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Tension clamps and joints

GENERAL

Tension clamps are used to tension conductors and earthwires and must therefore satisfy the most stringent requirements.
There are two basic systems of tension clamps, viz:
1. **Detachable clamps,** such as wede-type tension clamps, thimbles, bolted type tension clamps, which allow for subsequent adjustment, and
2. **Non-detachable clamps,** such as compression dead-end clamps which require absolute matching to the conductor length.

Obviously our design therefore fulfills the following:

Holding forces

- The clamps must take up the maximum conductor strain, i.e. they must take up the **holding forces** stipulated in the regulations, which as a rule lie between 85% and 95% of the ultimate conductor strength.
  These requirements do not apply to clamps which are used in switching substrations.
  The components which transmit the compressive force must be designed so that no unacceptable squeezing of the conductor may take place.

Vibrations

- **Vibrations** of the conductors are dangerous, especially at the conductor entrances of the clamps. Safety requirements can be met by a lightweight construction of the clamp and a trumpet shape of the terminations, resp. a gradual increase of conductor compression.

Corona

- Good **corona** and radio interference voltage (RIV) behaviour due to rounded shapes.

Short circuit capability

- The short circuit capability is excellent due to a narrow ranged groove which leads to a big contact area.
  The connecting parts of the clamps are adjusted to the requirements.

Corrosion resistance

- Maximum **corrosion resistance** is achieved by using a clamp material that matches with that of the conductor, for example a corrosion-resistant AlMgSi alloy for conductors made of aluminium, aldrey, etc.

Electrical losses

- **Electrical power losses** (eddy current losses) are kept to a minimum by an adequate design.

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 .

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

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Wedge type tension clamps

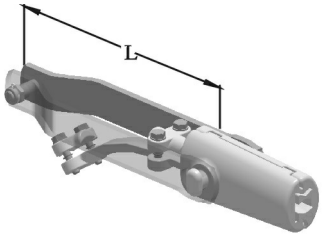
trunnion type,
for aluminium-, al-alloy-, ACSR-, AACSR- and alumoweld conductors

Wedge type tension clamps have a universal usage in all areas of overhead line construction. They are also used in substations.
For conductors with a diameter greater than 15,9 mm clamps with jumper attachments can be provided.
The two halves of the body are kept together because of the shape of the wedges.

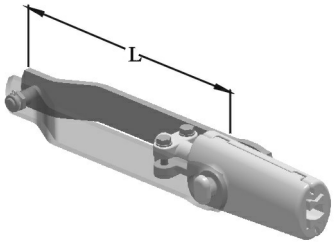
Material: Body and wedges: aluminium-alloy, forged
Straps: steel, hot dip galvanised
Bolt and screws: see separate table

L.-Nr.	Dimensions in mm		Breaking strength kN	Short circuit current kA	Variation	Weight kg
	Conductor Ø	L				
566.21/1	≤ = 9,0	210	70	20	2	1,10
566.21/2	9,1–10,5	210	70	20	2	1,10
566.21/3	10,6–11,7	210	70	20	2	1,10
566.21/4	11,8–14,0	210	70	20	2	1,10
566.03/1	10,6–12,5	270	100	20	2	3,40
566.03/2	12,6–14,0	270	100	20	2	3,40
566.03/3	14,1–15,8	270	100	20	2	3,40
566.04/0	15,9–17,3	320	110	32	1 + 2	4,90
566.04/1	17,4–19,0	320	110	32	1 + 2	4,90
566.15/1	19,0–21,1	360	180	40	1 + 2	7,00
566.15/2	21,2–23,4	360	180	40	1 + 2	7,00
566.15/3	23,5–24,8	360	180	40	1 + 2	7,00
566.16/1	23,5–25,6	435	200	50	1 + 2	10,50
566.16/2	25,7–27,9	435	200	50	1 + 2	10,50
566.16/3	28,0–30,1	435	200	50	1 + 2	10,50
566.16/4	30,2–32,4	435	200	50	1 + 2	10,50
566.16/5	32,5–33,4	435	200	50	1 + 2	10,50
566.17/2	32,9–36,0	525	300	50	1 + 2	19,20
566.17/3	36,1–39,2	525	300	50	1 + 2	19,20
566.17/4	39,3–41,1	525	300	50	1 + 2	19,20
566.07/4	39,4–44,0	550	250	50	1 + 2	20,60
566.08/1	43,0–46,3	550	250	50	1 + 2	20,60
566.08/2	46,3–50,0	550	250	50	1 + 2	20,60

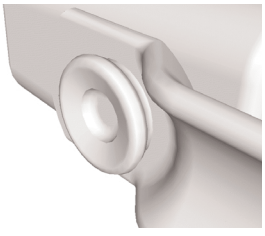
Straps for clamps < 15.8 mm Ø are already assembled with the body.



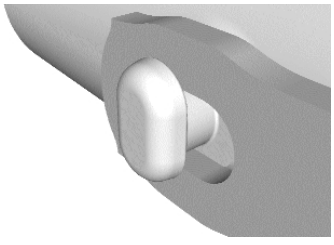
Variation 1 with jumper attachment.



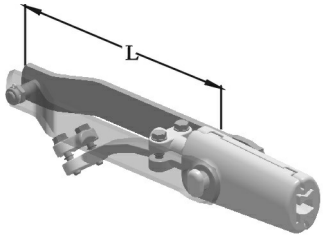
Variation 2 without jumper attachment.



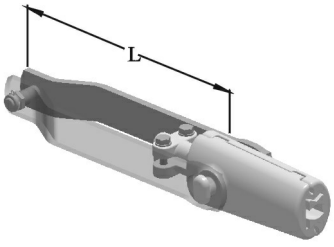
for Ø≤15,8 mm



for Ø≥15,9 mm



Variation 1 with jumper attachment.



Variation 2 without jumper attachment.

Wedge type tension clamps, trunnion type

for steel- and copper-conductors

Material: Body: aluminium-alloy, forged
Wedges: steel or malleable iron, hot dip galvanized
Straps: steel, hot dip galvanised
Bolts and screws: see seperate table

L.-Nr.	Dimensions in mm		Breaking strength kN	Short circuit current kA	Variation	Weight kg
	Conductor Ø	L				
566.21/S1	< = 9,0	210	70	20	2	1,3
566.21/S2	9,1–10,5	210	70	20	2	1,3
566.21/S3	10,6–11,7	210	70	20	2	1,3
566.03/S1	10,5–12-5	270	100	32	2	3,5
566.03/S2	12,6–14,0	270	100	32	2	3,5
566.03/S3	14,1–15,8	270	100	32	2	3,5
566.16CU/1	23,5–25,6	435	80	50	1 + 2	14,0
566.16CU/2	25,7–27,9	435	80	50	1 + 2	14,0
566.16CU/3	28,0–30,1	435	80	50	1 + 2	14,0
566.16CU/4	30,2–32,4	435	80	50	1 + 2	14,0
566.17/CU2	32,9–36,0	525	100	50	1 + 2	16,0
566.17/CU3	36,1–39,2	525	100	50	1 + 2	16,0

Straps for clamps < 15.8 mm Ø are already assembled with the body. See page 5/3.
Clamps for other dimensions on request.

Numbering system for wedge type clamps

Example:
566.15/14EA means a wedge type clamp 19–21,1 Ø without jumper attachment,
with connecting bolt 19; 8.8
split pin A2
and locking device acc. DIN 128–A made of stainless steel A2F80.

1."x" =	Number	Bolt-diameter	Clevis-opening	Short circuit current kA
	1	13	14	18
	2	13	20	18
	3	16	20	28
	4	19	20	40
	5	22	20	50

2."x" =	Code	Locking-device	Bolt-material	Split pin material	Jumber attachment
	A	DIN128-A	5,6	A2	NO
	B	Sheet	5,6	A2	NO
	C	DIN128-A	5,6	Cu sn.	NO
	D	Sheet	5,6	Cu sn.	NO
	E	DIN128-A	8,8	A2	NO
	F	Sheet	8,8	A2	NO
	G	DIN128-A	8,8	Cu sn.	NO
	H	Sheet	8,8	Cu sn.	NO
	I	DIN128-A	5,6	A2	YES
	J	Sheet	5,6	A2	YES
	K	DIN128-A	5,6	Cu sn.	YES
	L	Sheet	5,6	Cu sn.	YES
	M	DIN128-A	8,8	A2	YES
	N	Sheet	8,8	A2	YES
	P	DIN128-A	8,8	Cu sn.	YES
	R	Sheet	8,8	Cu sn.	YES

3."x" =	Code	Locking device
	blank	8.8 galv.
	A	A2F80

The 3 numbers and the codes are to be added to the L-N°.

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Double wedge tension clamps

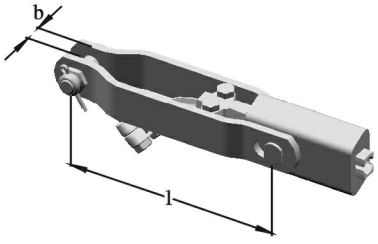
for aluminium-, al-alloy-, ACSR-, AACSR- and alumoweld conductors

To avoid damaging the conductor which might lead to notching effects the wedges are designed without serrated grooves.
This has the advantage of permitting transfer of the clamp to another place if it is necessary.

Double wedge tension clamps with jumper connections

Material: Body and wedges: high strength aluminium-alloy
Trunnion: steel, hot dip galvanised
Bolts and straps: steel, hot dip galvanised

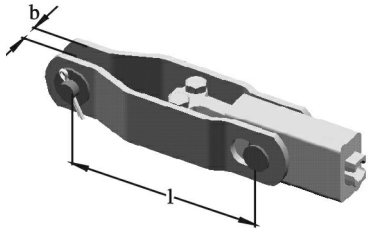
L.-Nr.	Dimensions in mm				Short circuit current kA	Weight kg
	Conductors Ø	l	b	Bolt		
4440.52/3	13,6–16,1	230	14	N 13	10	2,40
4440.52/4	13,6–16,1	230	14	S 13	10	2,40
4440.53/3	13,6–16,1	230	20	N 19	22	2,50
4440.53/4	13,6–16,1	230	20	S 19	22	2,50
4440.54/30	17,5–19,6	380	20	S 19	30	5,35
4440.55/3	20,3–22,5	380	20	S 19	30	5,15



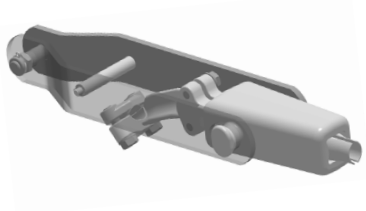
Double wedge tension clamps without jumper connections

Material: Body and wedges: high strength aluminium-alloy
Trunnion: steel, hot dip galvanised
Bolts and straps: steel, hot dip galvanised

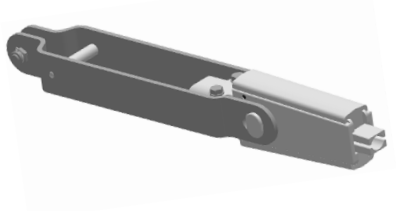
L.-Nr.	Dimensions in mm				Short circuit current kA	Weight kg
	Conductors Ø	l	b	Bolt		
4440.50	7,5– 9,6	150	14/20	N 13	10	1,06
4440.50/4	7,5–10,0	150	20	S 19	10	1,12
4440.51	10,5–12,5	150	14/20	N 13	10	1,04
4440.51/3	10,5–12,5	150	20	S 19	10	1,11
4440.52/1	13,6–16,1	230	14	N 13	10	2,25
4440.52/2	13,6–16,1	230	14	S 13	10	2,25
4440.53/1	13,6–16,1	230	20	N 19	22	2,35
4440.53/2	13,6–16,1	230	20	S 19	22	2,35



On request:



Wedge type clamps: art.-serie 267…



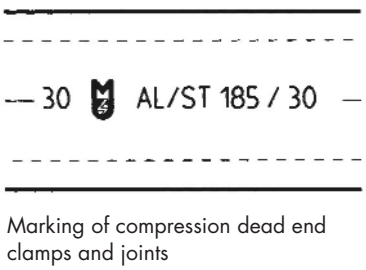
Wedge type clamps with hinge

Wedge type clamps art.-series 257… 260…

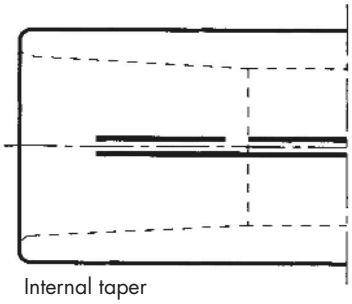
Wedge type clamps art.-serie 264 see cat.-part 18

Compression dead end clamps

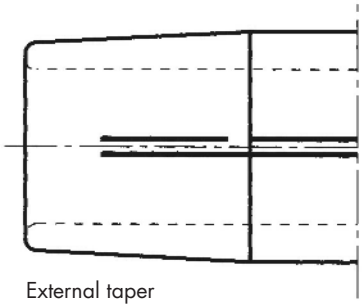
Compression dead end clamps are used in all areas of overhead line construction, that is both for substations and for transmission lines.
The greatest possible strength is achieved with compression dead end clamps; for example: with ACSR conductors the load-bearing steel cable is held separately, so that even conductors having an extremely high steel proportion can be clamped for high-tensile stresses.
There are different compression systems in use: circumferential compression and indentation for hexagonal compression, the latter being the most popular.
Compression can be achieved with a variety of tooling systems provided the compressive force of the press is sufficient and the characteristics of the inserts and clamps match.
Compression dead end clamps are tapered at the conductor inlets to allow gradual force transmission.
Normally the jumper terminal is bolted to the clamp flag; for smaller types, designs comprising a welded jumper can be supplied.
Compression fittings are available for every conductor type and size.
To achieve the best results the clamps are individually adapted for each conductor and therefore we need the following information, preferably on a data sheet, for the conductor:
– code name or identification of the conductor
– material and cross sections
– number and diameter of wires
– ultimate breaking load



Marking of compression dead end clamps and joints



Internal taper



External taper

Compression fittings are filled with compound and sealed. For larger types the compound is delivered in separate tubes.

Compressing systems:
There are basically 2 compression systems which use hexagonal compression, as detailed below:

	system 1	system 2
compression:	offset (continuous)	continuous
taper:	internal taper	external taper

We are able to supply clamps according to both of the above systems, but have shown in detail in this catalogue only those clamps belonging to system 1, i.e. having internal taper.
Clamps according to system 2 are available on request.

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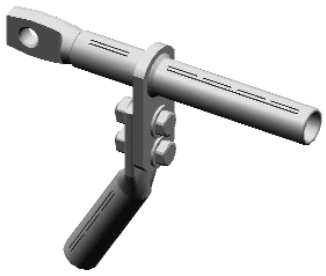
Compression dead end clamps with eye

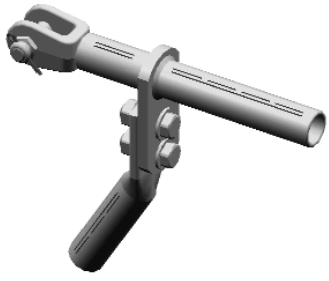
for ACSR- and AACSR-conductors
The steel core of the conductors will be compressed separately onto the eye.



Material:	Clamp and jumper: aluminium-alloy Eye and bolts: steel, hot dip galvanised
Serial-Nr.	Type of conductor
4462... 4465...	for ACSR-conductors for AACSR-conductors

Compression dead end clamps with clevis

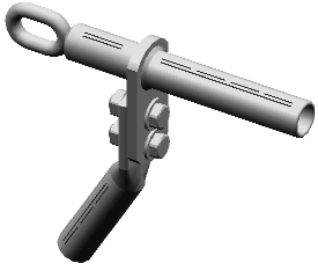
for ACSR- and AACSR-conductors
The steel core of the conductors will be compressed separately onto the tongue.



Material:	Clamp and jumper: aluminium-alloy Clevis and bolts: steel, hot dip galvanised
Serial-Nr.	Type of conductor
4463... 4464...	for ACSR-conductors for AACSR-conductors

Compression dead end clamps with oval eye

for ACSR- and AACSR-conductors
The steel core of the conductors will be compressed separately onto the tongue.



Material:	Clamp and jumper: aluminium-alloy Eye and bolts: steel, hot dip galvanised
Serial-Nr.	Type of conductor
4463... 4465...	for ACSR-conductors for AACSR-conductors

Compression dead end clamps with eye

for Al- and Al-alloy conductors

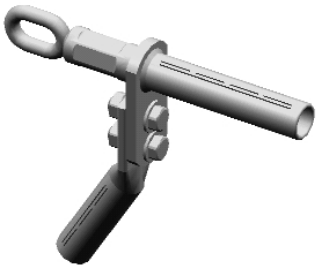
Material:	Clamp and jumper: aluminium-alloy Eye and bolts: steel, hot dip galvanised
Serial-Nr.	Type of conductor
4457... 4455...	for Al-conductors for Al-alloy-conductors

Tension clamps and joints

Compression dead end clamps with clevis

for aluminium- and al-alloy conductors

Material:	Clamp and jumper: aluminium-alloy Clevis and bolts: steel, hot dip galvanised
Serial-Nr.	Type of conductor
4457... 4455...	for al-conductors for al-alloy conductors



Compression dead end clamps with oval eye

for aluminium- and al-alloy conductors

Material:	Clamp and jumper: aluminium-alloy Eye and bolts: steel, hot dip galvanised
Serial-Nr.	Type of conductor
4457... 4455...	for al-conductors for al-alloy conductors

Compression dead end clamps with eye

for steel- and alumoweld conductors

Material:	Steel, hot dip galvanised or stainless steel
Serial-Nr.	Type of conductor
4458... 4458...	for steel conductors for alumoweld conductors

Compression dead end clamps with oval eye

for steel- and alumoweld conductors

Material:	Steel, hot dip galvanised or stainless steel
Serial-Nr.	Type of conductor
4459... 4459...	for steel conductors for alumoweld conductors

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Tension clamps and joints

Compression dead end clamps for traction lines.

This variation is used for tensioning the suspension wires as well as for the energised wire.
They have no jumper connection.
All kinds of material such as copper, bronze, steel and stainless steel can be clamped.

Other types on request.

Repair sleeves

for aluminium-, al-alloy-, ACSR-, AACSR- and alumoweld conductors
Serial-Nr. 4880

Compression joints full tension

for ACSR- and AACSR conductors

Material:	Al-sleeve: aluminium-alloy Steel-sleeve: steel, hot dip galvanised
Serial-Nr.	Type of conductor
4854... 4855...	for ACSR-conductors for AACSR-conductors

Compression joints full tension

for aluminium- and al-alloy conductors

Material:	Al-sleeve: aluminium-alloy
Serial-Nr.	Type of conductor
4852... 4853...	for al conductors for al-alloy conductors

Compression joints full tension

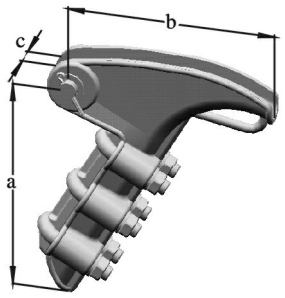
for steel- and alumoweld conductors

Material:	Steel, hot dip galvanised or stainless steel
Serial-Nr.	Type of conductor
4858... 4912...	for steel conductors for alumoweld conductors

Bolted type tension clamps

for aluminium-, al-alloy-, ACSR-, AACSR-conductors

Bolted type tension clamps are used in substations and distribution lines.
Consequently it is always necessary to give the exact data concerning conductor and stresses.
With this clamp type the conductor can be passed onwards uncut.
Fitting is extremely simple by tightening the clamp bolts to the prescribed tightening torque.

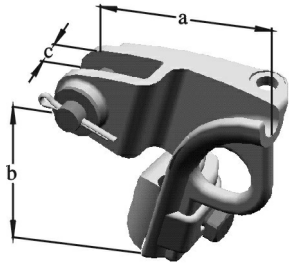


Material: Body and keeper piece: aluminium-alloy
Other parts: steel, hot dip galvanised

L.-Nr.	Dimensions in mm						Torque Nm	Short circuit current kA	Weight kg
	Cond. Ø	a	b	c	Bolt	U-Bolt			
4432.08	5,0–13,5	99	83	17	N13	2 x M 8	11	10	0,45
4432.14	9,0–16,0	155	125	23	N16	3 x M 10	22	20	0,90
4432.14/1	9,0–16,0	155	125	23	N13	3 x M 10	22	20	0,90
4432.15	13,0–20,0	250	182	27	S 19	3 x M 12	38	30	2,00
4432.04/2	17,4–22,5	300	210	28	N19	3 x M 14	60	30	2,50

Bolted type tension clamps

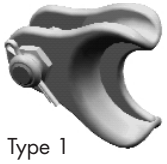
for aluminium-, al-alloy-, ACSR-, AACSR-conductors



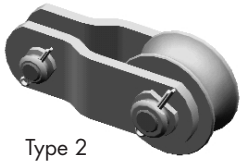
Material: Body and keeper piece: aluminium-alloy
Other parts: steel, hot dip galvanised

L.-Nr.	Cross section mm²	Dimensions in mm				Torque Nm	Weight kg
		a	b	c	Bolt		
4435.01/1	25–132	140	85	20	N16	60	0,90

Strain thimbles



Type 1



Type 2

Material: Thimble: malleable or ductile iron, hot dip galvanised
Bolt: steel, hot dip galvanized

L.-Nr.	Type	Dimensions in mm			Breaking strength kN	Short circuit current kA	Weight kg
		Bolt	Clevis width	Neck			
4410.01	1	S13	14	60	60	10	0,40
4410.02	1	S19	20	70	100	28	0,80
4410.15/1	1	S19	22	70	230	40	1,20
4410.15	1	S22	22	70	230	40	1,20
4410.9001	2	S22	20	75	310	42	4,60*

*steel, hot dip galvanised.

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