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GENERAL

String hardware is used to connect insulators to the towers and conductors.

The **forged hardware** is mainly made of heat treated steel.

This steel is especially suitable for forging and its good performance, especially ductility, is due to the heat treatment process.

This is of particular value if dynamic loads, for instance through ice shedding or oscillations, are likely.

In particular cases, where at very low temperatures dynamic stresses could occur, hardware made of special steels is available.

Short circuit capability

The short circuit capability of the string hardware depends on the cross sections used as well as the smoothness of bolts and holes and on the mechanical load applied. Furthermore the grade of steel used has some influence. Generally one can calculate that at a current density of 70 A/mm² the temperature of the materials used will be lower than 400° C.

One should keep in mind that at higher temperatures the strength of the hardware will be reduced.

Standards

The **connecting bolts** acc. DIN 48073/5.6 or 8.8.

Split pins are made of stainless steel or tinned copper.

Clevis eye connections acc. DIN 48074 resp. IEC 471 .

Standards for **balls and sockets** according to IEC 120 resp. DIN IEC 120, other standards on request.

Connecting dimensions for arcing protection acc. DIN 48068 and ÖNORM E4199.

Dimensions of other connections are shown in the relevant catalogue section, but also others are available on request.

Security split pins for sockets are in accordance to IEC 372 resp. DIN 48063.

Hot dip galvanising

Steel hardware is hot dip galvanised in Mosdorfer's own plant.

Galvanising can be done in accordance to national and international standards.

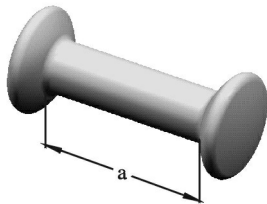
abbreviation for bolts:

S = screw bolt

N = rivet bolt

Twin ball pins

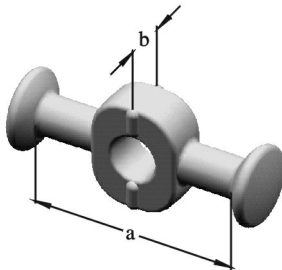
Material: Steel, forged, hot dip galvanised					
L.-Nr.	Dimensions in mm		Breaking strenght kN	Short circuit current kA	Weight kg
	Pin	a			
ÖNORM					
4210.01/1	11	30	60	6,5	0,06
4210.02/0	16	27	130	14	0,17
IEC					
4210.01/1	11	30	60	6,5	0,06
4210.02/1	16	40	130	14	0,20
4210.03/1	20	49	230	22	0,35



Twin ball pins

for arcing horn attachment

Material: Steel, forged, hot dip galvanised						
L.-Nr.	Dimensions in mm			Breaking strenght kN	Short circuit current kA	Weight kg
	Pin	a	b			
ÖNORM						
4210.10/0	16	84	19	130	40	0,36
4210.11/0	20	96	19	230	40	0,58
IEC						
4210.10/1	16	82	19	130	40	0,35
4210.11/1	20	96	19	230	40	0,60*
4210.12/1	24	138	22	320	50	1,15**
4210.13/1	28	132	22	380	50	1,52**



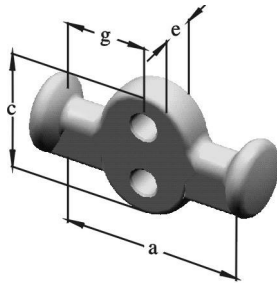
* with nozzle.

**with two holes for bolts M14 at 32 mm centres.

Twin ball pins

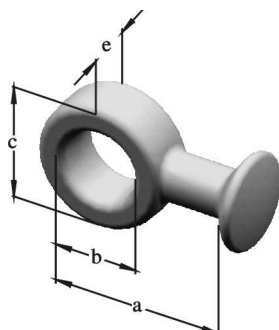
with nozzle, for arcing horn attachment

Material: Steel, forged, hot dip galvanised								
L.-Nr.	Dimensions in mm					Breaking strenght kN	Short circuit current kA	Weight kg
	Pin	a	c	e	g			
IEC								
135-351-040	16	100	70	18	50	150	40	0,58
135-351-030	20	90	70	18	50	210	40	0,80



with two holes for bolts M12 at 32 mm centres.

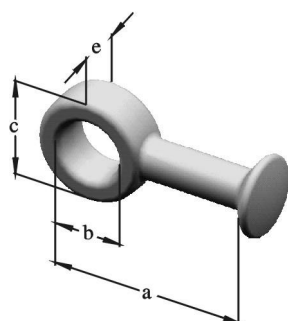
Round ball eyes short type



Material: Steel, forged, hot dip galvanised

L.-Nr.	Pin	Dimensions in mm				Breaking strength kN	Short circuit current kA	Weight kg
		a	b	c	e			
ÖNORM								
4210.15/1	11	48	20	40	13	60	6,5	0,12
4210.16/0	16	62	24	54	19	130	14,0	0,32
4210.16	16	55	24	56	16	130	14,0	0,29
IEC								
4210.15/1	11	48	20	40	13	60	6,5	0,12
4210.16/1	16	62	24	54	19	130	14,0	0,32
4210.17/1	20	80	30	55	19	200	22,0	0,48

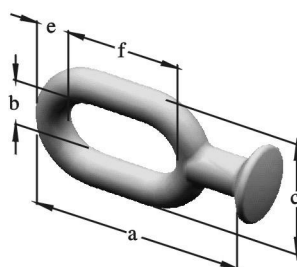
Round ball eyes long type



Material: Steel, forged, hot dip galvanised

L.-Nr.	Pin	Dimensions in mm				Breaking strength kN	Short circuit current kA	Weight kg
		a	b	c	e			
ÖNORM								
4210.20/1	11	75	20	40	13	60	6,5	0,14
4210.21/0	16	76	24	54	19	130	14,0	0,36
IEC								
4210.20/1	11	75	20	40	13	60	6,5	0,14
4210.21/1	16	76	24	54	19	130	14,0	0,36

Oval ball eyes



Material: Steel, forged, hot dip galvanised

L.-Nr.	Pin	Dimensions in mm					Breaking strength kN	Short circuit current kA	Weight kg
		a	b	c	e	f			
IEC									
4217.10/4	11	78	22	46	12	50	60	6,5	0,18*
4217.10/5	11	72	22	46	12	50	60	6,5	0,17**
4217.10/6	11	70	22	46	12	35	60	6,5	0,16
4217.11/1	16	80	25	53	14	50	100	14,0	0,30
4217.02/1	16	80	25	53	14	50	100	14,0	0,32*
4217.13/1	16	90	25	57	16	50	130	14,0	0,40

* with nozzle perpendicular to the oval eye.

** with nozzle parallel to the oval eye.

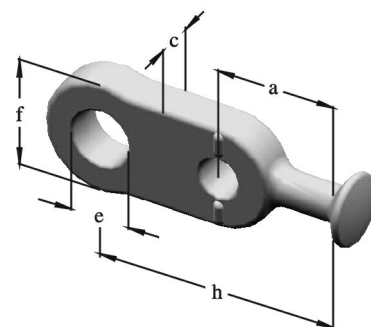
Ball eyes straight for arcing horn attachment

Material: Steel, forged, hot dip galvanised

L.-Nr.	Dimensions in mm						Breaking strength kN	Short circuit current kA	Weight kg
	Pin	a	c	e	f	h			
ÖNORM									
4213.00/0	11	32	13	20	40	70	60	12	0,22*
4213.01/0	16	48	19	30	54	105	130	30	0,64*
4213.011/0	16	48	19	24	54	105	130	35	0,69
4213.012/0	16	48	19	20	54	105	130	40	0,70
4213.013/0	16	48	19	26	54	105	130	35	0,66*
4213.02/0	20	57	19	24	60	129	230	45	0,95
IEC									
4213.00/0	11	32	13	20	40	70	60	12	0,22*
4213.01/2	16	45	19	30	55	104	130	30	0,67*
4213.011/1	16	45	19	24	55	104	130	40	0,72
4213.012/1	16	45	19	20	55	104	130	40	0,73
4213.013/1	16	45	19	26	55	104	130	35	0,71
4213.02/1	20	56	19	24	62	125	230	50	0,95
4213.021/1	20	56	19	26	62	125	230	45	0,94
4213.022/1	20	56	19	20	62	125	230	40	0,95
4213.023/1	20	56	19	30	62	125	230	40	0,93*
4213.03/1	24	69	22	30	70	142	320	50	1,55
4213.031/1	24	69	22	27	70	142	320	50	1,55
4213.032/1	24	69	22	24	70	142	320	50	1,55
4213.041/1	28	68	22	30	75	146	380	50	1,95
4213.042/1	28	68	22	27	75	146	380	50	1,95

* for U-bolt.

Ball eyes 24 and 28 mm with two holes for bolts M14 at 32 mm centres.

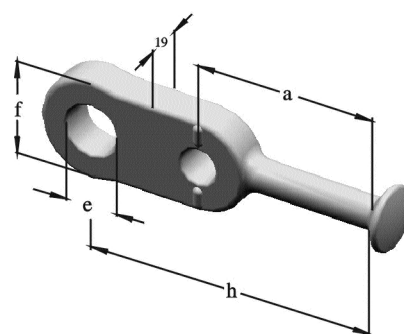


Ball eyes straight, long type for arcing horn attachment

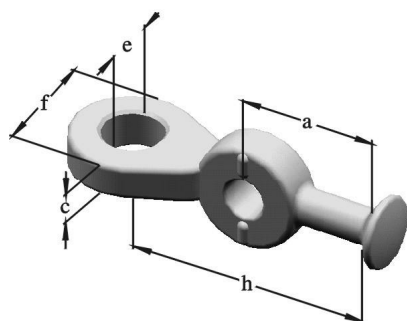
Material: Steel, forged, hot dip galvanised

L.-Nr.	Dimensions in mm					Breaking strength kN	Short circuit current kA	Weight kg
	Pin	a	e	f	h			
ÖNORM								
4215.01/0	16	85	30	54	142	130	30	0,68*
4215.011/0	16	85	24	54	142	130	35	0,74
4215.012/0	16	85	20	54	142	130	40	0,75
4215.02/0	20	105	30	60	176	230	35	1,17*
4215.021/0	20	105	24	60	176	230	45	1,19
IEC								
4215.02/1	20	104	30	60	175	230	35	1,17*
4215.021/1	20	104	24	60	175	230	45	1,19

*for U-bolt.



Ball eyes twisted for arcing horn attachment



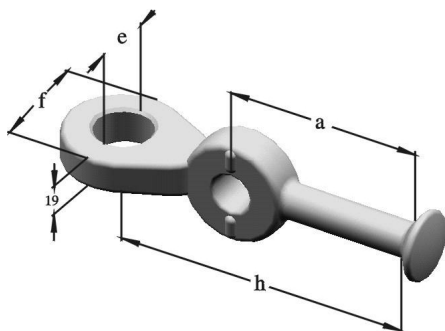
Material: Steel, forged, hot dip galvanised

L.-Nr.	Dimensions in mm						Breaking strength kN	Short circuit current kA	Weight kg
	Pin	a	c	e	f	h			
ÖNORM									
4213.09/0	11	32	13	20	40	70	60	12	0,20*
4213.10/0	16	48	19	30	55	110	130	30	0,64*
4213.101/0	16	48	19	24	55	110	130	30	0,64
4213.102/0	16	48	19	20	55	110	130	30	0,64
4213.103/0	16	48	19	26	55	110	130	30	0,64
4213.11/0	20	56	19	30	63	127	230	40	0,95*
4213.111/0	20	56	19	24	63	127	230	40	0,94
4213.112/0	20	56	19	26	63	127	230	40	0,95
4213.113/0	20	56	19	20	63	127	230	40	0,95
IEC									
4213.09/0	11	32	13	20	40	70	60	12	0,20*
4213.10/2	16	45	19	30	55	104	130	30	0,62*
4213.101/1	16	45	19	24	55	104	130	40	0,64
4213.102/1	16	45	19	20	55	104	130	40	0,64
4213.103/1	16	45	19	26	55	104	130	35	0,63
4213.11/1	20	56	19	30	62	125	230	40	0,91*
4213.111/1	20	56	19	24	62	125	230	50	0,90
4213.112/1	20	56	19	26	62	125	230	45	0,90
4213.113/1	20	56	19	20	62	125	230	40	0,92
4213.12/1	24	68	22	30	70	168	320	50	1,78
4213.121/1	24	68	22	27	70	168	320	50	1,78
4213.122/1	24	68	22	24	70	168	320	50	1,78
4213.131/1	28	66	22	30	70	166	380	50	1,86

* for U-bolt.

Ball eyes 24 and 28 mm with two holes for bolts M14 at 32 mm centres.

Ball eyes twisted, long type for arcing horn attachment



Material: Steel, forged, hot dip galvanised

L.-Nr.	Dimensions in mm					Breaking strength kN	Short circuit current kA	Weight kg
	Pin	a	e	f	h			
ÖNORM								
4215.10/0	16	85	30	55	147	130	30	0,72*
4215.101/0	16	85	24	55	147	130	30	0,78
4215.102/0	16	85	20	55	147	130	30	0,79
4215.111/0	20	104	24	63	175	230	40	1,01
4215.11/0	20	104	30	63	175	230	40	1,01*
IEC								
4215.11/1	20	104	30	63	175	230	40	1,01*
4215.111/1	20	104	24	63	175	230	40	1,01

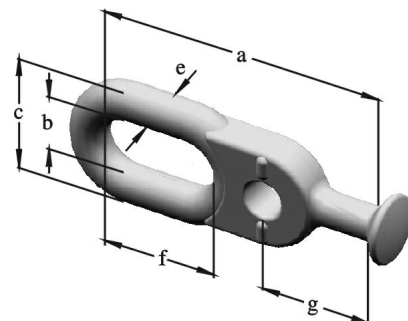
*for U-bolt.

Oval ball eyes straight

for arcing horn attachment

Material: Steel, forged, hot dip galvanised

L.-Nr.	Dimensions in mm							Breaking strength kN	Short circuit current kA	Weight kg
	Pin	a	b	c	e	f	g			
IEC										
4217.50/1	16	131	25	57	16	50	47	130	25	0,64
4217.51/2	20	164	40	68	19	60	56	185	40	1,10

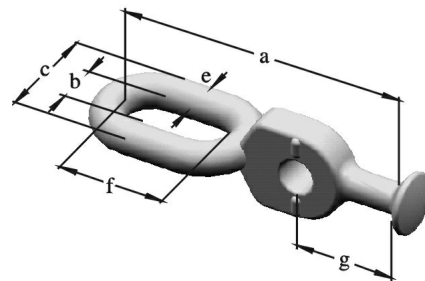


Oval ball eyes twisted

for arcing horn attachment

Material: Steel, forged, hot dip galvanised

L.-Nr.	Dimensions in mm							Breaking strength kN	Short circuit current kA	Weight kg
	Pin	a	b	c	e	f	g			
IEC										
4217.40/1	16	131	25	57	16	50	47	130	25	0,56
4217.41/1	20	160	25	61	18	60	57	230	35	0,95

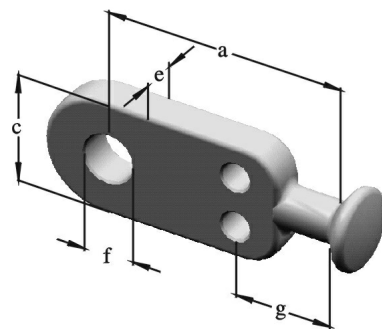


Ball eyes straight

for arcing horn attachment

Material: Steel, forged, hot dip galvanised

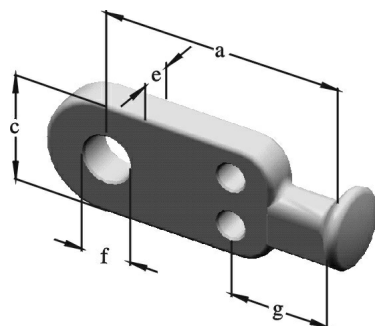
L.-Nr.	Dimensions in mm						Breaking strength kN	Short circuit current kA	Weight kg
	Pin	a	c	e	f	g			
IEC									
135-328-030	16	95	60	18	20	40	130	38	0,75
135-328-144	16	115	65	18	24	45	130	50	1,04
135-328-143	20	115	65	18	24	45	210	50	1,14
135-328-120	24	120	65	18	24	50	300	50	1,25



with 2 holes for bolts M12 at 32 mm centres.

Ball eyes straight

with nozzle, for arcing horn attachment



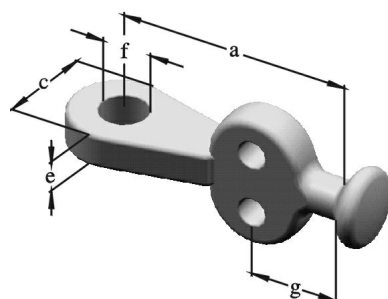
Material: Steel, forged, hot dip galvanised

L.-Nr.	Dimensions in mm						Breaking strength kN	Short circuit current kA	Weight kg
	Pin	a	c	e	f	g			
IEC									
135-328-178	16	110	60	18	20	45	150	40	0,95
135-328-070	16	110	60	18	24	45	150	40	0,95
135-328-060	20	110	60	18	24	45	210	40	1,02

with 2 holes for bolts M12 at 32 mm centres.

Ball eyes twisted

for arcing horn attachment



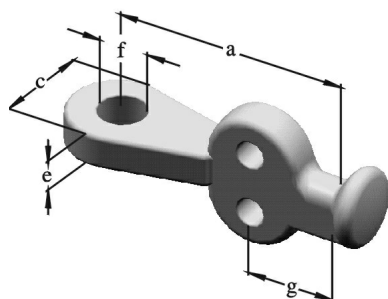
Material: Steel, forged, hot dip galvanised

L.-Nr.	Dimensions in mm						Breaking strength kN	Short circuit current kA	Weight kg
	Pin	a	c	e	f	g			
IEC									
135-356-070	16	125	50	18	20	50	130	30	0,78
135-356-020	16	125	50	18	24	50	130	30	0,78
135-356-082	16	130	65	18	24	50	130	50	1,06
135-356-010	20	120	50	18	24	45	185	30	0,88
135-356-081	20	125	65	18	24	45	210	50	1,28

with 2 holes for bolts M12 at 32 mm centres.

Ball eyes twisted

with nozzle, for arcing horn attachment



Material: Steel, forged, hot dip galvanised

L.-Nr.	Dimensions in mm						Breaking strength kN	Short circuit current kA	Weight kg
	Pin	a	c	e	f	g			
IEC									
135-356-075	16	125	50	18	20	50	150	30	0,80
135-356-074	20	125	60	18	24	45	210	40	1,05

with 2 holes for bolts M12 at 32 mm centres.

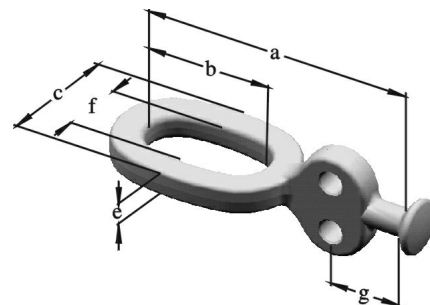
Oval ball eyes twisted

for arcing horn attachment

Material: Steel, forged, hot dip galvanised

L.-Nr.	Dimensions in mm							Breaking strength kN	Short circuit current kA	Weight kg
	Pin	a	b	c	e	f	g			
IEC 135-347-030	16	165	75	75	17	39	45	130	35	0,92

with 2 holes for bolts M12 at 32 mm centres.



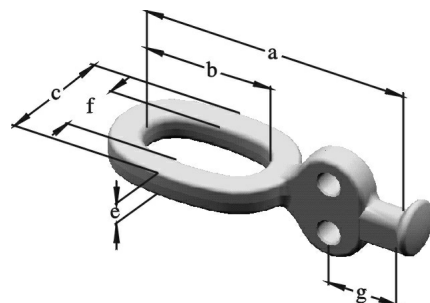
Oval ball eyes twisted

with nozzle, for arcing horn attachment

Material: Steel, forged, hot dip galvanised

L.-Nr.	Dimensions in mm							Breaking strength kN	Short circuit current kA	Weight kg
	Pin	a	b	c	e	f	g			
IEC 135-347-050	16	165	75	75	17	39	45	150	40	1,00
135-347-060	20	190	85	83	20	40	55	210	50	1,66

with 2 holes for bolts M12 at 32 mm centres.



Oval ball eyes straight

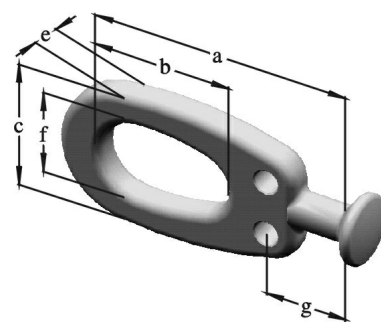
for arcing horn attachment

Material: Steel, forged, hot dip galvanised

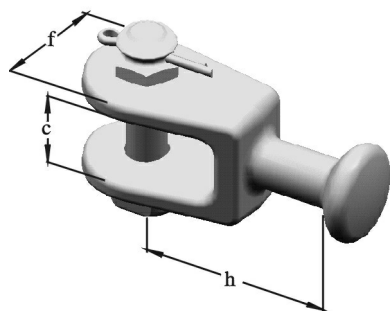
L.-Nr.	Dimensions in mm							Breaking strength kN	Short circuit current kA	Weight kg
	Pin	a	b	c	e	f	g			
IEC 135-327-040	16	130	75	78	17	42	40	130	40	0,78
135-327-050	20	140	75	82	18	42	45	185	50	1,16
IEC 135-327-020	16	130	75	78	17	42	40	150	40	0,80*
135-327-010	20	140	75	82	18	42	45	210	50	1,20*

with 2 holes for bolts M12 at 32 mm centres.

*with nozzle.



Ball clevises

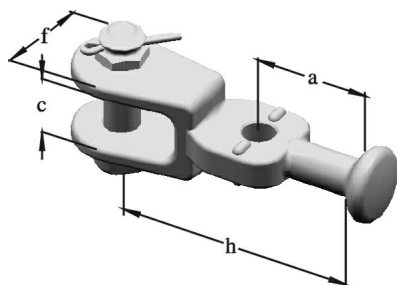


Material: Steel, forged, hot dip galvanised

L.-Nr.	Dimensions in mm					Breaking strength kN	Short circuit current kA	Weight kg
	Pin	Bolt	c	f	h			
IEC								
4217.20/1	16	S 16	20	38	65	130	14	0,60
4217.22/1	16	N 16	20	38	65	130	14	0,60
4217.23/1	16	S 19	20	38	65	130	14	0,60
4217.27/1	20	S 19	24	50	85	230	22	0,91

Ball clevises

for arcing horn attachment

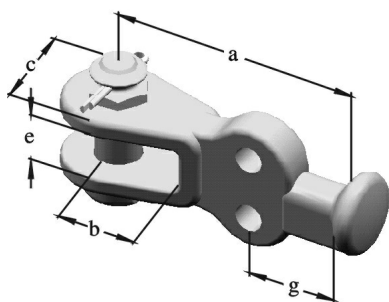


Material: Steel, forged, hot dip galvanised

L.-Nr.	Dimensions in mm						Breaking strength kN	Short circuit current kA	Weight kg
	Pin	Bolt	a	c	f	h			
IEC									
4217.31/1	16	S 19	45	24	40	110	120	22	0,78
4217.29/1	20	S 19	56	20	50	135	230	30	1,20

Ball clevises twisted

with nozzle, for arcing horn attachment



Material: Steel, forged, hot dip galvanised

L.-Nr.	Dimensions in mm							Breaking strength kN	Short circuit current kA	Weight kg
	Pin	Bolt	a	b	c	e	g			
IEC										
135-357-101	16	S19	125	40	50	22	50	150	50	1,08
135-357-096	16	S22	125	40	50	22	50	150	50	1,28
135-357-080	20	S22	120	40	50	22	45	210	40	1,25

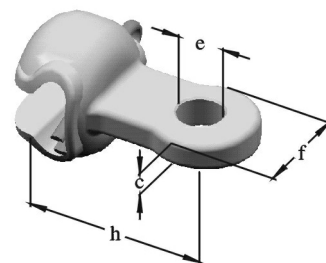
with 2 holes for bolts M12 at 32 mm centres.

Socket eyes

Material: Steel, forged, hot dip galvanised

L.-Nr.	Dimensions in mm					Breaking strength kN	Short circuit current kA	Security split pin	Weight kg
	Pin	c	e	f	h				
ÖNORM									
4220.01/1	11	13	14,5	40	55	60	6,5	VN 11	0,35*
4220.02/0	16	19	20,0	45	71	130	14	VN 16	0,67
IEC									
4220.01/1	11	13	14,5	40	55	60	6,5	VN 11	0,35*
4220.02/1	16	19	20,0	45	71	130	14	VN 16	0,67
4220.021/1	16	19	17,5	45	71	130	14	VN 16	0,68
4220.023/1	16	19	24,0	45	71	130	14	VN 16	0,68
4220.06/1	16	19	17,5	50	71	100	14	VN 16	0,72*
4220.08/1	16	19	20,0	50	71	100	14	VN 16	0,70*
4220.11/1	20	19	20,0	55	85	230	22	VN 20	1,07

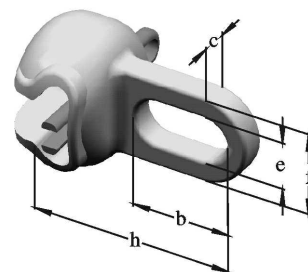
* Malleable or ductile iron.



Oval socket eyes

Material: Malleable or ductile iron, hot dip galvanised

L.-Nr.	Dimensions in mm						Breaking strength kN	Short circuit current kA	Security split pin	Weight kg
	Pin	a	c	e	f	h				
IEC										
4220.03/1	11	45	14	20	48	70	60	6,5	VN 11	0,40
4220.04/1	16	41	12	20	50	75	60	14	VN 16	0,52

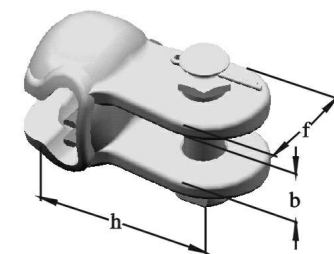


Socket clevises

Material: Malleable or ductile iron, hot dip galvanised

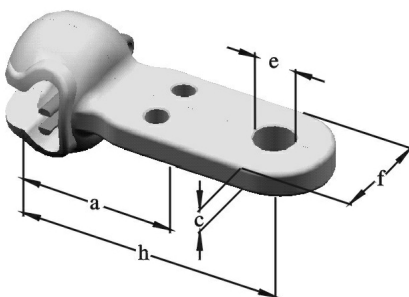
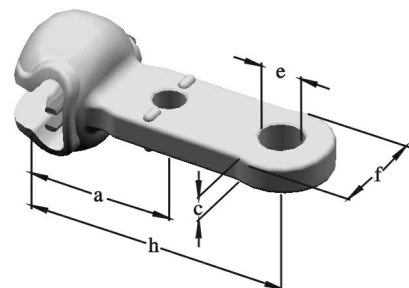
L.-Nr.	Dimensions in mm					Breaking strength kN	Short circuit current kA	Security split pin	Weight kg
	Pin	Bolt	b	f	h				
IEC									
4225.13/2	16	S 19	20	50	60	120	14	VN 16	0,96
4225.13/1	16	S 16	20	50	60	100	14	VN 16	0,92
4225.140/1	20	S 19	20	60	80	210	22	VN 20	1,72
4225.140/2	20	S 19	20	56	80	210	22	VN 20	1,35*
4225.40	24	S 22	20	70	100	300	32	VN 24	2,80

*Steel, forged, hot dip galvanized.



Socket tongues straight

for arcing horn attachment



Material: Steel, forged, hot dip galvanised

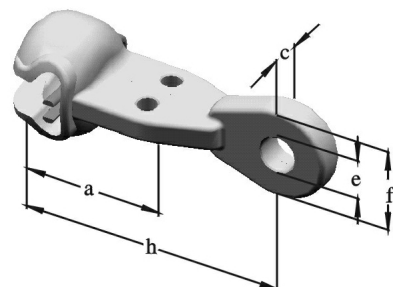
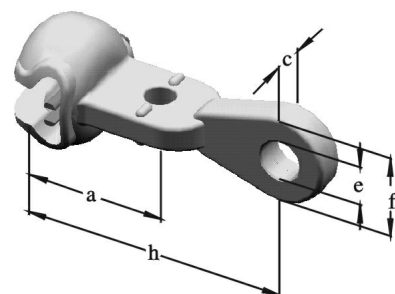
L-Nr.	Dimensions in mm						Breaking strength kN	Short circuit current kA	Security split pin	Weight kg
	Pin	a	c	e	f	h				
ÖNORM 4220.20/0	16	55	19	20	50	106	130	30	VN 16	0,87
IEC 4220.18/1	11	42	13	14	35	78	55	16	W 11	0,40
4220.20/1	16	57	19	20	56	120	130	40	VN 16	0,87
4220.201/1	16	57	19	24	56	120	130	40	VN 16	0,87
4220.206/1	16	55	19	20	50	106	120	30	VN 16	0,83*
4220.50/1	16	111	19	20	50	162	130	30	VN 16	1,22
4220.21/1	20	69	19	24	62	135	230	50	VN 20	1,43
4220.211/1	20	69	19	20	62	135	230	40	VN 20	1,45
4220.23/1	24	88	22	27	70	161	320	50	VN 24	2,97
4220.24/1	24	88	22	24	70	161	320	50	VN 24	2,97

* Malleable or ductile iron.

Socket eyes 24 mm with two holes for bolts M14 at 32 mm centres.

Socket eyes twisted

for arcing horn attachment



Material: Steel, forged, hot dip galvanised

L-Nr.	Dimensions in mm						Breaking strength kN	Short circuit current kA	Security split pin	Weight kg
	Pin	a	c	e	f	h				
ÖNORM 4220.30/0	16	57	19	20	55	128	130	30	VN 16	1,02
IEC 4220.30/1	16	57	19	24	55	128	130	40	VN 16	1,02
4220.301/1	16	57	19	20	55	128	130	40	VN 16	1,02
4220.301/2	16	57	19	20	50	128	120	30	VN 16	1,06*
4220.40/1	16	111	19	20	55	182	130	40	VN 16	1,37
4220.311/1	20	69	19	20	62	145	230	40	VN 20	1,42
4220.31/1	20	69	19	24	62	145	230	50	VN 20	1,42
4220.32/1	24	88	22	30	70	188	320	50	VN 24	3,17
4220.33/1	24	88	22	27	70	188	320	50	VN 24	3,17
4220.34/1	24	88	22	24	70	188	320	50	VN 24	3,17

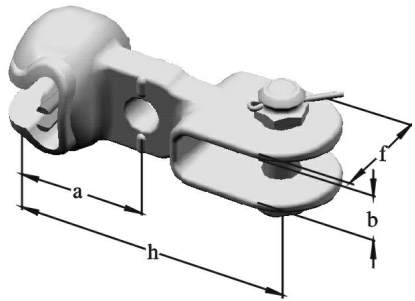
* Malleable or ductile iron.

Socket eyes 24 mm with two holes for bolts M14 at 32 mm centres.

Socket clevis

for arcing horn attachment

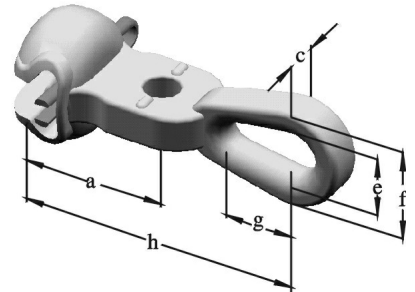
Material: Malleable or ductile iron, hot dip galvanised										
L.-Nr.	Pin	Bolt	Dimensions in mm				Breaking strength kN	Short circuit current kA	Security split pin	Weight kg
			a	b	f	h				
IEC 4225.15/1	20	S 19	60	20	60	135	160	40	VN 20	1,93



Oval socket eye twisted

for arcing horn attachment

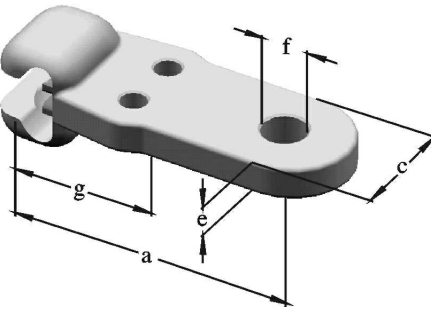
Material: Malleable or ductile iron, hot dip galvanised											
L.-Nr.	Dimensions in mm							Breaking strength kN	Short circuit current kA	Security split pin	Weight kg
	Pin	a	c	e	f	g	h				
IEC 4220.303/1	16	57	19	21	50	45	128	120	35	VN 16	1,10



Socket tongues straight

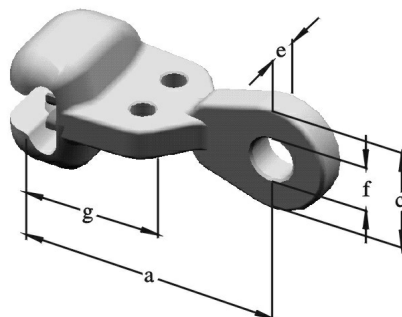
for arcing horn attachment

Material: Malleable or ductile iron, hot dip galvanised										
L.-Nr.	Pin	Dimensions in mm					Breaking strength kN	Short circuit current kA	Security split pin	Weight kg
		a	c	e	f	g				
IEC 135-335-063	16	130	64	18	24	55	160	50	EA 16	1,48
135-335-064	20	140	65	18	24	65	210	50	EA 20	2,25



with 2 holes for bolts M12 at 32 mm centres.

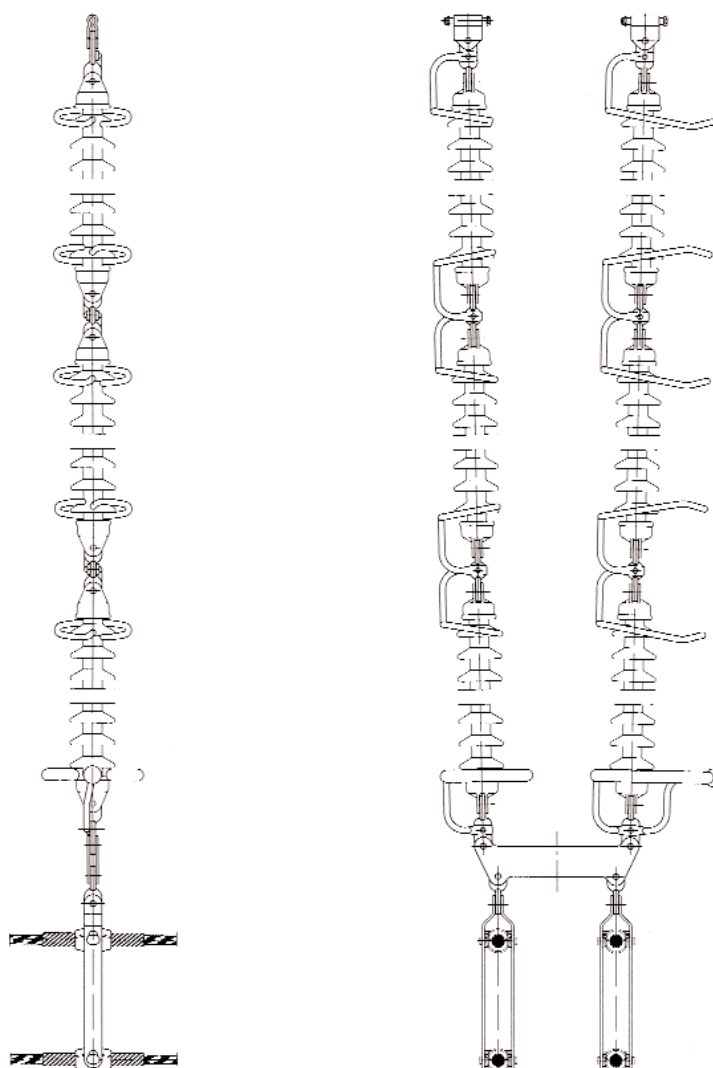
Socket tongues twisted for arcing horn attachment



Material: Malleable or ductile iron, hot dip galvanised

L.-Nr.	Dimensions in mm						Breaking strength kN	Short circuit current A	Security split pin	Weight kg
	Pin	a	c	e	f	g				
IEC										
135-333-001	16	120	50	18	20	60	140	36	EA 16	1,30
135-333-076	16	130	64	18	24	55	160	50	EA 16	1,50
135-333-070	16	276	50	18	20	76	140	36	EA 16	1,94
135-333-071	20	140	65	18	24	65	210	50	EA 20	2,10

with 2 holes for bolts M12 at 32 mm centres.



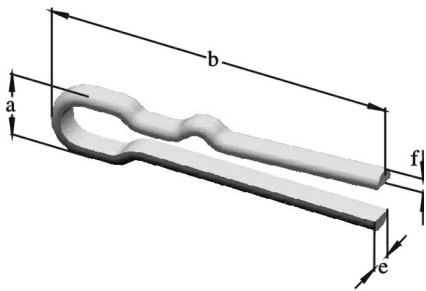
Example of an insulator string.

Security split pins acc. IEC 372 DIN 48063 **ÖNORM E 4130** **ÖNORM E 4131**

All socket fittings have security split pins. A special tool for connection is not required. The security split pin can be moved fore- and backwards by hand, to ensure a secured connection.

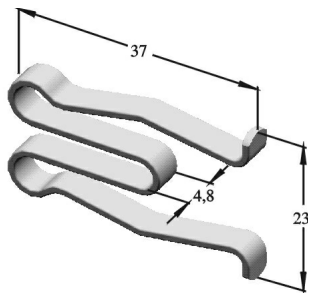
IEC-V-security split pins

Material: Stainless steel							
L.-Nr.	Type	Dimensions in mm					Weight kg
		Pin	a	b	e	f	
1049.01	VN	11	11,9	55	4,8	2,2	0,010
1049.02	VN	16	14,5	65	5,5	3,2	0,018
1049.03	VN	20	16,4	80	7,0	3,2	0,028
1049.04	VN	24	20,0	100	8,7	4,0	0,048
1049.05	VN	28	22,5	115	10,0	4,5	0,080
1049.06	VN	32	26,0	130	11,5	5,2	0,123



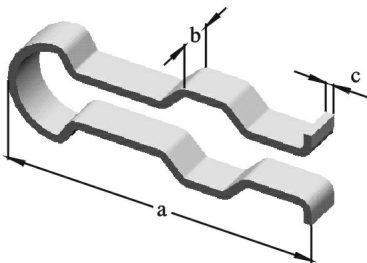
IEC-W-clip

Material: Phosphour bronze	
L.-Nr.	Weight kg
1050.01	0,01

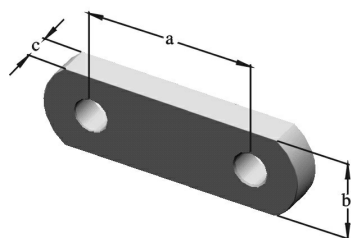


EA-security split pins

Material: Phosphour bronze					
L.-Nr.	Dimensions in mm				Weight kg
	Pin	a	b	c	
1049.9001	11	35	5	1,5	0,004
1049.9002	16	52	8	2,0	0,016
1049.9003	20	67	8	2,0	0,021
1049.9004	24	76	9	2,0	0,025



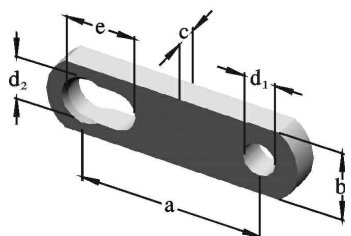
Double eyes straight



Material: Steel, hot dip galvanised

L.-Nr.	for bolt	Dimensions in mm			Breaking strength kN	Short circuit current kA	Weight kg
		a	b	c			
4260.01	13	50	40	13	60	10	0,27
4260.04/2	16	70	50	19	130	25	0,78
4260.04	19	70	50	19	200	35	0,77
4260.05/7	19	80	60	19	240	40	1,00
4260.04/1	19	100	50	19	200	35	0,98
4260.13	22	70	60	19	300	45	0,99
4260.05/1	22	100	60	19	300	45	1,25
4260.18/21	22	100	70	19	320	50	1,50
4260.15	22	150	60	19	300	45	1,69
4260.21/3	32	250	90	24	620	50	6,10

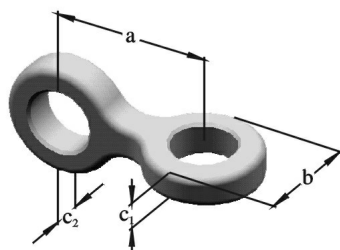
Oval double eyes straight



Material: Steel, hot dip galvanised

L.-Nr.	for bolt	Dimensions in mm						Breaking strength kN	Short circuit current kA	Weight kg
		a	b	c	d1	d2	e			
4260.51	19	83	50	19	20	22	45	150	30	0,52
4260.52	22	125	50	19	24	28	50	240	30	0,97
4260.53	32	215	80	25	34	38	80	523	50	3,65

Double eyes twisted



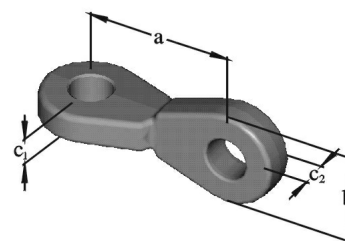
Material: Steel, hot dip galvanised

L.-Nr.	for bolt	Dimensions in mm				Breaking strength kN	Short circuit current kA	Weight kg
		a	b	c1	c2			
4261.01	19	50	40	13	13	80	10	0,15
4261.07	19	70	40	19	19	130	20	0,36
4261.09	19	100	40	19	19	130	20	0,42

Double eyes twisted

Material: Steel, hot dip galvanised

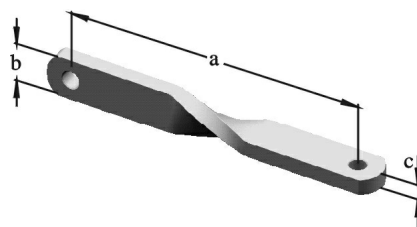
L.-Nr.	for bolt	Dimensions in mm				Breaking strength kN	Short circuit current kA	Weight kg
		a	b	c1	c2			
4261.08/10	19	70	50	19	19	200	30	0,52
4261.08	19	80	55	19	19	200	40	0,60
4261.08/2	22	80	55	19	19	200	40	0,60
4261.10	19	90	60	19	19	240	40	0,85
4261.11	22	90	60	19	19	240	40	0,85
4261.12	22	100	65	19	19	320	50	0,97
4261.12/1	25	100	65	19	19	340	50	0,95
4261.17	28	100	70	22	22	380	50	1,55



Double eyes twisted

Material: Steel, hot dip galvanised

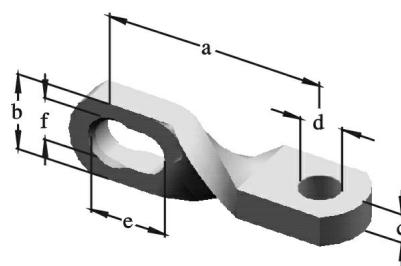
L.-Nr.	for bolt	Dimensions in mm			Breaking strength kN	Short circuit current kA	Weight kg
		a	b	c			
4261.60	19	800	40	19	120	20	4,71
4261.65	19	460	50	19	200	35	3,55
4261.65/2	19	120	50	19	200	35	1,10
4261.71	22	350	60	19	320	45	3,50
4261.71/1	22	220	60	19	320	45	2,45
4261.41/2	25	220	70	19	360	50	2,65
4261.41	28	210	70	20	500	50	2,92
4261.67/1	32	250	90	24	600	50	5,50



Oval double eyes twisted

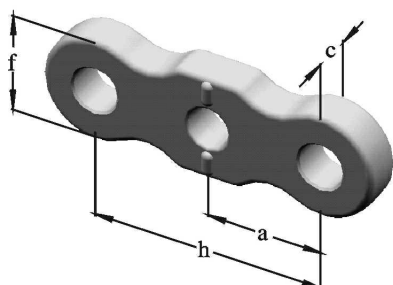
Material: Steel, hot dip galvanised

L.-Nr.	for bolt	Dimensions in mm						Breaking strength kN	Short circuit current kA	Weight kg
		a	b	c	d	e	f			
4261.44	13	90	40	13	14	35	18	60	18	0,50
4261.45	22	125	50	19	24	50	28	240	30	0,97
4261.64	32	215	80	25	34	80	38	523	50	3,70



String hardware

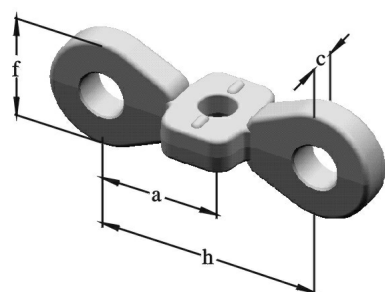
Double eyes straight for arcing horn attachment



Material: Steel, forged, hot dip galvanised

L.-Nr.	Dimensions in mm					Breaking strength kN	Short circuit current kA	Weight kg
	for bolt	a	c	f	h			
4261.50	19	53	19	50	106	240	40	0,82
4261.51/0	22	60	19	60	120	300	45	1,10
4261.51/10	19	60	19	55	120	240	40	1,00
4261.52	22	66	19	65	132	280	50	1,30

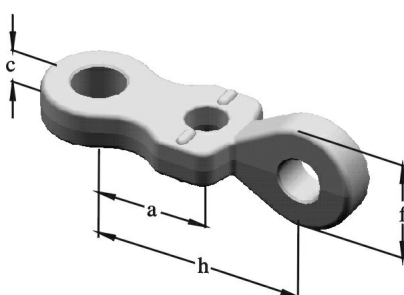
Double eyes straight for arcing horn attachment, connection twisted



Material: Steel, forged, hot dip galvanised

L.-Nr.	Dimensions in mm					Breaking strength kN	Short circuit current kA	Weight kg
	for bolt	a	c	f	h			
4261.40/1	19	53	19	50	106	200	30	0,75
4261.40/2	22	60	19	60	120	300	40	1,13
4261.40/3	19	60	19	55	120	240	40	0,94
4261.40/4	22	66	19	65	132	280	50	1,20

Double eyes twisted for arcing horn attachment

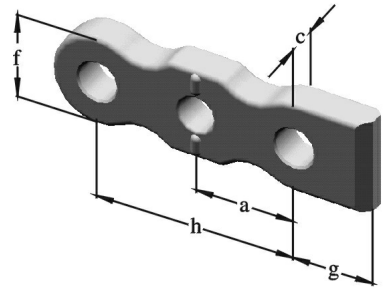


Material: Steel, forged, hot dip galvanised

L.-Nr.	Dimensions in mm					Breaking strength kN	Short circuit current kA	Weight kg
	for bolt	a	c	f	h			
4261.30	19	53	19	50	106	200	30	0,80
4261.31/10	19	60	19	55	120	240	40	1,00
4261.31/10/L	19	125	19	55	185	240	40	1,40
4261.31/0	22	60	19	60	120	300	40	1,10
4261.34/1	22	66	19	65	132	280	50	1,25

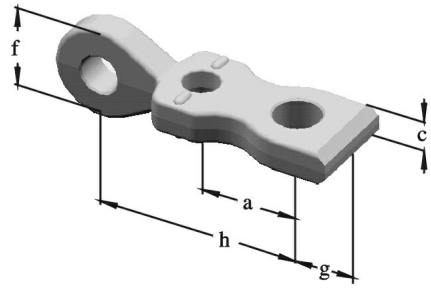
Double eye straight
for arcing horn attachment

Material: Steel, forged, hot dip galvanised									
L.-Nr.	for bolt	Dimensions in mm					Breaking strength kN	Short circuit current kA	Weight kg
		a	c	f	g	h			
4261.51/10/V	19	60	19	55	36	120	240	40	1,10



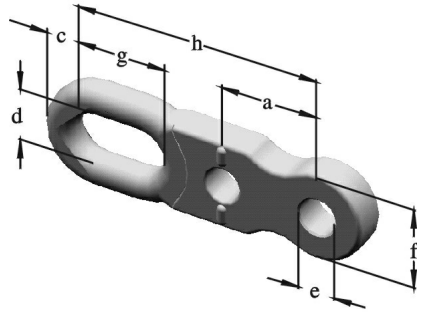
Double eye twisted
for arcing horn attachment

Material: Steel, forged, hot dip galvanised									
L.-Nr.	for bolt	Dimensions in mm					Breaking strength kN	Short circuit current kA	Weight kg
		a	c	f	g	h			
4261.31/10/V	19	60	19	55	36	120	240	40	1,10



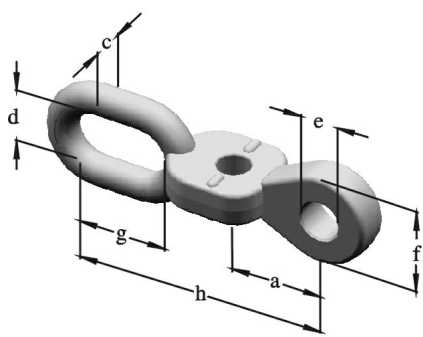
Oval double eye straight
for arcing horn attachment

Material: Steel, forged, hot dip galvanised										
L.-Nr.	Dimensions in mm							Breaking strength kN	Short circuit current kA	Weight kg
	a	c	d	e	f	g	h			
4261 57/1	53	16	25	20	50	50	140	130	25	0,91

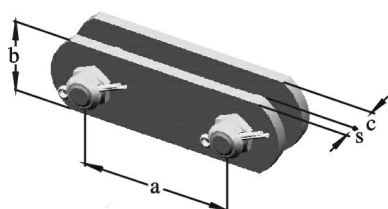


Oval double eye straight
for arcing horn attachment, connection twisted

Material: Steel, forged, hot dip galvanised										
L.-Nr.	Dimensions in mm							Breaking strength kN	Short circuit current kA	Weight kg
	a	c	d	e	f	g	h			
4261 56/1	53	16	25	20	50	50	140	130	25	0,85



Parallel links

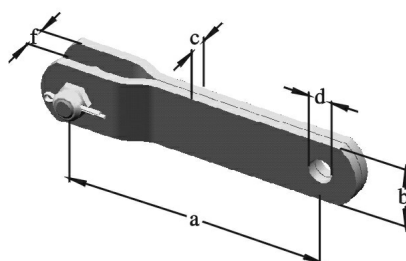


Material: Steel, hot dip galvanised

L.-Nr.	Dimensions in mm				Breaking strength kN	Short circuit current kA	Weight kg
	Bolt	a	c	b x s			
4263.10/1	S 19	90	20	40 x 6	75	15	0,82
4263.11/1	S 19	70	20	40 x 8	100	20	0,82
4263.12	S 19	70	20	50 x 8	200	32	1,02
4263.12/1	S 19	90	20	50 x 8	200	32	1,16
4263.32	S 22	100	20	60 x 8	230	40	1,61
4263.17/1	S 22	80	20	60 x 10	320	50	1,65

Other lengths on request.

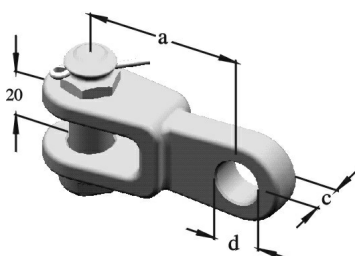
Cranked links straight



Material: Steel, hot dip galvanised

L.-Nr.	Bolt	Dimensions in mm					Breaking strength kN	Short circuit current kA	Weight kg
		a	b	d	c	f			
4265.01	S 19	75	40	20	12	20	75	15	0,52
4265.01/1	S 19	100	40	20	12	20	75	15	0,62
4265.01/2	S 19	125	40	20	12	20	75	15	0,72
4265.01/3	S 19	150	40	20	12	20	75	15	0,90
4265.02/1	S 19	100	40	20	16	20	100	20	0,92
4265.02/2	S 19	125	40	20	16	20	100	20	1,04
4265.02/3	S 19	150	40	20	16	20	100	20	1,20
4265.03	S 19	75	50	20	16	20	200	32	0,90
4265.03/1	S 19	100	50	20	16	20	200	32	1,10
4265.03/2	S 19	125	50	20	16	20	200	32	1,22
4265.03/3	S 19	150	50	20	16	20	200	32	1,40
4265.04/1	S 22	100	60	24	16	20	280	40	1,49
4265.04/2	S 22	125	60	24	16	20	280	40	1,68
4265.04/3	S 22	150	60	24	16	20	280	40	1,87
4265.04/4	S 22	250	60	24	16	20	280	40	2,55
4265.04/6	S 22	500	60	24	16	20	280	40	4,40
4265.08/2	S 22	125	60	24	20	20	320	50	2,10
4265.08/4	S 22	250	60	24	20	20	320	50	3,30
4265.08	S 22	500	60	24	20	20	320	50	5,60

Welded types are available on request.



Clevis tongues twisted

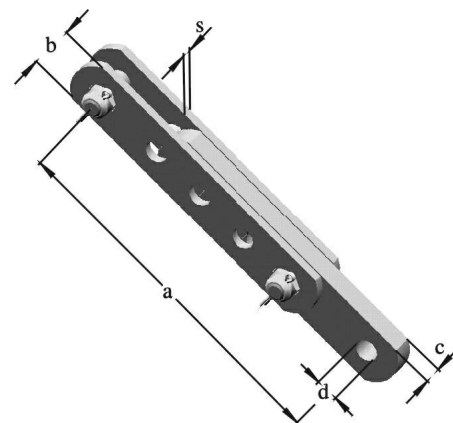
Material: Steel, forged, hot dip galvanised

L.-Nr.	Bolt	Dimensions in mm			Breaking strength kN	Short circuit current kA	Weight kg
		a	c	d			
4265.73	S 19	90	19	20	240	30	1,00
4265.76/6	S 19	100	19	20	240	40	1,20
4265.76/1	S 22	100	19	24	300	40	1,38

Adjustable extension links straight

Material: Steel, hot dip galvanised								
L.-Nr.	Dimensions in mm					Breaking strength kN	Short circuit current kA	Weight kg
	Bolt	b x s	a	c	d			
4266.10	S 19	40 x 6	235-340	19	24	75	15	1,95
4266.12	S 19	40 x 6	270-410	19	24	75	15	2,25
4266.20	S 19	40 x 8	265-405	19	24	100	20	2,50
4266.30	S 19	50 x 8	265-405	19	20	160	32	3,17
4266.33	S 19	50 x 8	350-490	19	20	160	32	3,80
4266.32	S 19	50 x 8	384-576	19	20	160	32	4,50
4266.38	S 19	50 x 8	455-775	19	20	160	32	5,20
4266.53	S 22	60 x 8	309-441	19	24	230	40	4,48
4266.50	S 22	60 x 8	420-564	19	24	230	40	5,91
4266.51/1	S 22	60 x 8	550-770	19	24	230	40	6,71

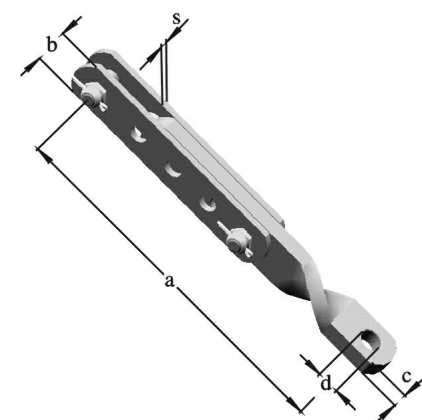
Other lengths on request.



Adjustable extension links twisted

Material: Steel, hot dip galvanised								
L.-Nr.	Dimensions in mm					Breaking strength kN	Short circuit current kA	Weight kg
	Bolt	b x s	d	a	c			
4267.10	S 19	40 x 6	24	310-450	19	75	15	2,57
4267.31	S 19	50 x 8	21	350-500	19	160	32	3,94
4267.313	S 19	50 x 8	24	350-500	19	160	32	3,94
4267.33/2	S 19	50 x 8	20	480-720	19	160	32	5,40
4267.35/1	S 19	50 x 8	20	550-770	19	160	32	5,76
4267.62	S 22	60 x 8	24	410-555	19	230	40	5,32
4267.50/1	S 22	60 x 8	24	550-770	19	230	40	6,80

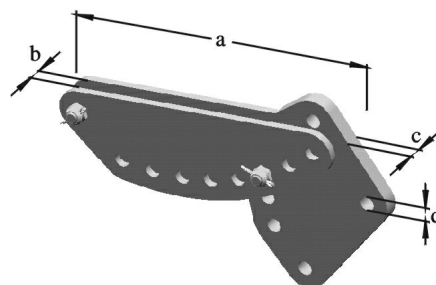
Other lengths on request.



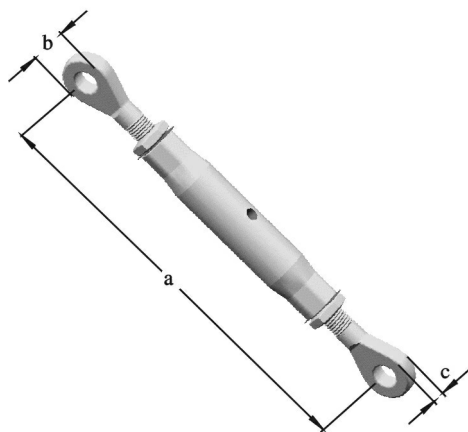
Sag adjusters

Material: Steel, hot dip galvanised								
L.-Nr.	Dimensions in mm					Breaking strength kN	Short circuit current kA	Weight kg
	Bolt	a	b	c	d			
4266.61/5	S 19	209-508	20	19	20	210	40	11,80
4266.61	S 22	209-508	23	20	24	320	50	12,20
4266.61/1	S 28	209-508	23	20	30	380	50	13,60

Other lengths on request.



Turnbuckles eye-eye

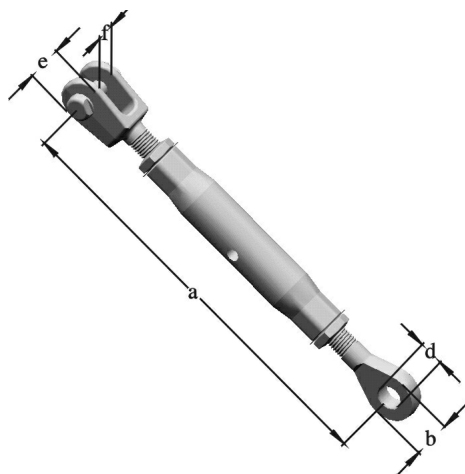


Material: Steel, forged, hot dip galvanised

L.-Nr.	Dia- meter	for bolt	Dimensions in mm			Breaking strength kN	Short cir- cuit cur- rent kA	Weight kg
			a	b	c			
4268.32	M20	19	300-420	50	19	160	18	2,00
4268.31	M20	19	540-790	55	19	160	18	3,30
4268.02/10	M24	19	380-505	55	19	240	25	3,10
4268.02	M24	22	380-505	55	19	240	25	3,10
4268.02/2	M24	19	560-810	55	19	240	25	4,80
4268.03	M27	22	410-545	60	19	280	35	4,50
4268.03/3	M27	22	540-790	60	19	280	35	5,80
4268.50	Tr 30x3	19	460-630	60	19	240	40	5,10
4268.50/1	Tr 30x3	22	460-630	60	19	320	40	5,10
584M30/2	M30	19	350-490	66	19	140	40	1,90*
584M30/1	M30	22	350-490	66	19	140	50	1,90*

* Al-type.

Turnbuckles eye-clevis

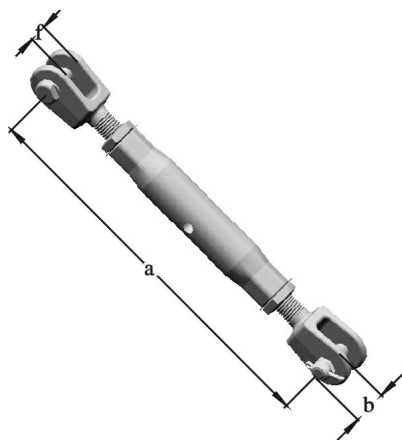


Material: Steel, forged, hot dip galvanised

L.-Nr.	Dia- meter	Bolt	Dimensions in mm					Breaking strength kN	Short cir- cuit cur- rent kA	Weight kg
			a	b	d	e	f			
4268.10	M20	S19	350-470	50	20	50	20	160	18	2,60
4268.14	M20	S19	540-790	55	20	50	20	160	18	3,70
4268.11/10/1	M24	S19	405-530	55	20	50	20	240	25	3,80
4268.11	M24	S22	410-535	55	24	56	20	240	25	4,00
4268.11/2	M24	S19	560-810	55	20	50	20	240	25	5,10
4268.13/2/S	M27	S22	440-575	60	24	56	20	280	35	4,80
4268.12/2	M27	S22	565-815	60	24	56	20	280	35	6,70
4268.52/5	Tr 30x3	S19	470-640	60	20	56	20	240	40	6,60
4268.52	Tr 30x3	S22	470-640	60	24	56	20	320	40	6,70
586M30/2	M30	S19	430-600	66	20	56	24	140	40	2,10*
586M30/1	M30	S22	430-600	66	24	56	24	140	50	2,10*

* Al-type.

Turnbuckles clevis-clevis

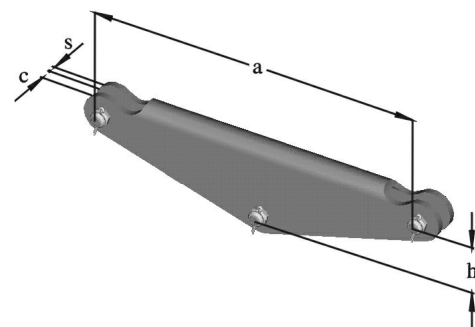


Material: Steel, forged, hot dip galvanised

L.-Nr.	Dia- meter	Bolts	Dimensions in mm			Breaking strength kN	Short cir- cuit cur- rent kA	Weight kg
			a	b	f			
4268.20	M20	S19	400-520	50	20	160	18	3,20
4268.20/2	M20	S19	540-790	50	20	160	18	4,10
4268.21/1	M24	S19	430-555	50	20	240	25	4,40
4268.21/10	M24	S22	440-565	56	20	240	25	4,90
4268.21/2	M24	S19	560-810	50	20	240	25	5,40
4268.22	M27	S22	470-605	56	20	280	35	5,90
4268.22/1	M27	S22	590-840	56	20	280	35	7,40

Yoke plates

Material: Steel, hot dip galvanised								
L.-Nr.	Dimensions in mm					Breaking strength kN	Short circuit current kA	Weight kg
	a	c	h	s	Bolts			
4270.01	280	14	50	4	N13/N13	60	15	1.47
4270.02	280	20	50	4	N19/N19	60	15	1.85
4270.03/1	330	20	47	6	S19/S19	150	30	3.20
4274.05	400	20	42	6	S19/S19	150	30	4.18
4274.05/1	400	20	42	6	S19/S22	150	30	4.24
4274.05/2	400	20	42	6	S22/S22	150	30	4.36
4274.10	400	20	42	8	S19/S19	200	40	5.37
4274.10/1	400	20	42	8	S19/S22	200	40	5.43
4274.10/2	400	20	37	8	S22/S22	250	50	5.55
4270.19/1	400	20	60	10	S19/S22	280	40	7.80
4270.19/3	400	20	60	10	S22/S22	280	50	7.80
4270.27/1	450	20	68	8	S19/S19	210	40	6.28
4270.27	450	20	68	8	S22/S22	210	40	6.42
4270.25/1	450	20	68	10	S19/S22	280	40	7.50
4270.26	450	20	68	10	S22/S22	280	50	9.25
4274.15	500	20	66	6	S19/S19	150	30	5.57
4274.15/2	500	20	66	6	S22/S22	150	30	5.75
4274.20	500	20	66	8	S19/S19	200	40	7.35
4274.20/1	500	20	66	8	S19/S22	200	40	7.37
4274.20/2	500	20	61	8	S22/S22	250	50	7.43
4270.36	500	20	68	10	S22/S22	250	50	9.30
4270.21/3	500	20	75	10	S19/S19	200	40	9.50
4270.30/1	600	20	90	8	S19/S19	200	40	9.70

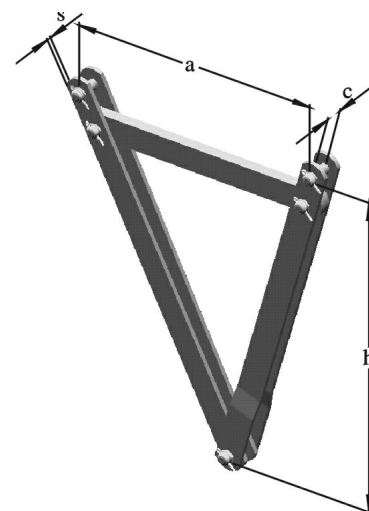


Mounting holes available on request.
Upon request yokes consisting of 2 plates connected by bolts are available.

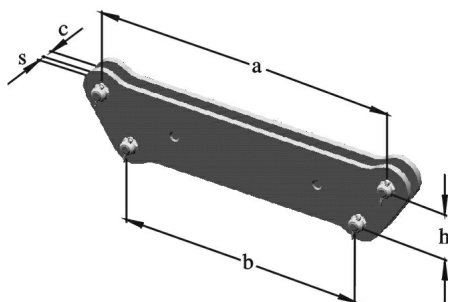
Triangular yokes

Material: Steel, hot dip galvanised								
L.-Nr.	Dimensions in mm					Breaking strength kN	Short circuit current kA	Weight kg
	a	c	h	s	Bolts			
4280.21	400	20	400	8	S19/S19	200	32	9.75
4280.04/1	400	20	500	8	S19/S19	200	32	10.60
4280.03/2	400	20	600	8	S19/S19	200	32	11.50
4280.13/2	500	20	600	8	S19/S19	200	32	13.20

Other types on request.



Trapezoidal yoke plates



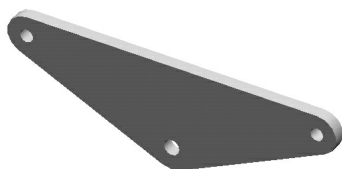
Material: Steel, hot dip galvanised									
L.-Nr.	Dimensions in mm					Bolts	Breaking strength kN	Short circuit current kA	Weight kg
	a	b	c	h	s				
4275.10	400	100	20	60	8	S19/S19	240	40	6,05
4275.18/3	400	200	20	60	8	S19/S19	240	40	6,70
4275.18/1	400	200	20	60	8	S22/S22	240	50	6,96
4275.12/3	500	200	20	60	8	S19/S19	240	40	7,70
4275.12/2	500	200	20	60	8	S22/S22	240	50	8,00
4275.20/2	500	400	20	80	8	S22/S22	240	50	8,90
4275.05/3	500	450	20	70	8	S22/S19	240	40	7,70
4275.05/2	500	450	20	70	10	S22/S22	600	50	9,90
4275.19/4	600	400	20	65	10	S22/S22	350	50	12,50

Mounting holes available on request.

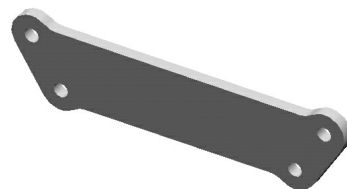
Yoke plates

Yoke plates for all purposes.

L-N°, dimensions, breaking loads, short circuit current will be provided on request.



Triangular plates.



Yoke plates for twin bundle.



Yoke plates for triple bundle.



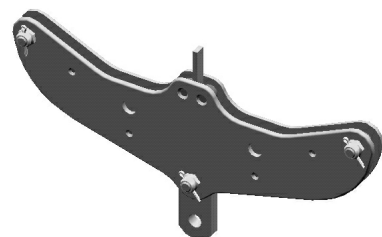
Yoke plates for four bundle.

YOKE PLATES with damping elements

For **multiple insulator strings** it can be necessary to integrate damping elements to reduce the bending strains in ceramic long rod insulators in the event of an insulator breaking.

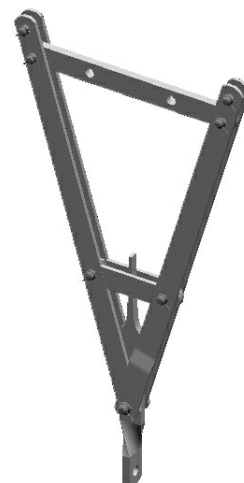
Triangular yoke plates with damping elements

This type is very compacted as the damping element is used as a connection point.



Triangular yoke plates with damping elements

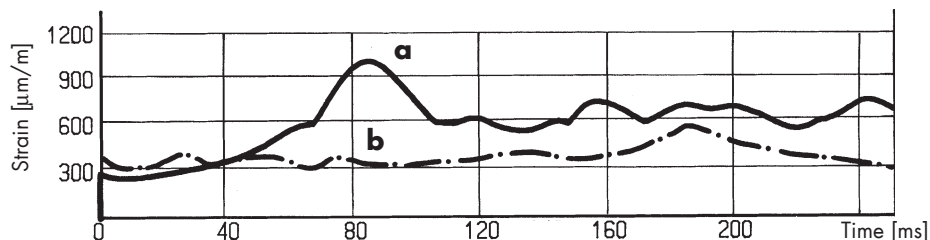
Used for double tension sets for all bundle configurations.



Yoke plates with damping straps

For double tension strings for twin and four bundle.

Compacted yoke plates, where the damping straps are also distance keepers.



Example: bending strain on long rod insulators

a) trapezoidal yoke plates

b) yoke with damping straps

