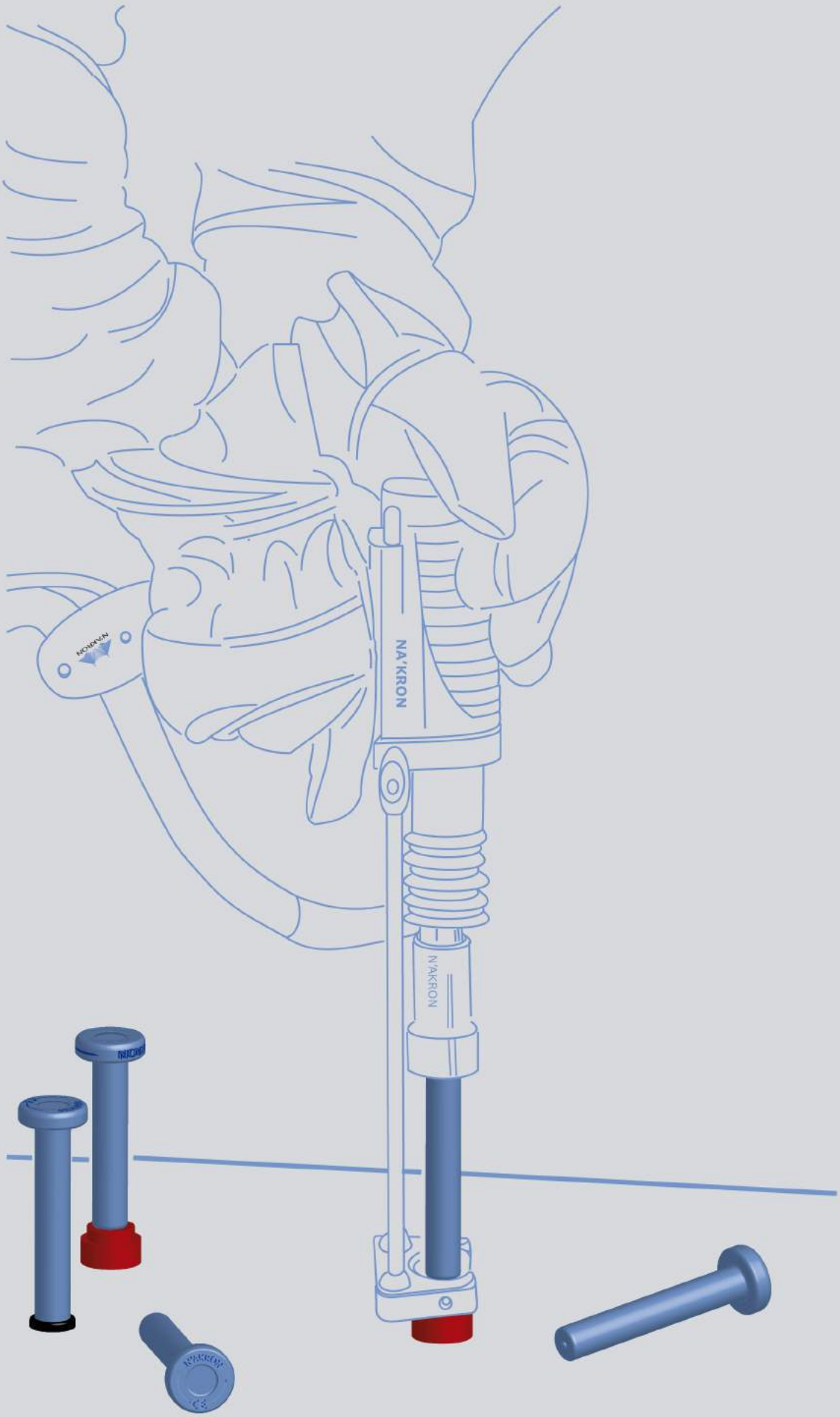
N'AKRON



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STUD AKRON

SHEAR CONNECTOR N'AKRON SD1 - A
UNE - EN ISO 13918:2008

N'AKRON

SHEAR CONNECTOR N'AKRON TYP - B
ANSI - AWS D1.1/D1.1M:2010

N'AKRON becomes one of the leading manufacturers and distributors of welding shear connetors in the world and its products, manufactured from mild steel or stainless grades, comply with all required industry standards, such as UNE EN ISO 13918:2008, American Welding Society ANSI/AWS D1.1 Welding Code or British Standards, to name just a few.

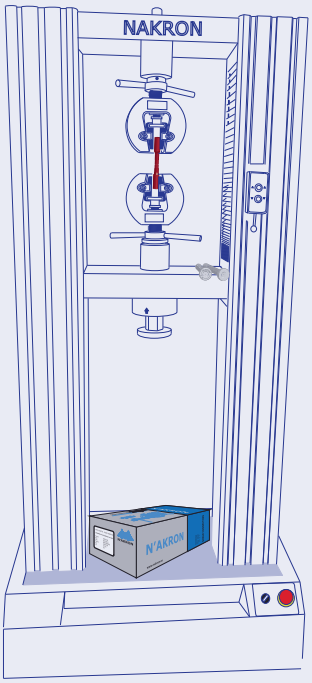
Strict adherence to our quality control procedures insures our customers receive quality products. Through its mill tests reports, N'AKRON guarantees complete traceability of all our products and provides its clients with Certificate 3.1, according to the standard UNE EN 10204, of each heat number purchase delivered.

We maintain a full range of welding studs, accessories and welding equipment, rental or on sale.

To provide the best technical support, N'AKRON offers its clients a resourceful group of professionals who, through our direct sale or distributor customers, concentrates the highest experience in the stud welding industry.

NK shear connector features prominently in the shipbuilding, the industrial sector or the road building trade, making use of it in:

- Composite beams.
- Composite slabs.
- Anchorages
- Foundation.
- Expansion joints.
- Ferrules/metal tips
- Pivots
- Façade-walls
- Structural rehabilitation of buildings.
- Bridge building.



- Geometry, dimensions and tolerances of NK connectors SD1-A are represented on the figures 1-6 and on the data charts 1.4-1.9 respectively.
- Ceramic ferrules used as auxiliary element for welding are itemized on figure n.7 and their dimensions on data chart 1.10, being their designation UF.
- NK shear connector SD1-A is manufactured according to European Standard EN ISO 13918:2008, the material used to manufacture it is steel Group 1, in accordance with Standard of Steel UNE – CEN ISO/TR 15608 IN, and with the limits

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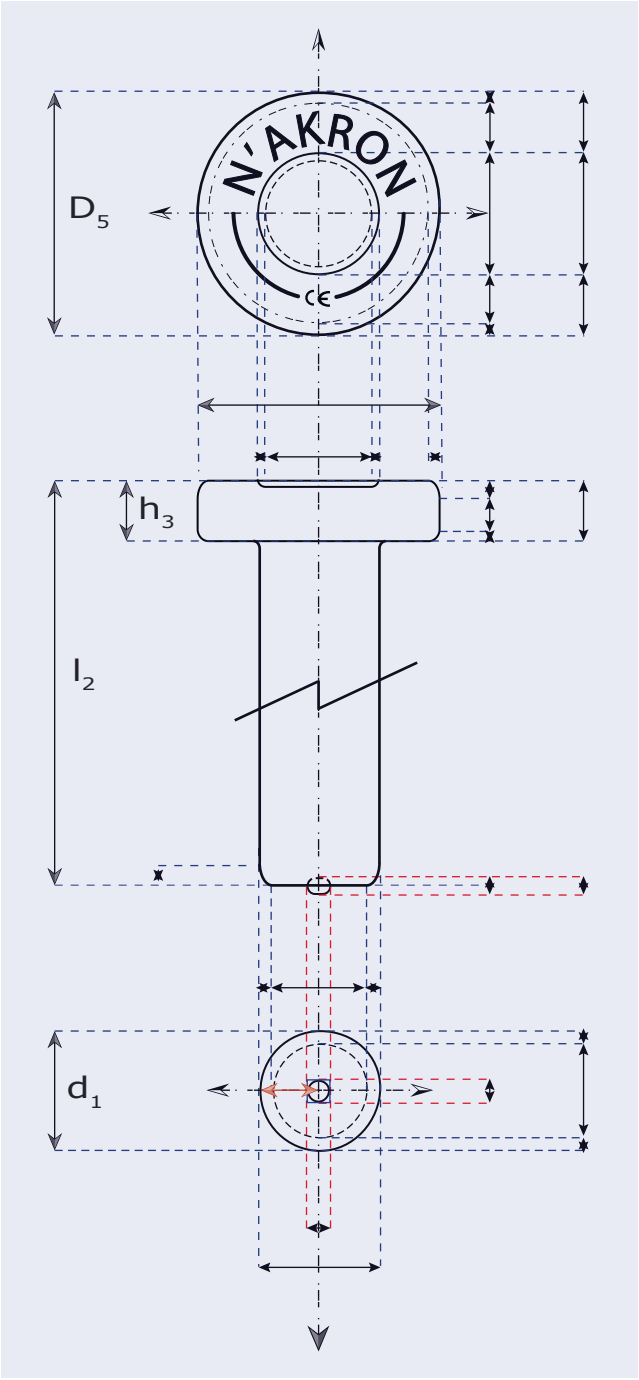
ANSI - AWS D1.1/D1.1M:2010



N'AKRON SHEAR CONNECTOR SD1 - A

NK shear connector is designed to tie concrete to the steel in a composite piece and, acting as an anchor in the concrete against tensile stress, transfers stress to the concrete, by adhesion or by pressure, depending on the structural typology.

In addition to this basic issue, that makes it necessary for composite beams, NK shear connector must perform other functions such as:

- Discount the possibility of brittle fracture that can occur when the gap is excessive.
- Ensure the joint between the concrete and the metal profile without considering other different factors (adhesion, friction…), whose potential loss could also lead to brittle fracture.
- Allow the application of direct charges on the metallic element without danger of detachment between the concrete and the steel (they cannot come unstuck).
- Prevent the connection to be entirely in the possible zone of tensioned concrete, avoiding any fissure, given that its function would be reduced.
- Guarantee the transmission capacity by a possible inverted sign of the flush efforts low stress.
- Establish adequate correlation between the estimate result and the piece reaction during the strength process.

N'AKRON shear connector is welded by means of arc welding technic with ceramic ferrule or shielding gas.

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SHEAR CONNECTOR N'AKRON SD1 - A
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SHEAR CONNECTOR N'AKRON TYP - B
ANSI - AWS D1.1/D1.1M:2010

The stud nominal length is considered after welding. Before being welded to the base metal, it will be longer, approximately between 3 and 5.5 mm, depending on the stud diameter. N'AKRON manufactures and supplies shear connectors in all standardized sizes, although sizes not specified may be made to order upon request.

NK shear connector is made in law carbon steel and may be supplied in stainless steel, upon request. NK shear connectors are used for all sorts of concrete connections and they can be welded to a flat surfaces as well as to inside or outside angles. All orders for studs include required ceramic ferrules. When ordering, specify if shear connectors are to be welded on stainless steel or on galvanized steel sheet.

The stud nominal length is considered after welding. Before being welded to the base metal, it will be longer, approximately between 3 and 5.5 mm, depending on the stud diameter. N'AKRON manufactures and supplies shear connectors in all standardized sizes, although sizes not specified may be made to order upon request.

CHEMICAL COMPOSITION

Group	Type of steel Steel with a yield point specified minimum Reh>450 N/mm2 and analisys in %											
1	C ≤ 0,25	Si ≤ 0,60	Mn ≤ 1,8	Mo ≤ 0,70[b]	S ≤0,045	P ≤ 0,045	Cu ≤ 0,40[b]	Ni ≤ 0,5[b]	Cr ≤ 0,3	Nb ≤ 0,06	V ≤ 0,1	Ti ≤ 0,05

Data chart 1.1

LIMITS

C ≤ 0,2%[a]	CEV ≤ 0,35[a]	Al ≥ 0,02%[a,b]

Data chart 1.2

[a] Casting analysis values

MECHANICAL PROPERTIES

Tensile strength	Yield strength	Elongation	Reduction area
$R_m \geq 450$ N/mm^2	$R_{eH} \geq 350$ N/mm^2	$A_5 \geq 15\%$	50%

Data chart 1.3

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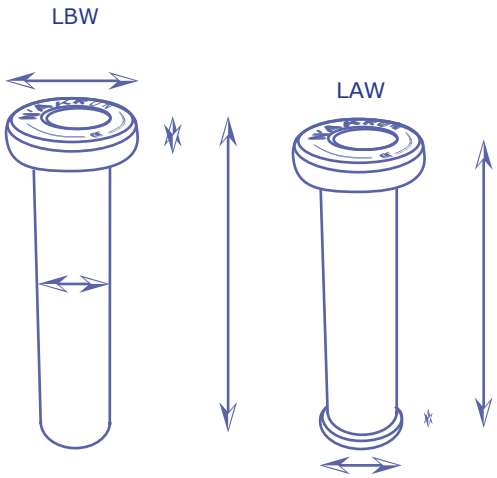
SHEAR CONNECTOR N'AKRON TYP - B
ANSI - AWS D1.1/D1.1M:2010

Symbols and abbreviations

d_1 nominal diameter
d_3 fillet diameter
d_5 head diameter
l_1 overall length (without aluminium pin)
l_2 nominal connector length
h_3 head connector height
h_4 fillet height



DIMENSIONS OF STUDS N'AKRON SD1-A - 10-13 MM

Data chart 1.4 - 1.5

d_1 Ø stud	l_2 length after weld	m mass kg/pc	l_1 length before weld	d_3 Ø fillet	d_5 Ø head	h_4 fillet height	h_3 head stud height	rf reference
10	50	0,05	53	13	19	2,5	7,0	NKSD11000050
10	75	0,06	78	13	19	2,5	7,0	NKSD11000075
10	100	0,08	103	13	19	2,5	7,0	NKSD11000100
10	125	0,09	128	13	19	2,5	7,0	NKSD11000125
10	150	0,11	153	13	19	2,5	7,0	NKSD11000150
10	175	0,12	178	13	19	2,5	7,0	NKSD11000150
13	50	0,08	53	17	25	3,0	8,0	NKSD11300200
13	75	0,10	78	17	25	3,0	8,0	NKSD11300225
13	100	0,13	103	17	25	3,0	8,0	NKSD11300250
13	125	0,16	128	17	25	3,0	8,0	NKSD11300275
13	150	0,18	153	17	25	3,0	8,0	NKSD11300300
13	175	0,21	178	17	25	3,0	8,0	NKSD11300325
13	200	0,23	203	17	25	3,0	8,0	NKSD11300350

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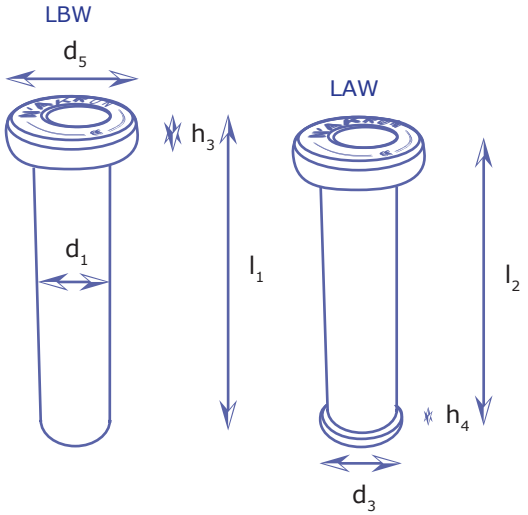
Symbols and abbreviations

d_1 nominal diameter
d_3 fillet diameter
d_5 head diameter
l_1 overall length (without aluminium pin)
l_2 nominal connector length
h_3 head connector height
h_4 fillet height



DIMENSIONS OF STUDS N'AKRON SD1 - 16 MM

Data chart 1.6

d_1 Ø stud	l_2 length after weld	m mass kg/pc	l_1 length before weld	d_3 Ø fillet	d_5 Ø head	h_4 fillet height	h_3 head stud height	rf reference
16	50	0,12	54	21	32	4,5	8,0	NKSD11600050
16	75	0,16	79	21	32	4,5	8,0	NKSD11600075
16	90	0,18	94	21	32	4,5	8,0	NKSD11600090
16	100	0,20	104	21	32	4,5	8,0	NKSD11600100
16	125	0,24	129	21	32	4,5	8,0	NKSD11600125
16	150	0,28	154	21	32	4,5	8,0	NKSD11600150
16	175	0,32	179	21	32	4,5	8,0	NKSD11600175
16	200	0,36	204	21	32	4,5	8,0	NKSD11600200
16	225	0,40	229	21	32	4,5	8,0	NKSD11600225
16	250	0,44	254	21	32	4,5	8,0	NKSD11600250

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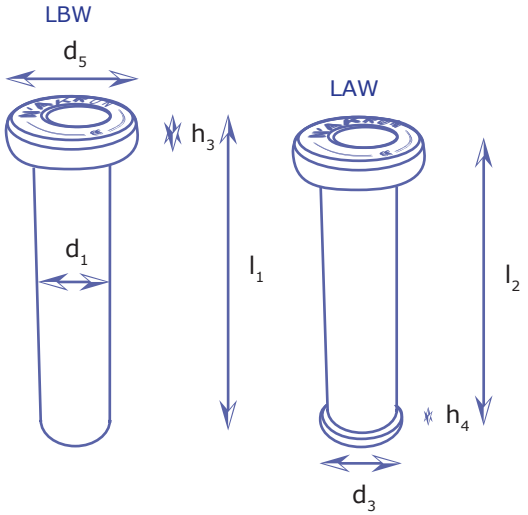
Symbols and abbreviations

d_1 nominal diameter
d_3 fillet diameter
d_5 head diameter
l_1 overall length (without aluminium pin)
l_2 nominal connector length
h_3 head connector height
h_4 fillet height



DIMENSIONS OF STUDS N'AKRON SD1 - 19 MM

Data chart 1.7

d_1 Ø stud	l_2 length after weld	m mass kg/pc	l_1 length before weld	d_3 Ø fillet	d_5 Ø head	h_4 fillet height	h_3 head stud height	rf reference
19	50	0,16	54,5	23	32	6,0	10,0	NKSD11900050
19	75	0,21	79,5	23	32	6,0	10,0	NKSD11900075
19	80	0,22	44,5	23	32	6,0	10,0	NKSD11900080
19	100	0,27	104,5	23	32	6,0	10,0	NKSD11900100
19	125	0,33	129,5	23	32	6,0	10,0	NKSD11900125
19	150	0,38	154,5	23	32	6,0	10,0	NKSD11900150
19	175	0,44	179,5	23	32	6,0	10,0	NKSD11900175
19	200	0,49	204,5	23	32	6,0	10,0	NKSD11900200
19	225	0,55	229,5	23	32	6,0	10,0	NKSD11900225
19	250	0,60	254,5	23	32	6,0	10,0	NKSD11900250
19	275	0,66	279,5	23	32	6,0	10,0	NKSD11900275
19	300	0,72	304,5	23	32	6,0	10,0	NKSD11900300
19	325	0,77	329,5	23	32	6,0	10,0	NKSD11900325
19	350	0,83	354,5	23	32	6,0	10,0	NKSD11900350

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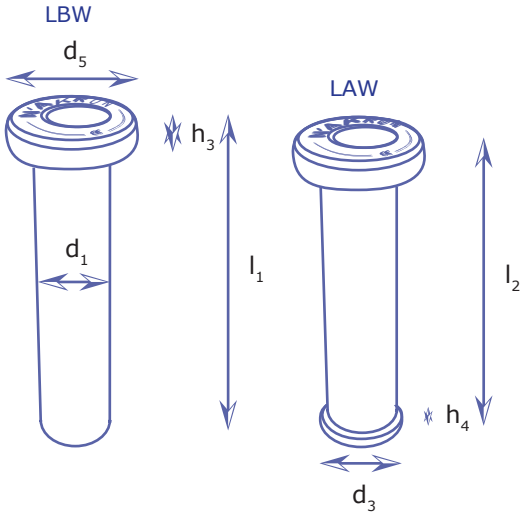
Symbols and abbreviations

d_1 nominal diameter
d_3 fillet diameter
d_5 head diameter
l_1 overall length (without aluminium pin)
l_2 nominal connector length
h_3 head connector height
h_4 fillet height



DIMENSIONS OF STUDS N'AKRON SD1 - 22 MM

Data chart 1.8

d_1 Ø stud	l_2 length after weld	m mass kg/pc	l_1 length before weld	d_3 Ø fillet	d_5 Ø head	h_4 fillet height	h_3 head stud height	rf reference
22	50	0,20	55	29	35	6,0	10,0	NKSD12200050
22	75	0,28	80	29	35	6,0	10,0	NKSD12200075
22	90	0,32	95	29	35	6,0	10,0	NKSD12200090
22	100	0,35	105	29	35	6,0	10,0	NKSD12200100
22	125	0,43	130	29	35	6,0	10,0	NKSD12200125
22	150	0,50	155	29	35	6,0	10,0	NKSD12200150
22	175	0,58	180	29	35	6,0	10,0	NKSD12200175
22	200	0,65	205	29	35	6,0	10,0	NKSD12200200
22	225	0,73	230	29	35	6,0	10,0	NKSD12200225
22	250	0,80	255	29	35	6,0	10,0	NKSD12200250
22	275	0,88	280	29	35	6,0	10,0	NKSD12200275
22	300	0,95	305	29	35	6,0	10,0	NKSD12200300
22	325	1,02	330	29	35	6,0	10,0	NKSD12200325
22	350	1,10	355	29	35	6,0	10,0	NKSD12200350

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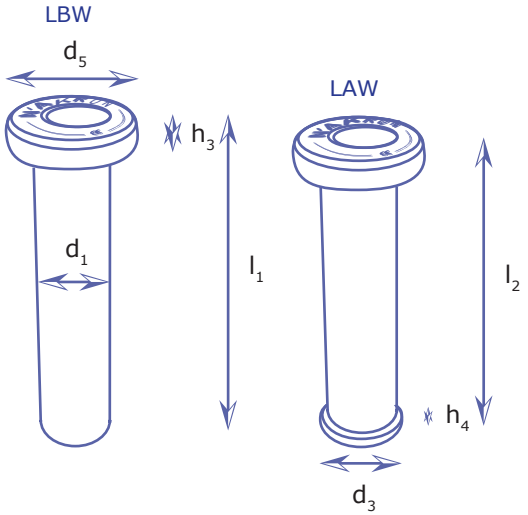
Symbols and abbreviations

d_1 nominal diameter
d_3 fillet diameter
d_5 head diameter
l_1 overall length (without aluminium pin)
l_2 nominal connector length
h_3 head connector height
h_4 fillet height



DIMENSIONS OF STUDS N'AKRON SD1 - 25 MM

Data chart 1.9

d_1 Ø stud	l_2 length after weld	m mass kg/pc	l_1 length before weld	d_3 Ø fillet	d_5 Ø head	h_4 fillet height	h_3 head stud height	rf reference
25	75	0,37	80,5	31	41	7,0	12,0	NKSD12500075
25	90	0,47	95,5	31	41	7,0	12,0	NKSD12500090
25	100	0,57	105,5	31	41	7,0	12,0	NKSD12500100
25	125	0,66	130,5	31	41	7,0	12,0	NKSD12500125
25	150	0,76	155,5	31	41	7,0	12,0	NKSD12500150
25	175	0,85	180,5	31	41	7,0	12,0	NKSD12500175
25	200	0,95	205,5	31	41	7,0	12,0	NKSD12500200
25	225	1,05	230,5	31	41	7,0	12,0	NKSD12500225
25	250	1,14	255,5	31	41	7,0	12,0	NKSD12500250
25	275	1,24	280,5	31	41	7,0	12,0	NKSD12500275
25	300	1,34	305,5	31	41	7,0	12,0	NKSD12500300
25	325	1,43	330,5	31	41	7,0	12,0	NKSD12500325
25	350	1,53	355,5	31	41	7,0	12,0	NKSD12500350

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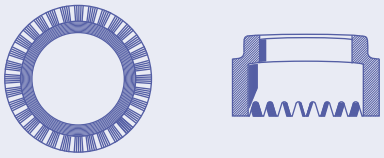
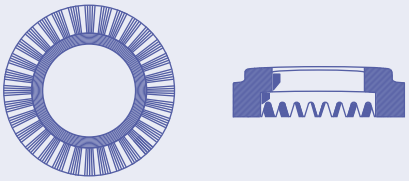
CERAMIC FERRULES

ESTANDARD

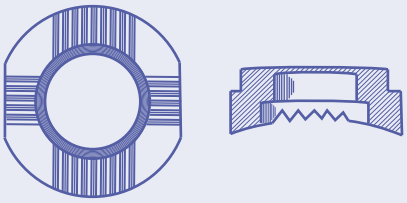


LOW PROFILE



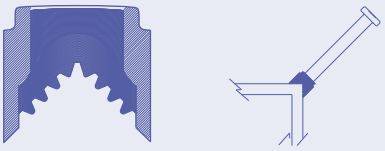
REDUCED BASES

CONCAVE

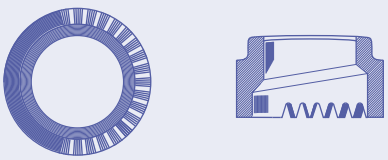


INTO FILLETS

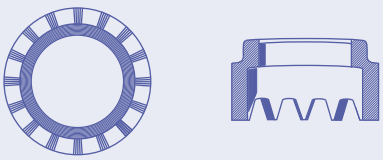
ONTO HEELS



WELDING TO VERTICAL



METAL DECK



STUD AKRON

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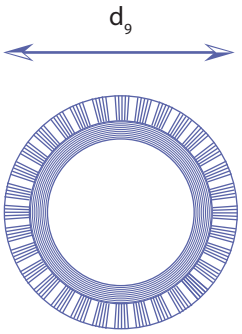
SHEAR CONNECTOR N'AKRON TYP - B
ANSI - AWS D1.1/D1.1M:2010

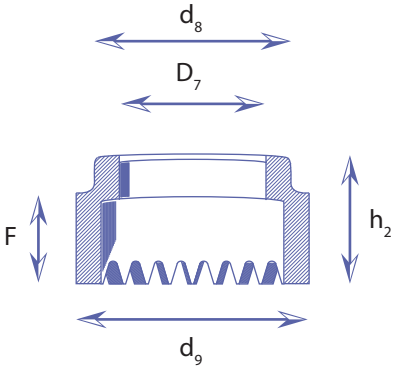
STANDARD CERAMIC FERRULES FOR STUD SD

Ceramic shields are essential parts of the stud welding process. They are designed to encircle the fastener welding, to protect the arc, to limit the weld to a specified zone of the base metal and to contain the molten metal, acting as a mould to shape this metal and to form the weld fillet, also named 'weld-flash'

Symbols and abbreviations

D_7	Inside neck diameter
d_8	Outer neck diameter
d_9	Outer ferrule diameter
F	Effective height
h_2	Overall height





STANDARD CERAMIC FERRULES FOR SHEAR CONNECTOR SD1, MM

d_1 Ø stud	D_7 inside neck diameter	d_8 neck diameter	d_9 major diameter	F height to neck	h_2 height overall	Rf reference
10	10,2	15,0	17,8	5,8	10,0	NKSD10STUF10
13	13,6	20,0	22,2	5,8	11,0	NKSD13STUF13
16	16,3	26,0	30,0	8,7	13,0	MKSD16STUF16
19	19,4	26,0	30,8	12,0	16,7	NKSD19STUF19
22	22,8	30,7	38,5	14,0	18,5	NKSD22STUF22
25	26,0	35,5	41,0	16,0	21,0	NKSD25STUF25

Data chart 1.10

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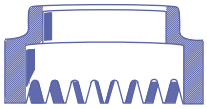
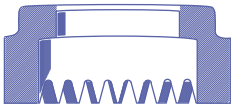
REDUCED OUTER DIAMETER FERRULES

NKSD16DRUF16



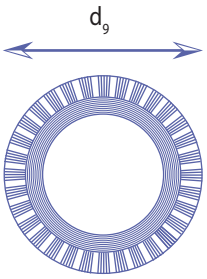
NKSD16STUF16

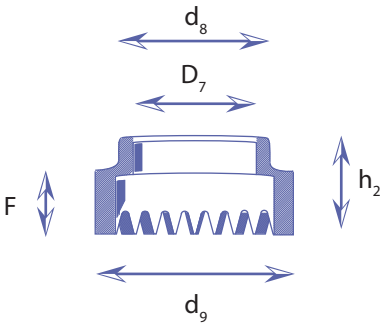


Difference between reduced diameter/standard ferrules

Symbols and abbreviations

D_7	Inside neck diameter
d_8	Outer neck diameter
d_9	Outer ferrule diameter
F	Effective height
h_2	Overall height





REDUCED OUTER DIAMETER FERRULES. DIMENSIONS, MM

d_1 Ø stud	D_7 inside neck diameter	d_8 neck diameter	d_9 major diameter	F height to neck	h_2 height overall	Rf reference
10	10,2	15,0	17,8	5,8	10,0	NKSD10DRUF10
10	10,2	13,0	16,3	6,0	10,0	NKSD11DRUF10
13	13,6	16,5	20,2	6,4	11,2	MKSD13DRUF13
16	16,3	20,0	26,2	8,3	13,0	NKSD16DRUF16

Data chart 1.11

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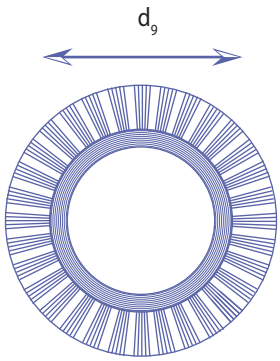
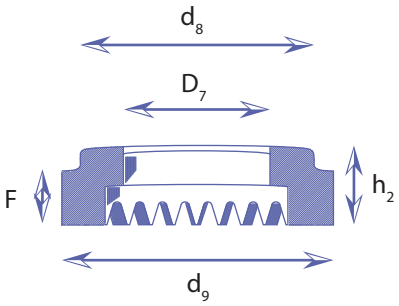
LOW PROFILE FERRULES

Symbols and abbreviations

D_7	Inside neck diameter
d_8	Outer neck diameter
d_9	Outer ferrule diameter
F	Effective height
h_2	Overall height





STANDARD LOW PROFILE FERRULES FOR SHORT STUDS, MM

d_1 Ø stud	D_7 inside neck diameter	d_8 neck diameter	d_9 major diameter	F height to neck	h_2 height overall	Rf reference
10	10,2	15,0	17,1	3,2	6,4	NKSD01PBUF10
10	10,2	20,0	22,2	4,0	7,1	NKSD02PBUF10
13	13,6	20,0	22,2	4,4	8,4	MKSD01PBUF13
13	13,6	23,4	26,6	3,2	8,0	NKSD02PBUF13
13	13,6	27,0	30,2	3,2	7,1	NKSD03PBUF13
16	16,3	23,4	26,2	4,8	9,5	NKSD01PBUF16
19	19,4	30,7	35,9	5,2	9,9	NKSD01PBUF19

Data chart 1.12

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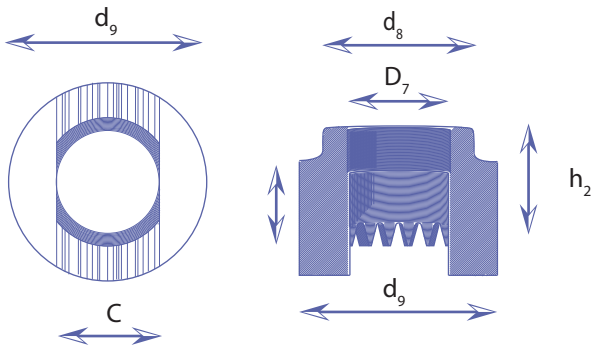
FERRULES WITH EARS OR TABS FOR REDUCED BASES

N'akron supplies ceramic shields that allow to wel full base when the stud diameter and the base plate are the same. These ferrules have ears or tabas which extend down over the base plate sides, vents and a cavitie limited to the base material.

Symbols and abbreviations

D_7	Inside neck diameter
C	Base material thickness
d_9	Outer ferrule diameter
F	Effective height
h_2	Overall height



STANDARD FERRULES WELDING TO EDGES OF BASE PLATES

d_1 Ø stud	C base material thickness	D_7 inside neck diameter	d_8 neck diameter	d_9 major diameter	F height to neck	h_2 height overall	Rf reference
10	10,0	10,2	16,5	20,2	14,3	14,7	NKSD01BCUF10
13	13,0	13,6	20,0	26,2	15,9	16,3	NKSD01BCUF13

Data chart 1.13

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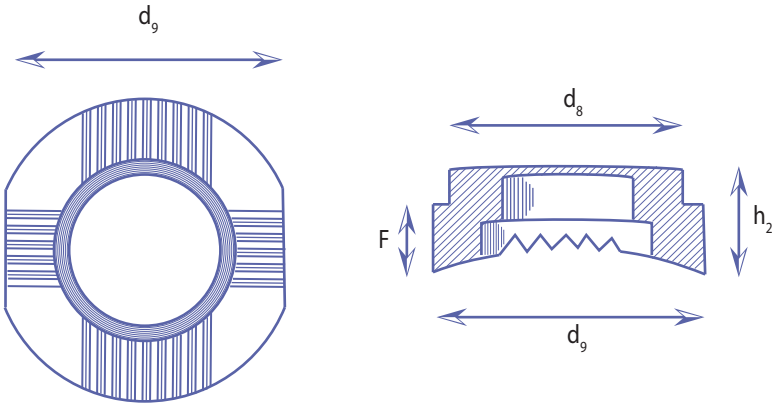
CONCAVE FERRULES FOR WELDING TO CURVED SURFACES

For many uses, shear connectors must be welded to the outside part of a concave surface such as tubes, cylinders or pipes. In that case, the ferrule must be adjusted to the stud diameter and the curve of base metal to achieve good weld results when this is carried out to a convex surface.



CONCAVE FERRULES, MM

d_1 Ø stud	D_7 inside diameter	weld surface curve diameter	d_9 major diameter	F effective height	d_8 grip neck diameter	rf reference
10	10,2	19,0	22,2	6,0	20,0	NKSD01COUF10
10	10,2	22,0	15,0	8,0	12,8	NKSD02COUF10
10	10,2	22,0	16,2	11,0	12,8	MKSD03COUF10
10	10,2	45,0	16,2	9,0	12,8	NKSD04COUF10
10	10,2	76,0	16,2	9,0	12,8	NKSD05COUF10

Data chart 1.14

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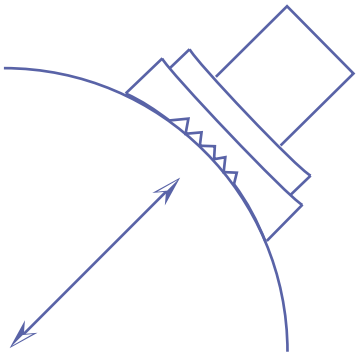
Symbols and abbreviations

D_7	Inside neck diameter
d_8	Outer neck diameter
d_9	Outer ferrule diameter
F	Effective height
h_2	Overall height



CONCAVE FERRULES, MM

d_1 Ø stud	D_7 neck diameter	weld surface curve diameter	d_9 major diameter	F effective height	d_8 grip neck diameter	rf reference
13	13,6	32,0	22,2	8,0	20,0	NKSD01COUF13
13	13,6	41,0	20,5	11,0	16,5	NKSD02COUF13
13	13,6	76,0	20,5	11,0	16,5	NKSD03COUF13
13	13,6	76,0	22,2	11,0	20,0	NKSD04COUF13
13	13,6	76,0	20,2	17,2	16,5	NKSD05COUF13
13	13,6	89,0	41,0	6,4	41,0	NKSD06COUF13
16	16,3	19,0	26,2	12,5	20,0	NKSD01COUF16
16	16,3	25,0	26,2	13,0	20,0	NKSD02COUF16
16	16,3	51,0	26,2	12,5	20,0	NKSD03COUF16
16	16,3	102,0	41,0	8,1	41,0	NKSD04COUF16
16	16,3	102,0	26,2	13,0	20,0	NKSD05COUF16
16	16,3	95,0	41,0	8,6	41,0	NKSD06COUF16
19	19,4	65,0	30,2	13,5	26,2	NKSD01COUF19
22	22,8	95,0	41,0	11,8	41,0	NKSD01COUF22
25	26,0	76,0	41,0	20,7	35,7	NKSD01COUF25

Data chart 1.15

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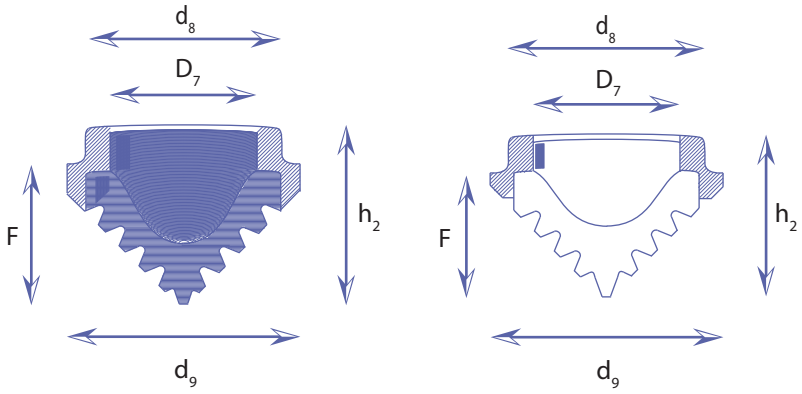
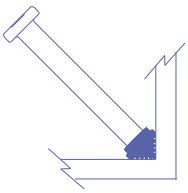
SPECIAL FERRULES FOR WELDING INTO FILLETS AND ONTO HEELS

Studs often have to be welded to the inside or outside of angles. In that case, it is essential that the ferrule radius matches up with the radius on the angle to shield the welding arc and to prevent any loss of metal. If the radius of de angle could not be determined, it would be better to select a ferrule whose radius was larger.





STANDARD FERRULES FOR WELDING INTO FILLET, MM

d_1 Ø stud	R Radius	D_7 inside neck diameter	d_8 neck diameter	d_9 major diameter	F height to neck	h_2 height overall	rf reference
10	6,4	10,2	12,8	16,3	9,5	12,2	NKSD01AIUF10
13	9,5	13,3	16,5	20,2	12,7	17,5	NKSD01AIUF13
13	6,4	13,3	16,5	17,5	20,2	12,7	NKSD02AIUF13
16	9,5	16,3	20,0	26,2	17,5	22,2	NKSD01AIUF16
19	19,0	19,4	26,2	31,2	17,5	22,2	NKSD01AIUF19
19	9,5	19,4	26,2	31,2	14,3	23,8	NKSD02AIUF19

Data chart 1.16

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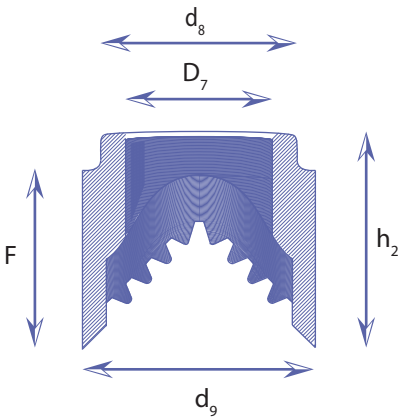
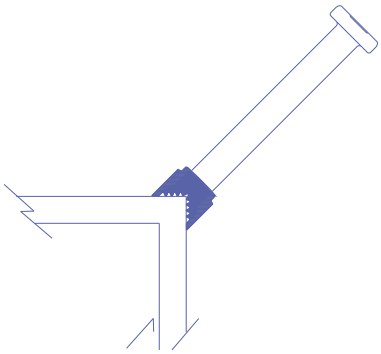
SPECIAL FERRULES FOR WELDING INTO FILLETS AND ONTO HEELS

Symbols and abbreviations

D_7	Inside neck diameter
d_8	Outer neck diameter
d_9	Outer ferrule diameter
F	Effective height
h_2	Overall height





STANDARD FERRULES ONTO HEEL

d_1 Ø stud	D_7 inside neck diameter	d_8 neck diameter	d_9 major diameter	F height to neck	h_2 height overall	rf reference
10	10,2	14,9	17,9	14,0	17,9	NKSD01AEUF10
13	13,3	20,0	26,2	15,9	20,6	NKSD01AEUF13
16	16,3	20,0	26,2	17,9	22,6	NKSD01AEUF16
19	19,4	26,2	30,9	21,4	26,2	NKSD01AEUF19
22	22,8	30,7	31,0	23,8	23,8	NKSD01AEUF22

Data chart 1.17

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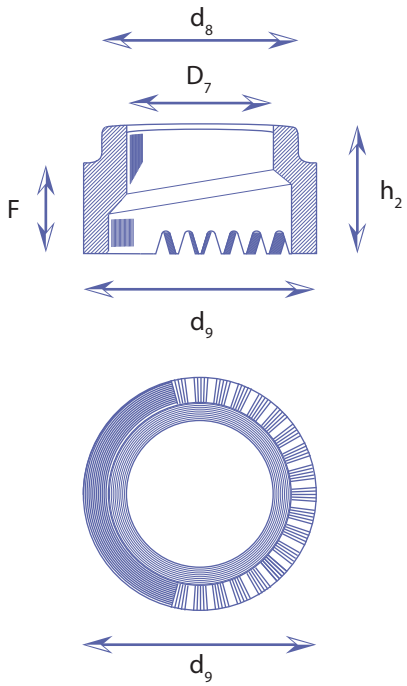
SPECIAL FERRULES FOR WELDING TO VERTICAL SURFACES

Because of the gravity, molten metal flows to the bottom side of ferrules when welding to a vertical surface. For this reason, there is an increased tendency toward metal loss through the ferrule vents and it is difficult to displace the molten metal to the welding top.

On small diameters, vertical welding presents no real problem, given that the welding time is short and molten metal produced is not much. However, larger diameter studs need longer welding times in this process and more molten metal is produced. Using standard ceramic ferrules causes blowholes forming, a poor weld flash formation on the top side of the weld fillet an an excessive metal loss through the ferrule vents.

In ferrules designed for vertical plate stud welding, thir vents at the bottom of ferrule cavity are been blocked (to prevent metal loss) and molten metal deposit has been modified and increased to strengthen at the top of the weld.



STANDARD FERRULES FOR WELDING TO VERTICAL SURFACES, MM

d_1 Ø stud	D_7 inside neck diameter	d_8 neck diameter	d_9 major diameter	F height to neck	h_2 height overall	rf reference
16	16,3	26,0	29,2	8,6	13,4	MKSD01SVUF16
19	19,4	26,0	30,9	12,3	17,2	NKSD01SVUF19
22	22,8	30,7	38,8	13,8	21,2	NKSD01SVUF22

Data chart 1.18

Welding to vertical surface is not recommended for 22 mm connectors, since it may not always produce a full weld flash that allows to pass the visual inspection. If 22 mm studs were welded to a vertical surface, the contractor would repair the top of the weld flash that do not have the full 360º weld flash.

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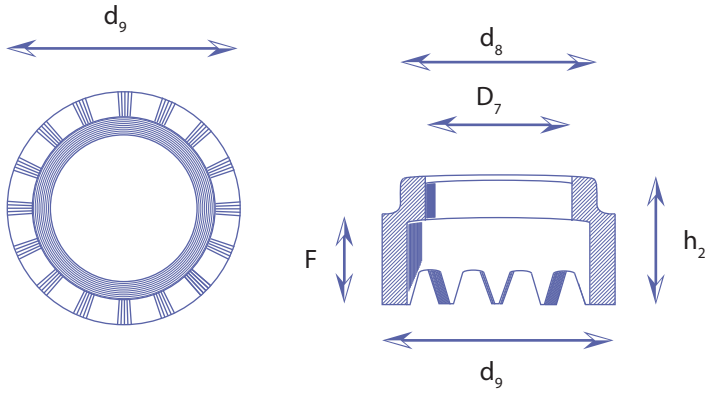
FERRULES FOR WELDING THROUGH METAL DECK

Symbols and abbreviations

D_7	Inside neck diameter
d_8	Outer neck diameter
d_9	Outer ferrule diameter
F	Effective height
h_2	Overall height



STANDARD CERAMIC FERRULES FOR SHEAR CONNECTOR SD1, MM

d_1 Ø stud	D_7 inside neck diameter	d_8 neck diameter	d_9 major diameter	F height to neck	h_2 height overall	rf reference
10	10,2	15,0	17,8	5,8	10,0	NKSD10STUF10
13	13,6	20,0	22,2	5,8	11,0	NKSD13STUF13
16	16,3	26,0	30,0	8,7	13,0	MKSD16STUF16
19	19,4	26,0	30,8	12,0	16,7	NKSD19STUF19
22	22,8	30,7	38,5	14,0	18,5	NKSD22STUF22
25	26,0	35,5	41,0	16,0	21,0	NKSD25STUF25

Data chart 1.19

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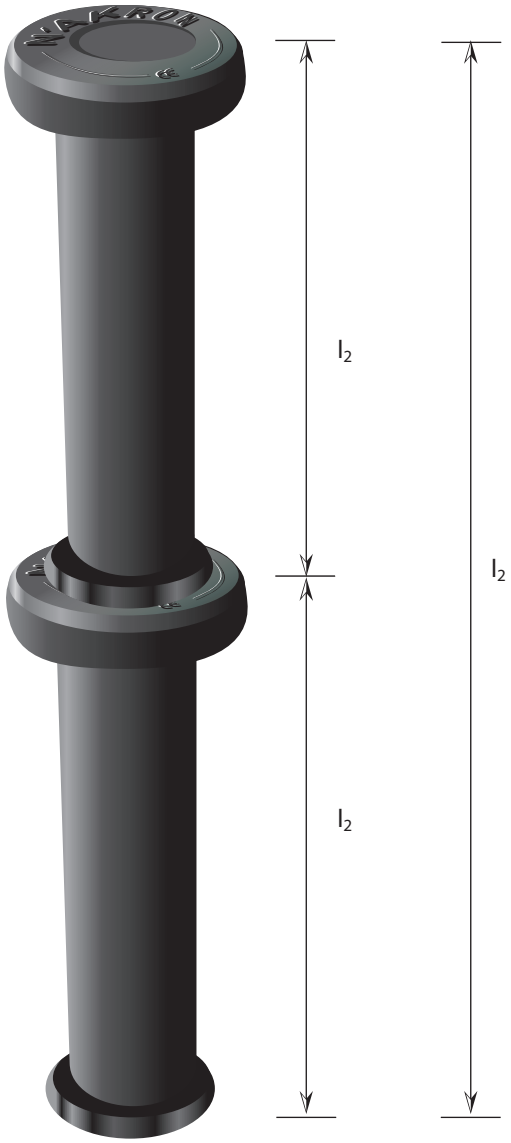

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SHEAR CONNECTOR N'AKRON SD1 - A
UNE - EN ISO 13918:2008

SHEAR CONNECTOR N'AKRON TYP - B
ANSI - AWS D1.1/D1.1M:2010

STUD WELDING PROCESS

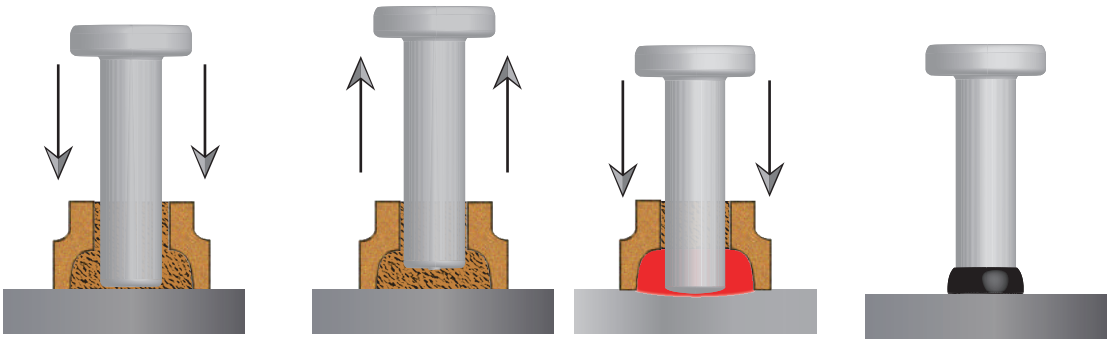
Stud welding consists in joining metal pieces, usually bar-shaped, to metal workpiece. It is used mainly in bridge building (especially in composite structures), in façade-walls, in steel buildings, as well as in industrial equipment.

In ARC Stud Welding process, the arc is primed for short time between the end of the stud and a portion of base metal: both pieces start melting and they end up joining. The procedure used for a proper shear connector welding is the ARC stud welding, made mechanically or automatically, by means of a stud welding gun or welding tool. The different phases of ARC stud welding are shown on drawings n. 8-9.

The shear connector is plugged into its fastening device and, fitted into a ceramic ferrule, is firmly placed against the work surface. At the beginning of welding process, the stud lifts off and then an pilot arc is drawn between the end of this connector and the work plate, promoting the melting of both the end of the stud and the parent metal. Once welding time has elapsed, the connector is automatically plunged into the molten pool of the metal with a special force (>100 N) and then the current source is disconnected.

DRAWN ARC STUD WELDING. SEQUENCES

Fig. 8



Stud placing | Lift and drawn arc | Stud plunge | Welded stud

This procedure is generally used in a range of diameters between 3 mm and 25 mm, with 100 m/3000 m weld time. This method usually utilizes ceramic ferrules and, only in certain cases, is used with a shielding gas or without molten pool shielding. Minimum sheet thickness is ¼ stud diameter for welding with CF and 1/8 in the case of SG welding, but it cannot be less than 1 mm.

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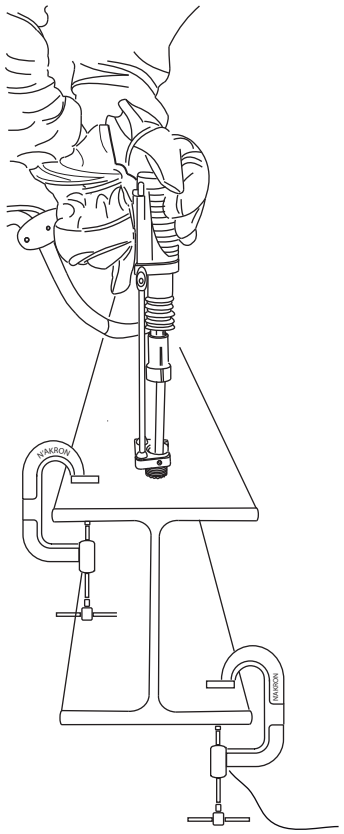
PROCEDURES FOR NK STUD WELDING



1. Top Flange of Beams or Plates

For a good stud welding process, the top flange of all beams or plates should be free of paint, heavy rust or mill scale, grease or ground, moisture and ll other foreign materials. These materials contaminants to any welding process, especially stud welding due to the short duration of the weld cycle.

2. Estructural Ground

It is always recommended that the welding ground be attached to a spot on a beam which has been ground clean. Poor or inadequate ground connections can result in a loss of weld current and, therefore, affect welding quality.

3. Power Requirement for Operating Power Source

Consult the machine manual or manufacturer for the recommended incoming power requirements prior to energizing the power source. This includes proper fuse selection, primary cable size and correct length. Inadequate incoming primary power or incorrect conductor size or length can contribute to a reduction in the required weld current.

4.Welding Current

It is essential to have the correct weld current for each application. The normal ranges are listed below. When excessive cable length is used, the result would be a reduction in weld current. This can contribute to weld inconsistency or even weld failure. Always use 4/0 cables in the welding circuit when excessive length is required. The amount of cable totally depends upon the power source used. It may be necessary in some cases to parallel cable when length required is too long.

10 mm	→	525	a	700 amp		13 mm	→	750	a	925 amp	
16 mm	→	1100	a	1400 amp		19 mm	→	1450	a	1750 amp	
22 mm	→	1700	a	1950 amp		25 mm	→	2000	a	2200 amp	

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SHEAR CONNECTOR N'AKRON TYP - B
ANSI - AWS D1.1/D1.1M:2010

5. Weld Setting

Exact weld settings cannot be given because no two works are the same. Actual settings will depend upon jobs site conditions. Listed below are approximate settings.

Stud base diameter			Welding Downhand				Welding Overhead				Welding to a Vertical Surface			
in	mm	Area mm²	Welding current A	Weld time seg	Lift mm	Plunge mm	Welding current A	Weld time seg	Lift mm	Plunge mm	Welding current A	Weld time seg	Lift mm	Plunge mm
1/4	6	28,274	450	.17	1,5	3,2	0,450	.17	1,5	3,2	450	.17	1,5	3,2
5/16	8	50,266	500	.25	1,5	3,2	0,500	.25	1,5	3,2	500	.25	1,5	3,2
3/8	10	78,540	550	.33	1,5	3,2	0,550	.33	1,5	3,2	600	.33	1,5	3,2
7/16	11	95,033	675	.42	2,0	3,2	0,675	.42	1,5	3,2	750	.33	1,5	3,2
1/2	13	132,733	800	.55	2,0	3,2	0,800	.55	1,5	3,2	875	.46	1,5	3,2
5/8	16	201,062	1200	.67	2,4	4,7	0,1200	.67	1,5	4,7	1275	.60	1,5	4,7
3/4	19	283,529	1500	.84	2,4	4,7	0,1500	.84	1,5	4,7				
7/8	22	380,134	1700	1.00	3,2	6,4	0,1700	1.00	1,5	6,4				
1	25	490,875	1900	1.40	3,2	6,4	0,2050	1.20	1,5	6,4				

Data chart 1.20

Gun lift should be measured with a stud and its respective ferrule of size which is are going to be used, compressing the gun as if to weld and using an insulated piece of material, such a piece of wood.

Weld current should also be checked by using an amp meter ad should be checked periodically due to cable heating which can cause reduction in weld current.

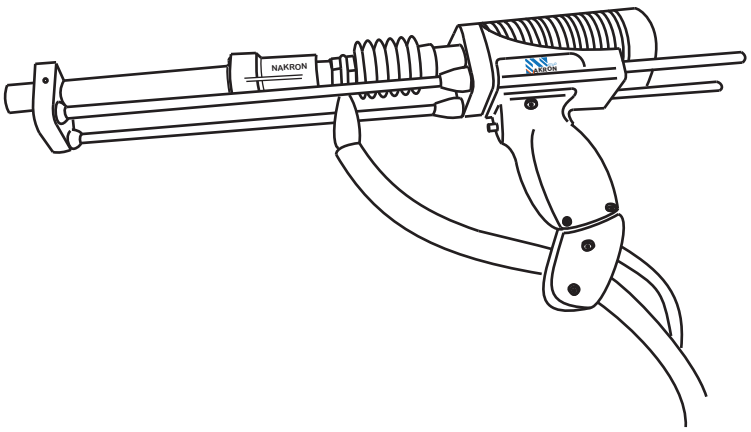

Fig. 10

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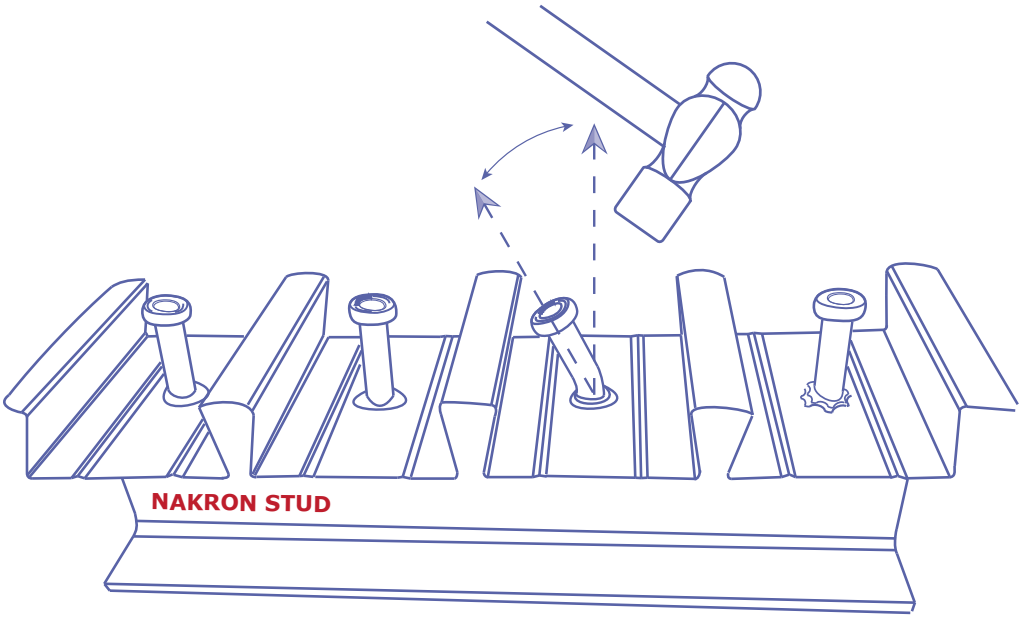
6. Testing of Welded Studs

At least, two or three studs should be bent, in any direction, until they reach a 30 degree angle from weld position, striking them with a hammer or bending with a pipe. If any failure occurs, settings will be readjusted and test will be repeated. Once welding quality has been set, production may be started. It is advisable to test two studs every half hour to assure a right welding. This can be accomplished by bending several studs to a 15 degree angle from weld position. It a failure did not occur, the welds would be considered acceptable. It is not necessary to straighten a stud which is bent. Testing should be carried out and checked at the beginning of each day, after any shift in operator, or if the set-up is changed in any way.



7. Visual Inspection

Visual inspection must show a full 360 degree weld fillet, although not necessarily the same fillet height around circumference of the stud. An undercut at the weld fillet will be cause for rejection. If the fillet is something less than 360 degrees, it must be completed by hand welding. The studs should then be tested by bending 15 degrees from their original axis either by striking with a hammer or placing a pipe over the stud and, manually or mechanically, bending it. If there was not a failure, the weld should be considered good. However, if the weld fails, the studs have to be replaced.

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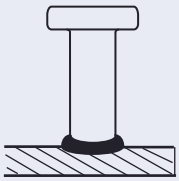
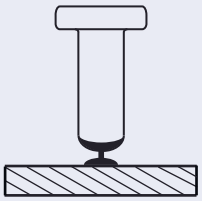
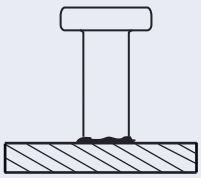
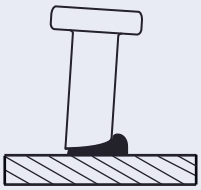
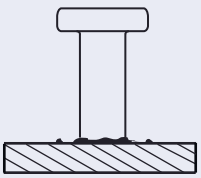
WELDING DEFECTS AND CORRECTIVE ACTIONS

VISUAL INSPECTION

Overall appearance - Weld fillet: regular, bright, shiny and complete. - Length after welding: withing tolerances.		PC - Right parameters CA - None
- Reduced diameter welding. - Excessive length.		PC: - Too little plunge or lift. - Too high power. CA: - Increase plunge, check ferrule centering and studlift. - Decrease time, power or both
- Low fillet height, irregular weld fillet and grayish appearance. - Excessive length.		PC: - Too low power. - Damp ferrule. CA: - Increase plunge, check ferrule centering and stud lift. - Increase power, time or both
- Weld fillet not centered correctly. - Undercuts.		PC: - Blow arc. - Ferrule not exactly centered CA: - Attach ground clamps simmetrically. - Check ferrule centering
- Low fillet heigh, bright or considerable side projections. - Too short length after welding.		PC: - Too high power. - Too high pungle speed. CA: - Decrease power, time or both. - Adjust plunge, gun chuck adaptor or both.

PC, possible cause; CA, corrective actions

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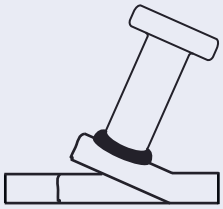
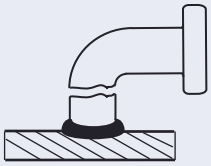
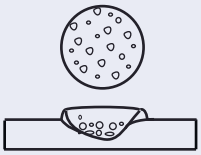
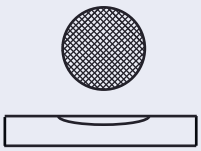
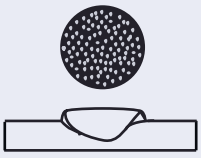
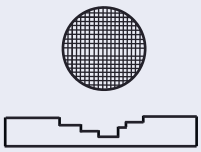
TORQUEBEND TESTING

- Tear of base metal.		PC - Right parameters. CA - None
- Crack above weld fillet after enough distortion.		PC - Right parameters. CA - None.
- Tear within the welding,high porosity.		PC: - Power too low. - Non-proper base metal for stud welding. CA: - Increase power, time or both. - Check chemical composition.
- Crack in HAZ. - Crack in gray zone, without enough distortion.		PC: - Too high carbon content in base metal. - Non-proper base metal. CA: - Check base metal. - Increase welding time. - Pre-heating may be necessary.
- Welding crack. - Brigth appearance.		PC: - Too high flux content. - Too short welding time. CA: - Check the amount of flux. - Increase welding time
- Tear in the base metal sheet.		PC: - Non-metallic inclusions in base metal. - Non-proper base metal.

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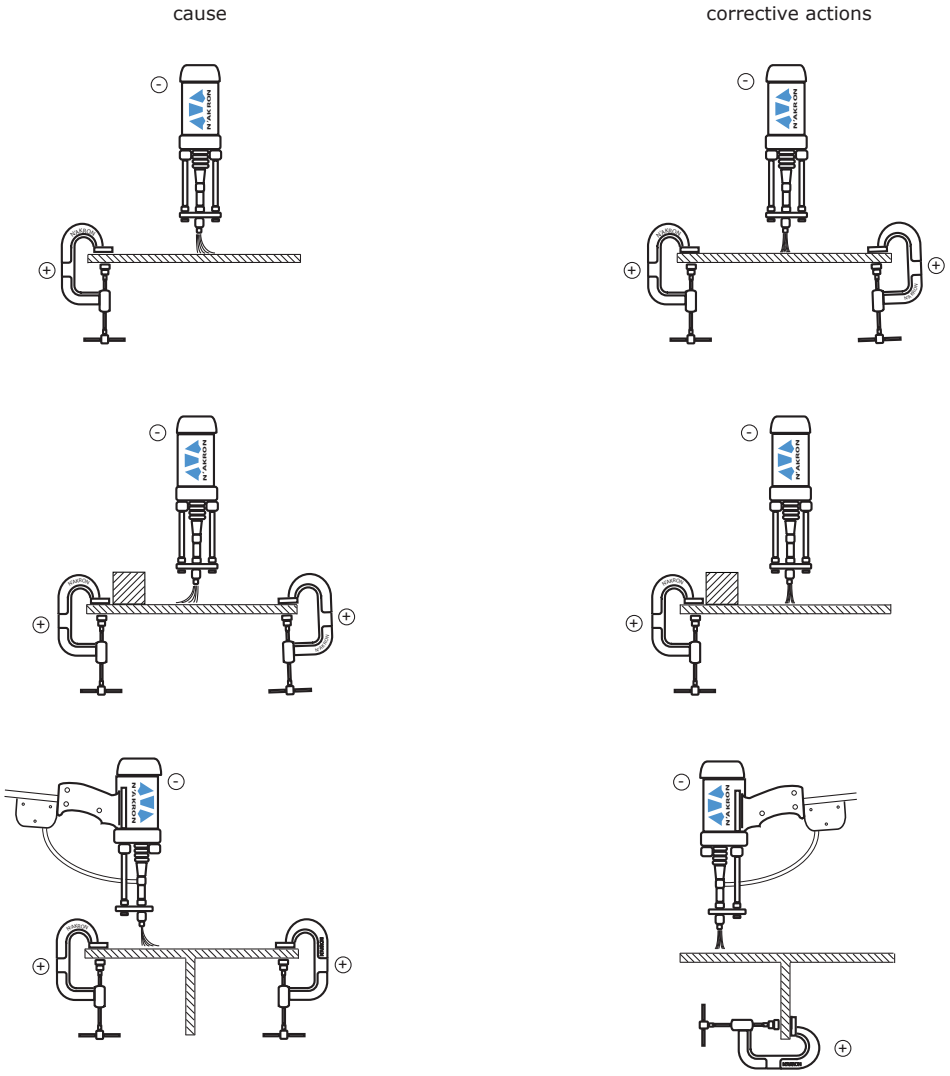
BLOW ARC EFFECTS. CORRECTIVE ACTIONS

The arc blow is proportional to the current intensity and can be prevented by setting the mass clamps and clamping symmetrically with compensative masses or –in the case of hand gun with external welding cable- by pivoting the gun around the vertical axis. The arc blow drives fusion on an only side and can increase the blowholes in the welded materials.



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BASE METAL

The short time drawn arc causes the simultaneous melting of connector and base metal, in this way both molten parts are mixed to form the welded fillet, modifying properties of the heat-affected zone. This phenomenon varies according to the different stud welding methods. In general, the volume of molten stud surpasses the volume of molten parent metal. Normally, the weld zone on the base metal is larger than the cross section of the shear connector. It is necessary to examine with special care about the strength and elongation properties in transitional zone of the weld, and the connector as well.

- The base metal area must be cleaned. Coats of paint, rust, scale, grease and nonweldable metal coatings should be removed from the welding zone. This can be accomplished by means of a mechanical or chemical procedure. Base metals coated with oxid or scale must be perfectly polished with emery?/cleaned by scraping.

- Surfaces to be welded must be kept dry and free of any condensation. When temperature is below 5º C, appropriate pre-heating may be necessary.

- The welding quality of a shear connector depends not only on the strict adherence to the welding process specification but also on the proper operation of the drive mechanism, the state of pieces to join, on the accessories and the power supply.

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CERAMIC FERRULE

Ceramic ferrule forms a combustion chamber around the welding, protecting the welder from both arc and welding projection, it concentrates the arc in a small area and limits the loss of heat and the cooling rate. Ferrule protects only slightly welding from ambient air. When the stud is thrust into the molten material , it moves molten metal towards the outside of gasket to form a weld flash or fillet around the shear stud. Thereby, it is possible to weld in any position. Ferrule is only used for a single welding and discarded once molten metal has solidified.

- Ceramic ferrule must be in contact with the base metal .
- Ceramic ferrule should be placed concentrically with respect to the connector; an inclination or an irregular contact between ferrule and stud leads to produce an irregular weld fillet and it can obstruct the plunge.
- Ceramic ferrules must be stored in a dry place.
- In the risk of hydrogen cracking, ceramic ferrule should be dried at high temperature (1 h above 900ºC).

SHIELDING GAS

In stud welding with shielding gas, atmosphere around the arc is replaced by a shielding gas which reduces the blowholes forming considerably. A mixture with 82% argon and 18% carbon dioxide (EN 439-M21) is used for steel and most metals.

The shielding gas influences the arc as well as the stud and worpiece melting , modifying the surface stress into the molten pool metal; it influences also weld fillet shape and penetration shape. As a basic rule, it should take the welding position PA, according to EN ISO 6947. A ceramic ferrule can be used also to improve the weld fillet shape and to keep the drawn arc in a zone close to the workpiece.

The gas is supplied by means of a device that should ensure a steady level of gas shield, without any turbulence, being essential to observe the following requirements:

- The gas arrival must be ring-shaped (around the stud, on all its sides).
- The gas has to displace the normal atmosphere before starting the welding; a preliminar purge period should be observed.

STUD WELDING WITH NO SHIELD

Welding studs without shield is only possible in the case of small diameter studs (below 10 mm) and with short welding time (below 100 ms). Between the disadvantages of this method, they are a high oxidation of the molten zone as well as an increase of blowholes and irregular weld. A stud welding feature is the very short duration of the electrical arc time (between 0.5 and 3.0 ms) as well as a high rate of heating and cooling, respectively.

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d_1	l_2	d_3	h_4	Weight kg/100 Pcs	Ceramic	Reference
10	50	13	2,5	5,0	UF10	NKSD11000050
10	75	13	2,5	6,0	UF10	NKSD11000075
10	100	13	2,5	8,0	UF10	NKSD11000100
10	125	13	2,5	9,0	UF10	NKSD11000125
10	150	13	2,5	11,0	UF10	NKSD11000150
10	175	13	2,5	12,0	UF10	NKSD11000175
13	50	17	3,0	8,0	UF13	NKSD11300050
13	75	17	3,0	10,0	UF13	NKSD11300075
13	100	17	3,0	13,0	UF13	NKSD11300100
13	125	17	3,0	16,0	UF13	NKSD11300125
13	150	17	3,0	18,0	UF13	NKSD11300150
13	175	17	3,0	21,0	UF13	NKSD11300175
13	200	17	3,0	23,0	UF13	NKSD11300200
16	50	21	4,5	12,0	UF16	NKSD11600050
16	75	21	4,5	16,0	UF16	NKSD11600075
16	100	21	4,5	20,0	UF16	NKSD11600100
16	125	21	4,5	24,0	UF16	NKSD11600125
16	150	21	4,5	28,0	UF16	NKSD11600150
16	175	21	4,5	32,0	UF16	NKSD11600175
16	200	21	4,5	36,0	UF16	NKSD11600200
16	225	21	4,5	40,0	UF16	NKSD11600225
16	250	21	4,5	44,0	UF16	NKSD11600250
19	50	23	6,0	16,0	UF19	NKSD11900050
19	75	23	6,0	21,0	UF19	NKSD11900075
19	80	23	6,0	22,0	UF19	NKSD11900080
19	100	23	6,0	27,0	UF19	NKSD11900100
19	125	23	6,0	33,0	UF19	NKSD11900125
19	150	23	6,0	38,0	UF19	NKSD11900150
19	175	23	6,0	44,0	UF19	NKSD11900175
19	200	23	6,0	49,0	UF19	NKSD11900200
19	220	23	6,0	54,0	UF19	NKSD11900220
19	225	23	6,0	55,0	UF19	NKSD11900225
19	250	23	6,0	60,0	UF19	NKSD11900250
19	275	23	6,0	66,0	UF19	NKSD11900275
19	300	23	6,0	72,0	UF19	NKSD11900300
19	325	23	6,0	77,0	UF19	NKSD11900325
19	350	23	6,0	83,0	UF19	NKSD11900350

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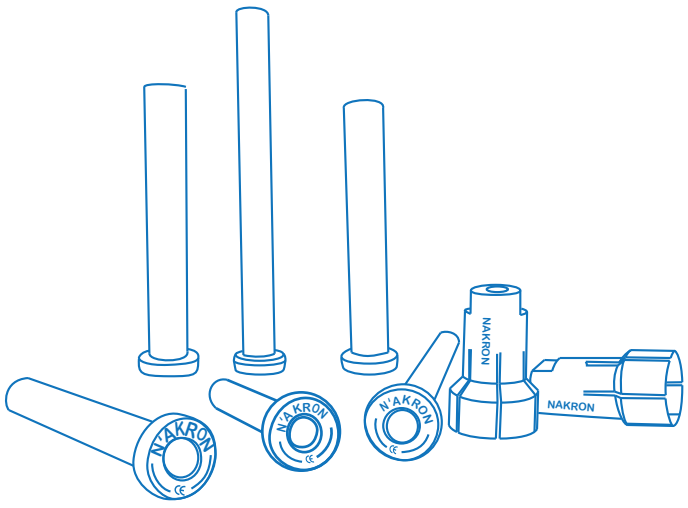
d_1	l_2	d_3	h_4	Weight kg/100 Pcs	Ceramic	Reference
22	50	29	6,0	20,0	UF22	NKSD12200050
22	75	29	6,0	28,0	UF22	NKSD12200075
22	100	29	6,0	35,0	UF22	NKSD12200100
22	125	29	6,0	43,0	UF22	NKSD12200125
22	150	29	6,0	50,0	UF22	NKSD12200150
22	175	29	6,0	58,0	UF22	NKSD12200175
22	200	29	6,0	65,0	UF22	NKSD12200200
22	225	29	6,0	73,0	UF22	NKSD12200225
22	250	29	6,0	80,0	UF22	NKSD12200250
22	275	29	6,0	88,0	UF22	NKSD12200275
22	300	29	6,0	95,0	UF22	NKSD12200300
22	325	29	6,0	102,0	UF22	NKSD12200325
22	350	29	6,0	110,0	UF22	NKSD12200350
25	75	31	7,0	37,0	UF25	NKSD12500075
25	100	31	7,0	47,0	UF25	NKSD12500100
25	125	31	7,0	57,0	UF25	NKSD12500125
25	150	31	7,0	66,0	UF25	NKSD12500150
25	175	31	7,0	76,0	UF25	NKSD12500175
25	200	31	7,0	85,0	UF25	NKSD12500200
25	225	31	7,0	95,0	UF25	NKSD12500225
25	250	31	7,0	105,0	UF25	NKSD12500250
25	275	31	7,0	114,0	UF25	NKSD12500275
25	300	31	7,0	124,0	UF25	NKSD12500300
25	325	31	7,0	134,0	UF25	NKSD12500325
25	350	31	7,0	143,0	UF25	NKSD12500350



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d_1 nominal Ø		l_2 length after welding		l_1 length before welding		d_5 head Ø		h_3 head height	
estandard	tolerance	estandard	tolerance	estandard	tolerance	estandard	tolerance	estandard	tolerance
10	-0,4		+1 -2	l_2+3	±1,5	19	±0,3	7	+1 -0,5
10	9,6 ~ 10	50	48 ~ 51	53	51,5 ~ 54,5	19	18,7 ~ 19,3	7	6,5 ~ 8,0
10	9,6 ~ 10	75	73 ~ 76	78	76,5 ~ 79,5	19	18,7 ~ 19,3	7	6,5 ~ 8,0
10	9,6 ~ 10	100	98 ~ 101	103	101,5 ~ 104,5	19	18,7 ~ 19,3	7	6,5 ~ 8,0
10	9,6 ~ 10	125	123 ~ 126	128	126,5 ~ 129,5	19	18,7 ~ 19,3	7	6,5 ~ 8,0
10	9,6 ~ 10	150	148 ~ 151	153	151,5 ~ 154,5	19	18,7 ~ 19,3	7	6,5 ~ 8,0
10	9,6 ~ 10	175	173 ~ 176	178	176,5 ~ 179,5	19	18,7 ~ 19,3	7	6,5 ~ 8,0
10	9,6 ~ 10	200	198 ~ 201	203	201,5 ~ 204,5	19	18,7 ~ 19,3	7	6,5 ~ 8,0
13	-0,4		+1 -2	l_2+3	±1,5	25	±0,3	8	+1 -0,5
13	12,6 ~ 13	50	48 ~ 51	53	51,5 ~ 54,5	25	24,7 ~ 25,3	8	7,5 ~ 9,0
13	12,6 ~ 13	75	73 ~ 76	78	76,5 ~ 79,5	25	24,7 ~ 25,3	8	7,5 ~ 9,0
13	12,6 ~ 13	100	98 ~ 101	103	101,5 ~ 104,5	25	24,7 ~ 25,3	8	7,5 ~ 9,0
13	12,6 ~ 13	125	123 ~ 126	128	126,5 ~ 129,5	25	24,7 ~ 25,3	8	7,5 ~ 9,0
13	12,6 ~ 13	150	148 ~ 151	153	151,5 ~ 154,5	25	24,7 ~ 25,3	8	7,5 ~ 9,0
13	12,6 ~ 13	175	173 ~ 176	178	176,5 ~ 179,5	25	24,7 ~ 25,3	8	7,5 ~ 9,0
13	12,6 ~ 13	200	198 ~ 201	203	201,5 ~ 204,5	25	24,7 ~ 25,3	8	7,5 ~ 9,0
16	-0,4		+1 -2	l_2+4	±1,5	32	±0,3	8	+1 -0,5
16	15,6 ~ 16	50	48 ~ 51	54	52,5 ~ 55,5	32	31,7 ~ 32,3	8	7,5 ~ 9,0
16	15,6 ~ 16	75	73 ~ 76	79	77,5 ~ 80,5	32	31,7 ~ 32,3	8	7,5 ~ 9,0
16	15,6 ~ 16	100	98 ~ 101	104	102,5 ~ 105,5	32	31,7 ~ 32,3	8	7,5 ~ 9,0
16	15,6 ~ 16	125	123 ~ 126	129	127,5 ~ 130,5	32	31,7 ~ 32,3	8	7,5 ~ 9,0
16	15,6 ~ 16	150	148 ~ 151	154	152,5 ~ 155,5	32	31,7 ~ 32,3	8	7,5 ~ 9,0
16	15,6 ~ 16	175	173 ~ 176	179	177,5 ~ 180,5	32	31,7 ~ 32,3	8	7,5 ~ 9,0
16	15,6 ~ 16	200	198 ~ 201	204	202,5 ~ 205,5	32	31,7 ~ 32,3	8	7,5 ~ 9,0
16	15,6 ~ 16	225	223 ~ 226	229	227,5 ~ 230,5	32	31,7 ~ 32,3	8	7,5 ~ 9,0
16	15,6 ~ 16	250	248 ~ 251	254	252,5 ~ 255,5	32	31,7 ~ 32,3	8	7,5 ~ 9,0
19	-0,4	50	+1 -2	l_2+4,5	±1,5	32	±0,3	10	+1 -0,5
19	18,6 ~ 19	50	48 ~ 51	54,5	53,0 ~ 56,0	32	31,7 ~ 32,3	10	9,5 ~11,0
19	18,6 ~ 19	75	73 ~ 76	79,5	78,0 ~ 81,0	32	31,7 ~ 32,3	10	9,5 ~11,0
19	18,6 ~ 19	100	98 ~ 101	104,5	103,0 ~ 106,0	32	31,7 ~ 32,3	10	9,5 ~ 110
19	18,6 ~ 19	125	123 ~ 126	129,5	128,0 ~ 131,0	32	31,7 ~ 32,3	10	9,5 ~ 110
19	18,6 ~ 19	150	148 ~ 151	154,5	153,0 ~ 156,0	32	31,7 ~ 32,3	10	9,5 ~ 110
19	18,6 ~ 19	175	173 ~ 176	179,5	178,0 ~ 181,0	32	31,7 ~ 32,3	10	9,5 ~ 110
19	18,6 ~ 19	200	198 ~ 201	204,5	203,0 ~ 206,0	32	31,7 ~ 32,3	10	9,5 ~ 110
19	18,6 ~ 19	225	223 ~ 226	229,5	228,0 ~ 231,0	32	31,7 ~ 32,3	10	9,5 ~ 110
19	18,6 ~ 19	250	248 ~ 251	254,5	253,0 ~ 256,0	32	31,7 ~ 32,3	10	9,5 ~ 110
19	18,6 ~ 19	275	273 ~ 276	279,5	278,0 ~ 281,0	32	31,7 ~ 32,3	10	9,5 ~ 110
19	18,6 ~ 19	300	298 ~ 301	304,5	303,0 ~ 306,0	32	31,7 ~ 32,3	10	9,5 ~ 110
19	18,6 ~ 19	325	323 ~ 326	329,5	328,0 ~ 331,0	32	31,7 ~ 32,3	10	9,5 ~ 110
19	18,6 ~ 19	350	348 ~ 351	354,5	353,0 ~ 356,0	32	31,7 ~ 32,3	10	9,5 ~ 110
19	18,6 ~ 19	375	373 ~ 376	379,5	378,0 ~ 381,0	32	31,7 ~ 32,3	10	9,5 ~ 110
19	18,6 ~ 19	400	398 ~ 401	404,5	403,0 ~ 406,0	32	31,7 ~ 32,3	10	9,5 ~ 110

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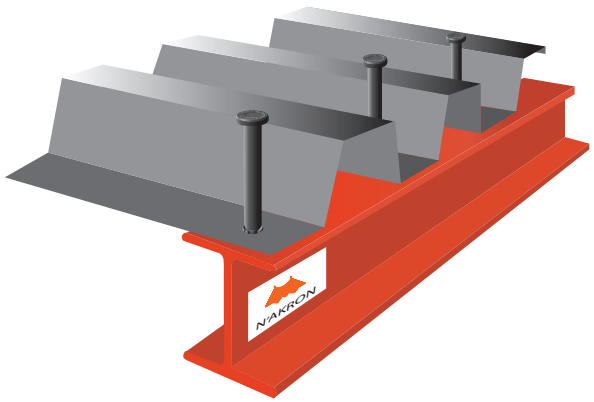
d_1 nominal Ø		l_2 length after welding		l_1 length before welding		d_5 head Ø		h_3 head height	
estandard	tolerance	estandard	tolerance	estandard	tolerance	estandard	tolerance	estandard	tolerance
22	-0,4		+1 -2	l_2+5	±1,5	35	±0,3	10	+1 -0,5
22	21,6 ~ 22	50	48 ~ 51	55,0	53,5 ~ 56,5	35	34,7 ~ 35,3	10	9,5 ~ 11,0
22	21,6 ~ 22	75	73 ~ 76	80,0	78,5 ~ 81,5	35	34,7 ~ 35,3	10	9,5 ~ 11,0
22	21,6 ~ 22	100	98 ~ 101	105,0	103,5 ~ 106,5	35	34,7 ~ 35,3	10	9,5 ~ 11,0
22	21,6 ~ 22	125	123 ~ 126	130,0	128,5 ~ 131,5	35	34,7 ~ 35,3	10	9,5 ~ 11,0
22	21,6 ~ 22	150	148 ~ 151	155,0	153,5 ~ 156,5	35	34,7 ~ 35,3	10	9,5 ~ 11,0
22	21,6 ~ 22	175	173 ~ 176	180,0	178,5 ~ 181,5	35	34,7 ~ 35,3	10	9,5 ~ 11,0
22	21,6 ~ 22	200	198 ~ 201	205,0	203,5 ~ 206,5	35	34,7 ~ 35,3	10	9,5 ~ 11,0
22	21,6 ~ 22	225	223 ~ 226	230,0	228,5 ~ 231,5	35	34,7 ~ 35,3	10	9,5 ~ 11,0
22	21,6 ~ 22	250	248 ~ 251	255,0	253,5 ~ 256,5	35	34,7 ~ 35,3	10	9,5 ~ 11,0
22	21,6 ~ 22	275	273 ~ 276	280,0	278,5 ~ 281,5	35	34,7 ~ 35,3	10	9,5 ~ 11,0
22	21,6 ~ 22	300	298 ~ 301	305,0	303,5 ~ 306,5	35	34,7 ~ 35,3	10	9,5 ~ 11,0
22	21,6 ~ 22	325	323 ~ 326	330,0	328,5 ~ 331,5	35	34,7 ~ 35,3	10	9,5 ~ 11,0
22	21,6 ~ 22	350	348 ~ 351	355,0	353,5 ~ 356,5	35	34,7 ~ 35,3	10	9,5 ~ 11,0
22	21,6 ~ 22	375	373 ~ 376	380,0	378,5 ~ 381,5	35	34,7 ~ 35,3	10	9,5 ~ 11,0
22	21,6 ~ 22	400	398 ~ 401	405,0	403,5 ~ 406,5	35	34,7 ~ 35,3	10	9,5 ~ 11,0
25	-0,4		+1 -2	l_2+5,5	±1,5	41	±0,3	12	+1 -0,5
25	24,6 ~ 25	75	73 ~ 76	80,5	79,0 ~ 82,0	41	40,7 ~ 41,3	12	11,5 ~ 13,0
25	24,6 ~ 25	100	98 ~ 101	105,5	104,0 ~ 107,0	41	40,7 ~ 41,3	12	11,5 ~ 13,0
25	24,6 ~ 25	125	123 ~ 126	130,5	129,0 ~ 132,0	41	40,7 ~ 41,3	12	11,5 ~ 13,0
25	24,6 ~ 25	150	148 ~ 151	155,5	154,0 ~ 157,0	41	40,7 ~ 41,3	12	11,5 ~ 13,0
25	24,6 ~ 25	175	173 ~ 176	180,5	179,0 ~ 182,0	41	40,7 ~ 41,3	12	11,5 ~ 13,0
25	24,6 ~ 25	200	198 ~ 201	205,5	204,0 ~ 207,0	41	40,7 ~ 41,3	12	11,5 ~ 13,0
25	24,6 ~ 25	225	223 ~ 226	230,5	229,0 ~ 232,0	41	40,7 ~ 41,3	12	11,5 ~ 13,0
25	24,6 ~ 25	250	248 ~ 251	255,5	254,0 ~ 257,0	41	40,7 ~ 41,3	12	11,5 ~ 13,0
25	24,6 ~ 25	275	273 ~ 276	280,5	279,0 ~ 282,0	41	40,7 ~ 41,3	12	11,5 ~ 13,0
25	24,6 ~ 25	300	298 ~ 301	305,5	304,0 ~ 307,0	41	40,7 ~ 41,3	12	11,5 ~ 13,0
25	24,6 ~ 25	325	323 ~ 326	330,5	329,0 ~ 332,0	41	40,7 ~ 41,3	12	11,5 ~ 13,0
25	24,6 ~ 25	350	348 ~ 351	355,5	354,0 ~ 357,0	41	40,7 ~ 41,3	12	11,5 ~ 13,0
25	24,6 ~ 25	375	373 ~ 376	380,5	379,0 ~ 382,0	41	40,7 ~ 41,3	12	11,5 ~ 13,0
25	24,6 ~ 25	400	398 ~ 401	405,5	404,0 ~ 407,0	41	40,7 ~ 41,3	12	11,5 ~ 13,0



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STUD AKRON

SHEAR CONNECTOR N'AKRON SD1 - A
UNE - EN ISO 13918:2008

N'AKRON

SHEAR CONNECTOR N'AKRON TYP - B
ANSI - AWS D1.1/D1.1M:2010

N'AKRON SHEAR CONNECTORS TECHNICAL DATA

Nk shear connector is manufactured from a suitable material for being welded through arc welding system. Its dimensions and design comply with UNE - EN ISO 13918:2008 Standard.

Nk connector is available in several material swhoseproperties can be documented by means of a test report 2.2 or a certificate of inspection 3.1 or 3.2 (EN 10204).

Non-Alloy structural steel

Nk stud, of non-alloy structural steel to be soldered by arc welding, is made from steel belonging to Group 1 (in accordance with ISO/TR 15618:2005 Standard), being established stringent requirements , in terms of its carbon content, purity degree and grain size. This makes the material particularly suitable for the Nk stud welding.

Nk stud, made from Group 1 steel, is delivered with the following mechanical properties:

Tensile Strength Rm > 450 N/mm2
Yield Strength Rel > 350 N/mm2
Elongation A5 > 15%

Nk connector exceeds all UN - EN ISO 13918:2008 requirements.

CE Conformity

Nk shear connector complies with the Regulation 305/2011/EU of the European Parliament of the Council of March 9, 2011 (the Construction Products Regulation).

Being applicable all provisions concerning the assessment and verification of constancy of performance parameters as well as the features described in the Informative Annex ZA of the Standard:

EN 1090-1:2009+A1:2011

Under the 2+ system, they are applicable to:

•Certificate No. 0370 - CPR - 1787
•Notified Body

CE

Connector dimensions

Nominal length is the length of th estud after welding. Connectors supplied for welding are 1 to 5.5 mm longer, dependent on their diameter.

Nk stud for being welded with ceramic ferrule protection is provided with a small aluminium ball on its end (in accordance with welding procedure requirements) to facilitate the opening of the arc, stabilize it and deoxidize the surface of base metal. The correct amount of flux used is a key factor in getting a perfect result in the weld.

Ceramic ferrule

During the stud welding, a ceramic ferrule forms a combustion chamber around the welding which protects the welder from both arc and welding projection. It concentrates the arc in a reduced area and limits the loss of heat and cooling rate. The ceramic ferrule is used for a single weld and removed once the molten metal has solidified.

Welding collar

During the welding process, a flange or collaris formed where it attaches to the working piece. Its dimension depends upon the welding parameters as well as the ceramic used.

Making of packaging

According to the example, following information is detailed on each package: heat number,unitsand product detail.

- Connector ISO 13918-SD1 19*100
- Ceramic ferrule UF 19

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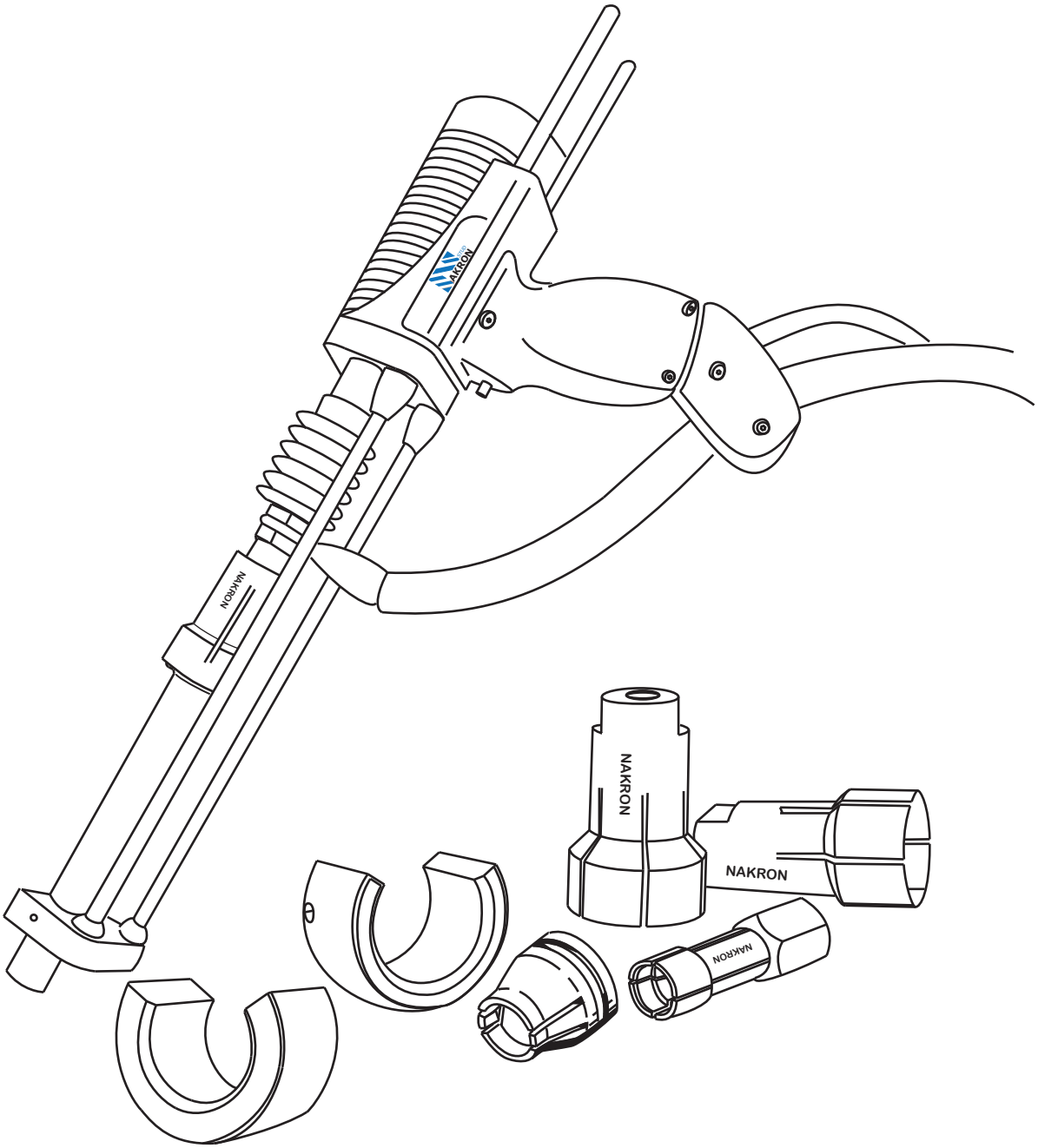
ACCESSORY



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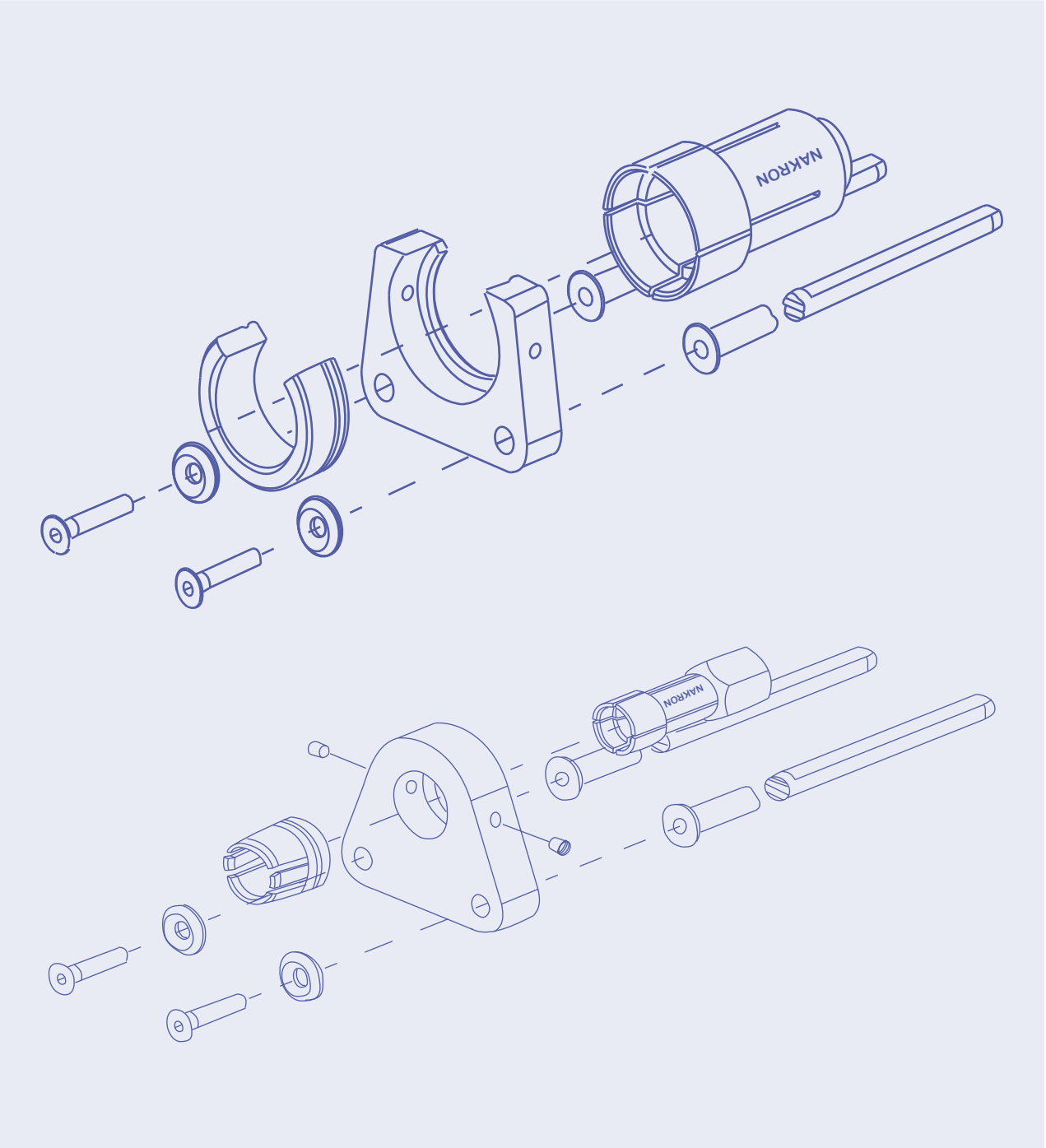

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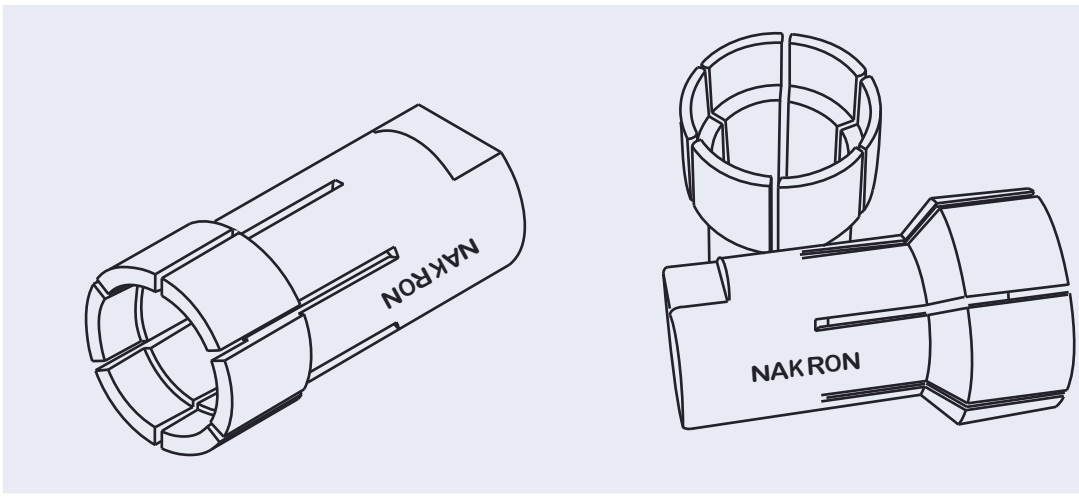
CHUCK



stud diameter Ø d_1	head diameter Ø d_5	reference
10 mm (3/8")	19 mm	NKBPES190010
13 mm (1/2")	25 mm	NKBPES250013
16/19 mm (5/8"; 3/4")	32 mm	NKBPES321619
22 mm (7/8")	35 mm	NKBPES350022
25 mm (1")	41 mm	NKBPES410025

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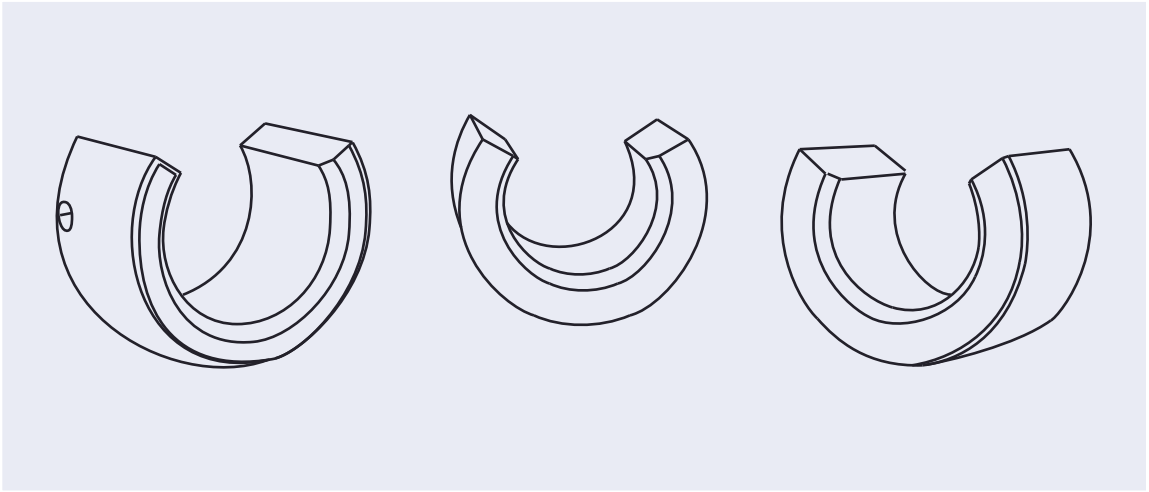
SHEAR CONNECTOR FERRULE GRIP



stud diameter Ø d_1	inside diameter	outside diameter	reference
13 mm (1/2")	16,50	44,45	NKPCSTE0013
16 mm (5/8")	20,00	44,45	NKPCSTE0016
16/19 mm (5/8"; 3/4")	26,00	44,45	NKPCSTE1619
22 mm (7/8")	30,70	44,45	NKPCSTE0022
25 mm (1")	35,50	44,45	NKPCSTE0025

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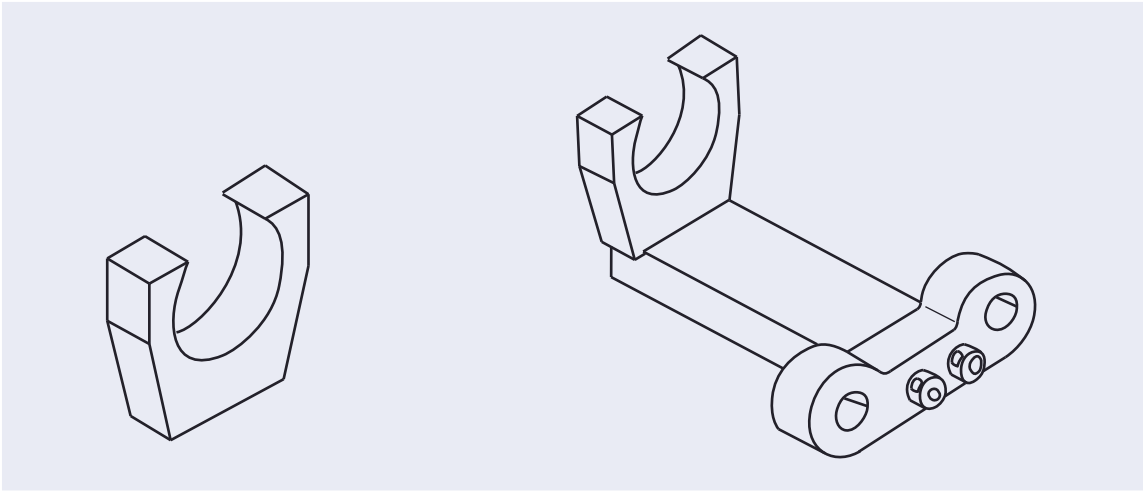
WELD THROUGH DECK FERRULE HOLDER



stud diameter Ø d_1	inside diameter	outside diameter	reference
13 mm (1/2")	16,50	44,45	NKPCGC0013
16 mm (5/8")	20,00	44,45	NKPCGC0016
16/19 mm (5/8"; 3/4")	26,00	44,45	NKPCGC1619
22 mm (7/8")	30,70	44,45	NKPCGC0022
25 mm (1")	35,50	44,45	NKPCGC0025

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