



# EARTH WIRE FITTINGS



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## General

Ground wires provide **earth protection** for overhead power lines and **protecting from lightning strikes**.

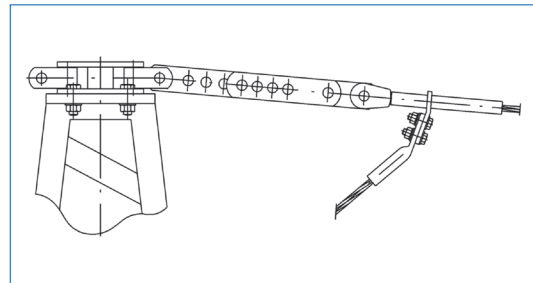
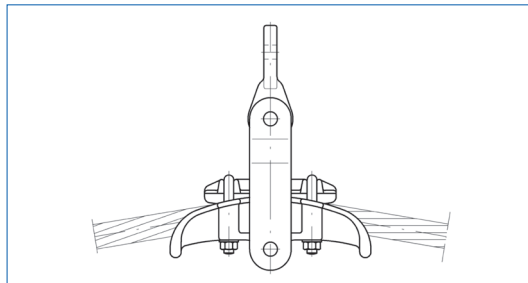


The grounded system releases high energy safely, providing minimum disruption to the power delivery system.

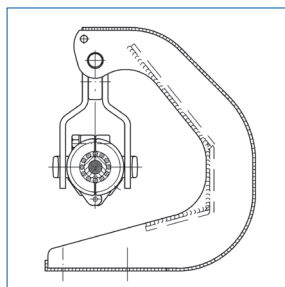
Earth wires should be mounted at the highest positions of support structures to provide highest levels of protection.

Earthwires are mainly steel coated wires, eg ACS. ACSR conductors are also commonly used.

Example for the suspension of an earthwire suspension clamp (left) and example for a tension point (right)

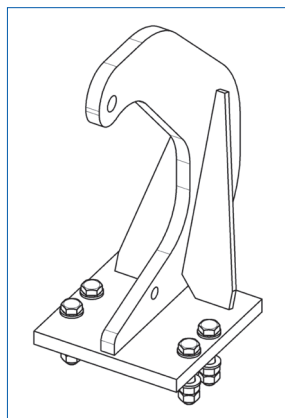
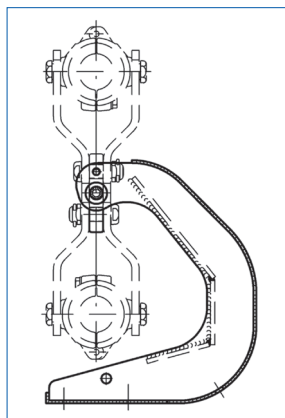


Earthwire C-bracket with suspension clamp



At suspension points, oscillating suspension clamps are mostly used allowing controlled movement, and typically mounted onto C-brackets providing protection from vibration. This system offers significant vibration protection advantages over rigid fastening, by allowing controlled freedom of movement preventing damage.

C-bracket with higher degree of movement (left) and C-bracket with a central plate (right)



### C-brackets

C-bracket supports offered in the table provide special type options, e.g. higher degrees of movement at the hinge connection, providing movement  $>200^\circ$  for the suspension clamp.

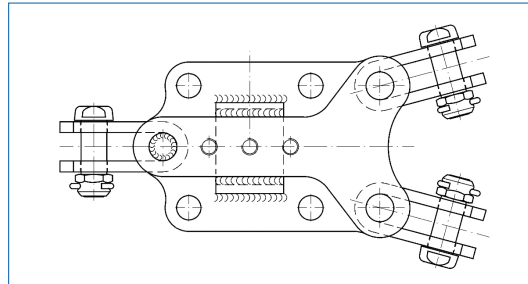
Full vertical orientation of the clamp is also possible.

C-bracket mounting base plates can also be adapted to suit specific tower mounting plates.

A type with a central plate is also available.

### Earthwire suspension and tension brackets

There are many options available, both with and without earth clamps. If only one conductor is to be clamped, the opposite groove can be fitted with a filler piece. Bracket attachments are not supplied with screws as standard. These can be provided separately once attachment details are confirmed. Different clamp bore sizes and spacing are also available, complete with corresponding screw lengths and sizes. Tension brackets can also be adapted to suit specific applications.

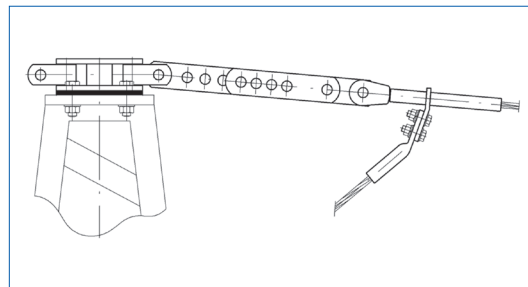


Earthwire bracket

Groundwires tension clamps fittings are commonly wedge, compression or helical types, all described in **part 5** and **part 18**.

To facilitate measurement of the earthing resistance insulating accessories are available for suspension and tension sets, which must then be earthed to the support structure by means of flexible connections.

To ensure low electrical resistance of the earth grounding system, **earth bonding accessories** are used to bond tension and suspension brackets to the tower structure. A range of flexible earth bonds are used and available.



Groundwire bracket with insulating accessories

### Warning spheres

Warning Spheres are installed on groundwires to warn low flying aircraft of the elevated obstacles. These are generally positioned on routes near airports and elevated spans on the uppermost earthwire cable. The warning device consists of two hemispheres attached to the groundwire by two bolted clamps. The Spheres are 600mm diameter; all other details available on request.

The Warning spheres can be delivered in three different Types of UV and Ozone resistant colours - red, orange and white or alternating - white/orange or white/red.



Warning sphere

## Material

- All materials used are fully compatible with the conductor application. For example, clamps attached to aluminium based conductors are manufactured from high strength corrosion resistant aluminium alloys.
- Unless otherwise specified, all ferrous components are hot dipped galvanized acc. to *EN 61284* or *ISO EN 1461*; Overhead lines-requirements and tests for fittings. Where stainless steel fasteners are used, *ISO EN 3506*; Mechanical properties of corrosion resistant stainless steel fasteners - Part 1: Bolts, screws and studs are specified.

- For special cases where big dynamic loads may occur at low temperatures, fittings made of low-temperature (cryogenic) steels are available.
- For lines constructed in higher corrosive atmospheres and environments, the minimum zinc thickness of fittings can be increased from 85  $\mu$  to 110  $\mu$  or 130  $\mu$  Microns.
- All fitting assemblies supplied have **identification marking** according to *EN 61284*; this includes manufactures mark and date code, specified minimum mechanical failure load, and 1 second short circuit current withstand rating.

Eye-clevis connections are designed acc. to *IEC 61471* and *DIN 48074* - Eyes and clevises; connecting dimensions, Bolts acc. to *DIN 48073* - Connecting bolts for overhead power lines. Bolt security split pins are manufactured in stainless steel. Copper tinned types can be also be supplied.

## Note about this part of the catalogue

Fittings for fibre optic cables can be found in **Part 18** of the catalogue.

Suspension clamps, tension clamps, and conductor attachment parallel groove clamps are described in **Parts 4, 5 and 6**.

Other accessories, shackles, links, turnbuckles and materials used can be found in **Part 3**.

Heliformed products according to **Part 4, 5**.

For Vibration control devices, please refer to **Part 10**.



## C-bracket

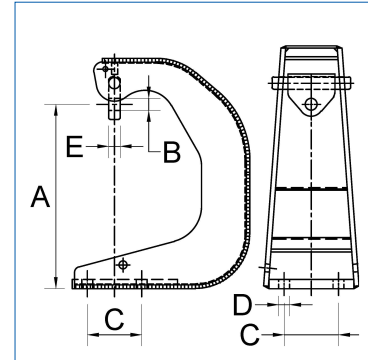
**material: steel, welded, hot dip galvanized**

L.-Nr.	dimensions in mm					max. vertical load kN	max. horizontal load kN	kg
	A	B	C	D	E			
4654.01S	265	20	90	18	20	30	15	13,65
4654.03	310	20	90	18	20	30	15	18,60
4654.04	310	20	90	18	20	40	70	24,00
4654.01	265	20	90	18	20	45	20	12,80

C-brackets for conductor uplift and with other hole centres or equipped with insulating accessories are available upon request.

Fastening screws can be delivered upon request.

Other types are available upon request.

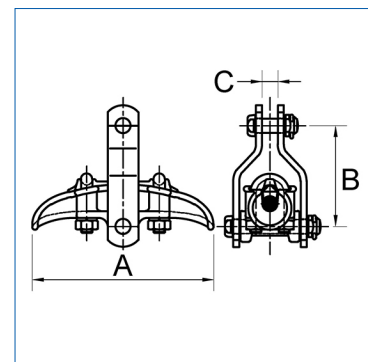


## Suspension clamp with bolt, with straps for steel and copper conductors

**material: malleable or ductile iron, hot dip galvanized; steel, hot dip galvanized**

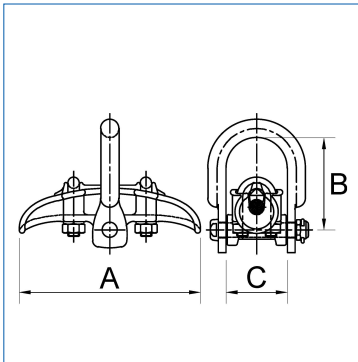
L.-Nr.	dimensions in mm				bolt	kN	kA 1s	kg
	cond.Ø	A	B	C				
4337.02/5	6,0 - 12,7	130	100	20	19	55	15	1,80
4337.00	9,0 - 16,5	210	150	20	19	120	32	3,10

Other dimensions are available upon request.



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## Suspension clamp with bolt, with shackle for steel and copper conductors

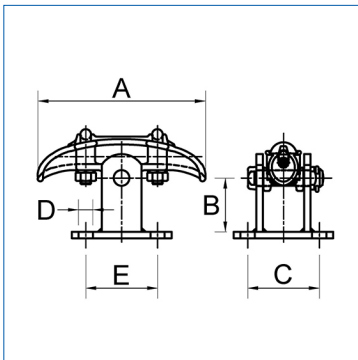


**material: malleable or ductile iron, hot dip galvanized; steel, hot dip galvanized**

L.-Nr.	dimensions in mm				bolt	kN	kA 1s	kg
	cond.Ø	A	B	C				
4337.02/4	6,0 - 12,7	130	100	52	16	120	18	1,50
4337.00/1	9,0 - 16,5	210	100	52	19	80	16	2,51

Other dimensions are available upon request.

## Suspension clamp with bracket, casted for aluminium based conductors



**material: aluminium, casted; steel, hot dip galvanized**

L.-Nr.	dimensions in mm						kN	kA 1s	kg
	cond.Ø	A	B	C	D	E			
4616.04	9,0 - 16,5	210	35	90	18	90	100	22	2,60
4616.05	16,5 - 22,1	230	45	90	18	90	120	30	3,10
4616.07	25,0 - 32,0	250	50	90	18	90	130	32	3,40

Suspension clamps with brackets having other hole centres and with insulating accessories are available upon request.

Fastening screws can be delivered upon request.

Other types are available upon request.



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## Suspension clamp with bracket, forged for aluminium based conductors

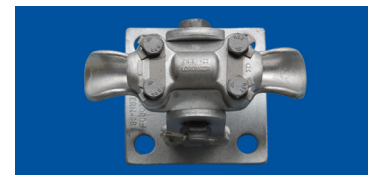
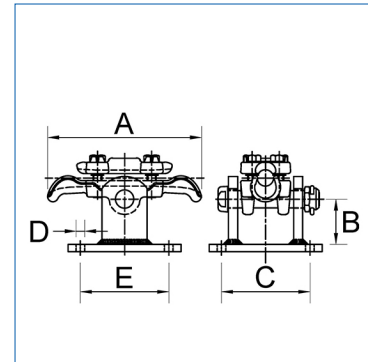
**material: aluminium, forged; steel, hot dip galvanized**

L.-Nr.	dimensions in mm						kN	kA 1s	kg
	cond.Ø	A	B	C	D	E			
4616.10	13,5 - 17,5	170	35	90	18	90	100	32	3,10
4616.12	18,5 - 23,0	190	50	90	18	90	80	32	2,26

Suspension clamps with brackets having other hole centres and with insulating accessories are available upon request.

Fastening screws can be delivered upon request.

Other types are available upon request.



## Suspension clamp with bracket for steel and copper conductors

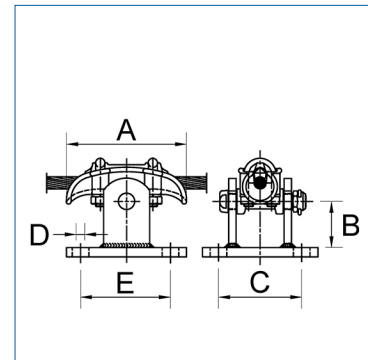
**material: malleable or ductile iron, hot dip galvanized**

L.-Nr.	dimensions in mm						kN	kA 1s	kg
	cond.Ø	A	B	C	D	E			
4615.01	6,0 - 12,7	130	50	90	18	90	100	16	2,64
4615.02	9,0 - 16,5	210	60	90	18	90	50	22	3,37

Suspension clamps with brackets having other hole centres and with insulating accessories are available upon request.

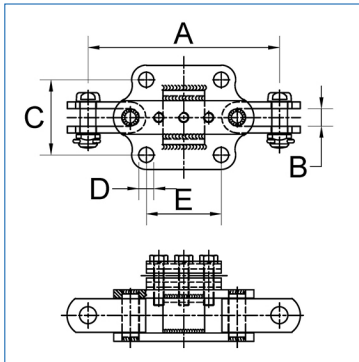
Fastening screws can be delivered upon request.

Other types are available upon request.



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## Earthwire bracket with parallel groove clamp, double for aluminium based conductors



### material: aluminium; steel, hot dip galvanized

L.-Nr.	dimensions in mm						bolt	kN	kA 1s	kg
	cond.Ø	A	B	C	D	E				
4652.02	8,2 - 11,7	230	21	90	18	90	19	100	30	3,89
4652.03	11,8 - 15,8	230	21	90	18	90	19	100	20	3,88
4652.04	15,9 - 19,2	230	21	90	18	90	19	100	20	4,05
4652.06/8	17,3 - 19,2	300	20	90	18	90	19	230	40	7,60
4652.06/1	19,1 - 21,0	300	20	90	18	90	19	230	40	7,80
4652.06/2	21,1 - 23,4	300	20	90	18	90	19	230	40	8,37

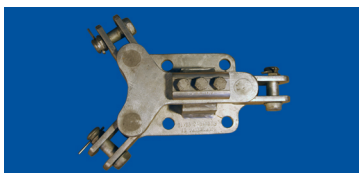
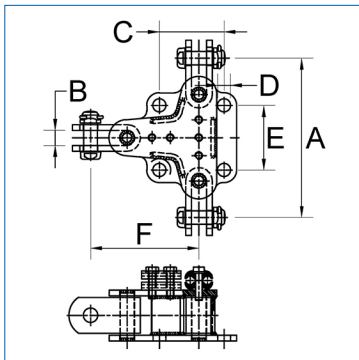
Earth wire brackets without parallel groove clamps or with parallel groove clamps that are made of other materials and have other hole centres can be delivered upon request.

Fastening screws can be delivered upon request.

Filling pieces for the clamp groove can be delivered, if necessary.

Other types are available upon request.

## Earthwire bracket with parallel groove clamp, triple for aluminium based conductors



### material: aluminium; steel, hot dip galvanized

L.-Nr.	dimensions in mm							bolt	kN	kA 1s	kg
	cond.Ø	A	B	C	D	E	F				
4653.10/1	8,20 - 11,70	222	21	90	18	90	151	19	160	32	5,67
4653.13	11,80 - 15,80	222	21	90	18	90	151	19	160	32	7,60
4653.09/1	15,80 - 19,20	214	21	90	18	90	148	19	160	32	5,85

Earth wire brackets without parallel groove clamps or with parallel groove clamps that are made of other materials and have other hole centres can be delivered upon request.

Fastening screws can be delivered upon request.

Filling pieces for the clamp groove can be delivered, if necessary.

Models with only one parallel groove clamp are available upon request.

Other types are available upon request.





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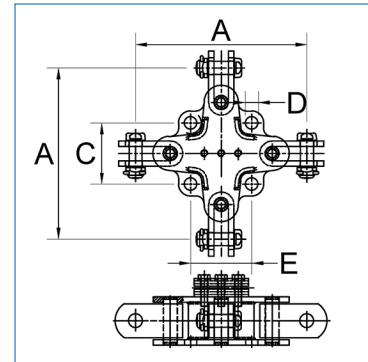


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## Earthwire bracket with parallel groove clamp, quad for aluminium based conductors

**material: aluminium; steel, hot dip galvanized**

L.-Nr.	dimensions in mm						bolt	kN	kA 1s	kg
	cond.Ø	A	B	C	D	E				
4653.40/2	8,20 - 11,70	252	21	90	18	90	19	160	32	6,60
4653.40	11,80 - 13,00	252	21	90	18	90	19	160	32	6,62
4653.0001	15,90 - 19,20	252	21	90	18	90	19	160	32	5,80
4653.40/1	19,30 - 24,60	252	21	90	18	90	19	160	32	7,00



Earth wire brackets without parallel groove clamps or with parallel groove clamps that are made of other materials and have other hole centres can be delivered upon request.

Fastening screws can be delivered upon request.

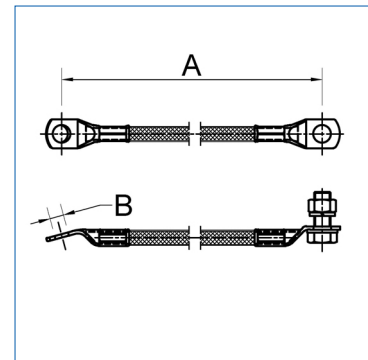
Filling pieces for the clamp groove can be delivered, if necessary.

Other types are available upon request.

## Shunt copper, insulated

**material: high flexible copper wire, insulated; copper, tinned; steel, hot dip galvanized**

L.-Nr.	dimensions in mm		cross section sq mm	screw	kA 1s	kg
	A	B				
4664.01/3A	500	17	70	M12 X 30	14	0,60
4664.01/5A	1000	17	70	M12 X 30	14	1,00
4664.01/6A	1500	17	70	M12 X 30	14	1,30
4664.31/1A	500	17	95	M12 X 35	19	0,72

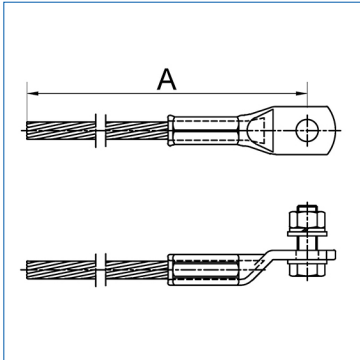


Other lengths and connections are available upon request.



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## Shunt aluminium



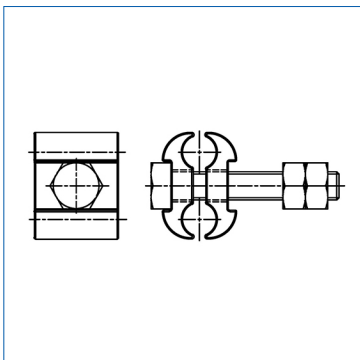
### material: aluminium; steel, hot dip galvanized

L.-Nr.	dimension in mm	cross section sq mm	screw	kA 1s	kg
	A				
4664.35	500	70	M12 X 35	8	0,20
4664.35/1	1000	70	M12 X 35	8	0,30
4664.36	1000	95	M12 X 35	11	0,39
4664.0004	1000	95	M12 X 35	11	0,44
4664.36/1	1500	95	M12 X 35	11	0,60
4664.45	1000	120	M12 X 35	14	0,45
4664.45/10	1500	120	M12 X 35	14	0,70

Other lengths and connections are available upon request.

## Earthing clamp

aluminium



### material: aluminium; steel, hot dip galvanized

L.-Nr.	cond.Ø mm	screw	kA 1s	kg
4680.58/1	8,1 - 11,7	M10 X 60	16	0,10
4680.60/1	11,8 - 15,8	M10 X 70	20	0,14
4680.59	15,9 - 19,2	M12 X 70	28	0,20
4680.61	19,3 - 24,6	M12 X 80	40	0,30

Earthing clamps made of copper are available upon request.

Other types are available upon request.



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## Earthing clamp

steel

**material: steel, hot dip galvanized**

L.-Nr.	cond.Ø mm	screw	kA 1s	kg
4680.32	6,0 - 13,0	M10 X 60	8	0,29
4680.30/1	8,0 - 12,0	M12 X 50	8	0,33
4680.33/3	11,7 - 15,7	M12 X 70	12	0,38

Other dimensions are available upon request.

