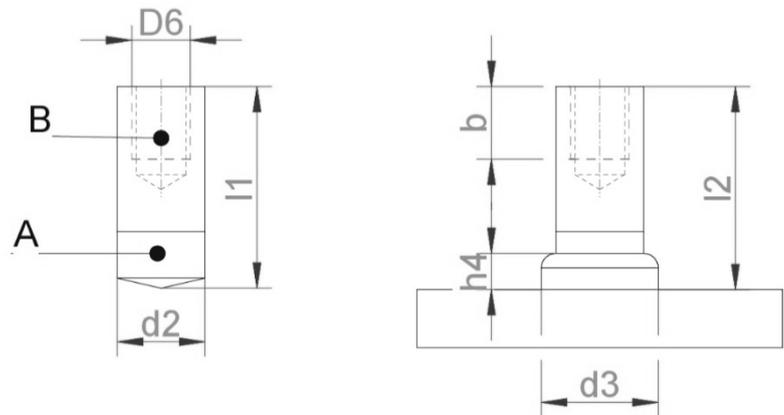


d ₁	M6	M8	M10	M12	M16
d _{2±1}	5,35	7,19	9,03	10,86	14,6
d ₃	8,5	10	12,5	15,5	19,5
h ₄	3,5	3,5	4	4,5	6
ceramic ferrule	PF6	PF8	PF10	PF12	PF16
l ₂	on request				

material: A= 4.8 B=1.4571

Further dimensions on request

DUO-stud with internal
thread type ID

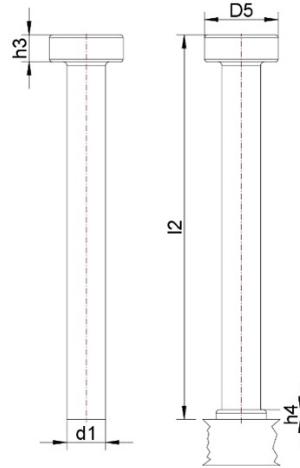


D₆	M6	M8	M8	M10	M10
$d_2 \pm 0,1$	12	12	14,6	14,6	16
d_3	16	16	18,5	18,5	21
$b + 2P$	9	12	15	15	15
h_4	4	5	6	6	7
l_{2min}	20	20	25	25	25

material: A= 4.8 B=1.4571

Further dimensions on request

shear connector type SD (EN ISO 13918)
ETA-03/0039

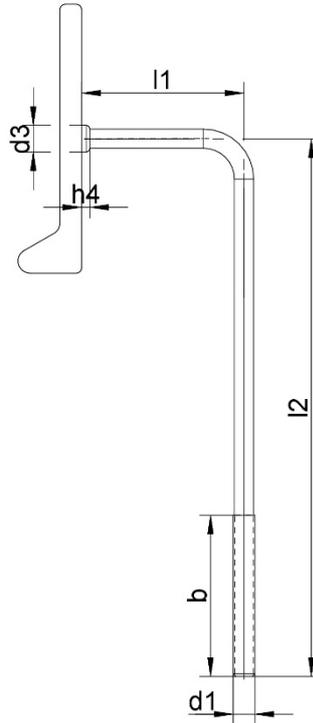


dimension (d1xI2)	barrel size	kg/100	h4	d5	h3			
10x 30	5500	3,25	2,5	19	7			
10x 50	4500	4,60						
10x 75	3300	6,10						
10x100	2400	7,60						
10x125	1800	9,20						
10x150	1400	10,80						
10x175	1000	12,30						
13x 50	2500	7,80						
13x 75	1800	10,40	3	25	8			
13x100	1400	13,00						
13x125	1100	15,60						
13x150	900	18,20						
13x175	700	20,80						
13x200	500	22,40						
16x 35	2000	9,90				4,5	32	8
16x 50	1500	12,20						
16x 75	1200	16,20						
16x100	900	20,10						
16x125	750	24,10						
16x150	600	28,00						
16x200	400	34,90						
16x250	300	42,80						
16x300	700	51,00						

dimension (d1xI2)	barrel size	kg/100	h4	d5	h3			
19x 50	1250	16,00	6	32	10			
19x100	700	27,10						
19x150	500	38,30						
19x200	350	49,20						
19x225	300	54,80						
19x250	250	60,70						
19x300	600	72,00						
19x350	500	83,30						
22x 50	1000	20,00				6	35	10
22x 75	700	28,20						
22x 90	600	32,80						
22x100	550	35,70						
22x150	350	50,60						
22x175	310	58,10						
22x200	250	65,50						
22x225	225	73,00						
22x250	200	80,50						
22x300	500	97,00						
22x350	400	112,00						
25x100	400	46,50						
25x150	280	65,50						
25x200	200	84,50						
25x250	150	105,60						
25x300	350	121,50						
25x350	300	143,00						

material S235JRG2C+C470

angle stud type WB

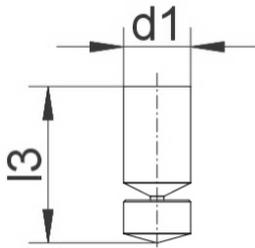


d ₁	M8	
d _{2±1}	7,19	
d ₃	10	
h ₄	3,5	
l ₁	60	120
l ₂	min60	

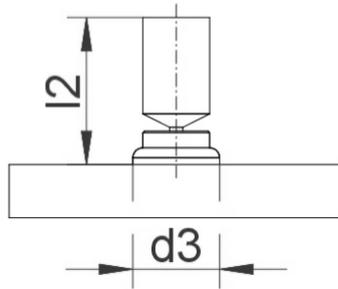
material: S235JRG2C+C

Further dimensions on request

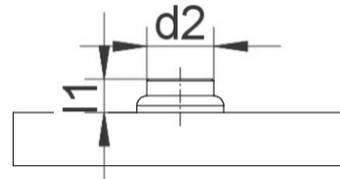
anti skid type AS



stud before welding



Welded studs



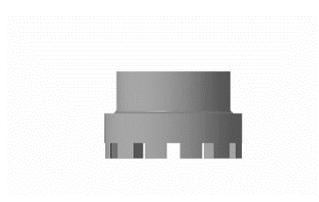
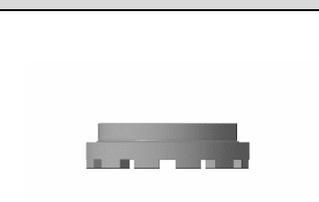
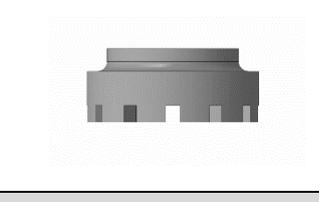
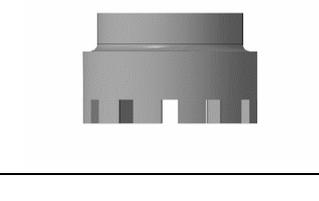
Bolt broken off

$d1 \pm 0,1$	10	10	10
$d3$	13	13	13
$d2$	10	10	10
$l1$	5	6	8
$l2$	25	20	25
$l1 \pm 1^a$	$l2 \pm 2,3$	$l2 \pm 2,3$	$l2 \pm 2,3$

material S235JR

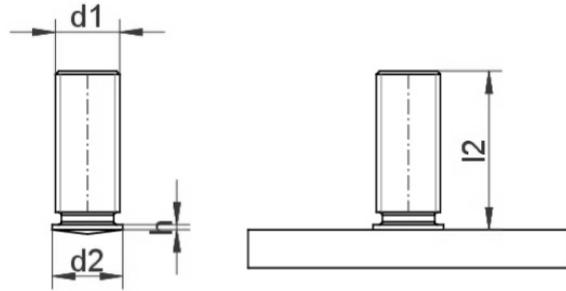
Further dimensions on request

ceramic ferrule

description	total high (mm) ±2	total Ø(mm) ±2	used for bolt type	drawing	
UF 4	9	10	ND		
UF 5	8	11,5	ND		
UF 6	8	11,5	FD, UD, ID, SD		
UF 8	8,5	15,5	FD, UD, ID		
UF 10	10	18	FD, UD, ID		
UF 12	10,5	20	FD, UD, ID		
UF 12,7	11	22	SD		
UF 13	11	26	SD		
UF 16	13	30	FD, UD, ID, SD		
UF 19	16,5	31	SD		
UF 20	16,5	31	FD, UD, ID		
UF 22	19	39	SD		
MF 6	-	-	MD		
MF 8	4,5	18	MD		
MF 10	5,5	20	MD		
MF 12	6	23	MD		
MF 16	9	29	MD		
MF 20	9	32,5	MD		
PF 6	6,5	11,5	PD		
PF 8	6,5	15	PD		
PF 10	6,5	18	PD		
PF 12	9	20	PD		
PF 16	11	26	PD		
PF 20	10	34	PD		
PF 24	18,5	39	PD		
RF 6	10	12	RD		
RF 8	9	15	RD		
RF 10	11,5	18	RD		
RF 12	13	20	RD		
RF 16	9	30	RD		
RF 20	9	32	RD		
RF 24	13 ^b	33	RD		

Short-cycle drawn arc stud welding

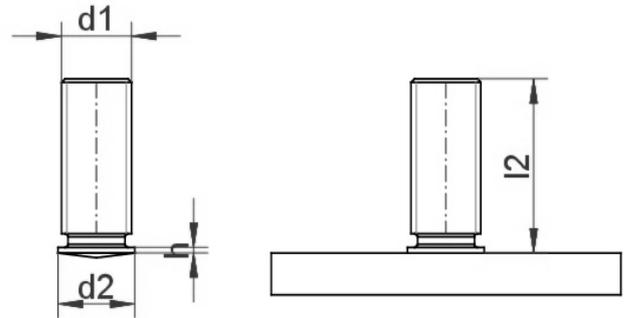
threaded stud with flange type PS M10
Aluminium



d1	l2	d2	h
M10	20	12	3
	25		
	30		
	40		
	60		
	80		
	150/140		
M12	40	14	3,3
	50		
	90		

material: AlMg5

threaded stud with flange type PS
(EN ISO 13918)

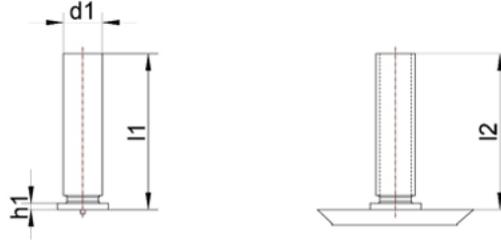


d1	l2	d2	h	chuck
M6	25	7	0,8-1,4	H10610
M6	30			H11589
M6	40			
M6	50			
M6	80/60			
M8	20	9		H10611
M8	30			H11152
M8	40			
M8	50			
M8	80/60			

material: 4.8, A2, A4

Stud welding with tip ignition

threaded stud type PT
(EN ISO 13918)



d1	l2	h1	VE	kg/100	chuck
M3	6	0,7-1,4	500	0,031	H13302
M3	8			0,039	
M3	10			0,047	
M3	12			0,056	
M3	16			0,720	
M3	20			0,089	
M4	8			0,067	H13303
M4	10			0,082	
M4	12			0,097	
M4	16			0,127	
M4	20			0,156	
M4	25			0,193	
M5	10	0,130	H13304		
M5	12	0,153			
M5	16	0,201			
M5	20	0,248			
M5	25	0,307			
M5	30	0,366			
M6	10	0,186	H13305		
M6	12	0,220			
M6	16	0,287			
M6	20	0,336			
M6	25	0,439			
M6	30	0,539			
M8	12	0,8-1,4	500	0,387	H13306
M8	16			0,509	
M8	20			0,632	
M8	25			0,789	
M8	30			0,938	

material: 4.8 C2E(standard), A2