

In accordance with the German standard DIN 18014: 2007-09 Fundamente der – Allgemeine Planungsgrundlagen (Title English: Foundation earth electrode - General planning criteria), foundation earth electrodes have to be connected every two meters with the foundation plate. Among the various connection possibilities the clamping connection has turned out to be the most economic, as it can be realised quickly and easily on site.

According to the current lightning protection standards among others also the reinforcement steels shall be used as natural components of the down-conductor system. In the following a survey of the nominal and outer diameters as well as of the reinforcement steel cross sections according to DIN 1045-1:2001-07 (see **Figure 1**).

In order to allow the advantageous clamping connection to be used also in case of reinforcement steels of larger diameters, DEHN has developed special clamps.

They can be installed quickly and easily. As shown in **Figures 2 and 3** they can be used as connecting and fastening element for fixed earthing terminals as well.

Optionally, this new type of connecting clamp also allows to use cable lugs for a flexible connection, as shown in **Figure 4**.

The already practice proven connecting clamp for T, cross and parallel connections has been equipped with an additional clamping frame. Thus, as **Figure 5** shows, both, the electrical contact between reinforcement steel and fixed earthing terminal and the mechanical fixing in the formwork is realised. This clamp may also be used for the T or cross connection of a round conductor.



Figure 2:
U-bolt clamp Part No. 308 045



Figure 3:
U-bolt clamp Part No. 308 046



Figure 4:
U-bolt clamp with cable lug



Figure 5:
Connecting clamp Part No. 308 035



Nominal diameter d_s



Outer diameter d_A

The outer diameter including corrugation is approx. $d_A = 1.15 \times d_s$.

Nominal diameter d_s (mm)	6	8	10	12	14	16	20	25	28	32	40
Outer diameter incl. corrugation d_A (mm)	6.9	9.2	11.5	13.8	16.1	18.4	23	29	32	37	46
Nominal cross section (mm ²)	28.3	50.3	78.5	113.1	154	201	314	491	616	804	1257

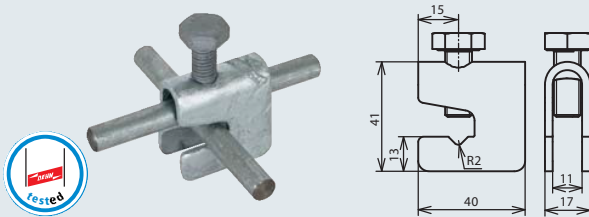
Figure 1: Diameter of reinforcement steels
Ref.: Bewehrungen von Tragwerken aus Beton, Stahlbeton und Spannbeton nach DIN 1045-1:2001-07



Clamps to connect reinforcing steel mesh or reinforcement with round and flat conductors

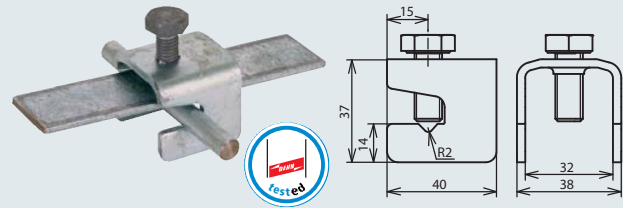
Arrangement:
(II) = parallel
(+) = cross

For T, cross and parallel connections



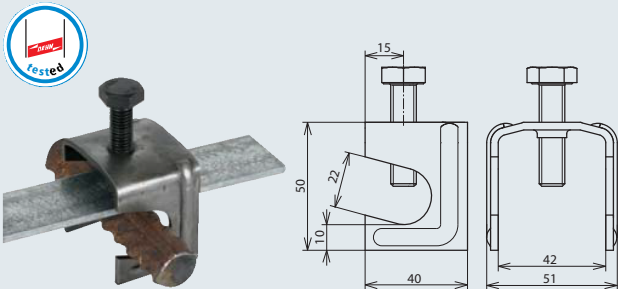
Part No.	308 025
Material	St/tZn
Clamping range Rd / Rd	(+) 6-10 / 6-10 mm
Clamping range Rd / FI	(+) 6-10 / 30 mm
Clamping range FI / FI	(II) 30 / 30 mm
Screw	● M10x25 mm
Material of screw	StSt
Standard	EN 50164-1
Short-circuit current (50 Hz) (1 s; ≤ 300 °C)	9 kA

For T, cross and parallel connections



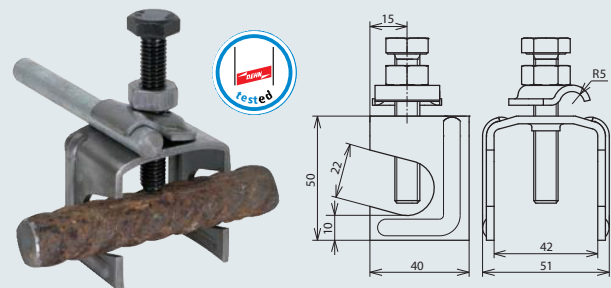
Part No.	308 026
Material	St/tZn
Clamping range Rd / FI	(+) 6-10 / 30 mm
Clamping range FI / FI	(+ / II) 30 / 30 mm
Screw	● M10x25 mm
Material of screw	St/tZn
Standard	EN 50164-1
Short-circuit current (50 Hz) (1 s; ≤ 300 °C)	13 kA

For T and cross connections



Part No.	308 030
Material	St/bare
Clamping range Rd / FI	(+) 6-22 / 40 mm
Screw	● M10x40 mm
Material of screw	St/bare
Standard	EN 50164-1
Short-circuit current (50 Hz) (1 s; ≤ 300 °C)	1.0 kA

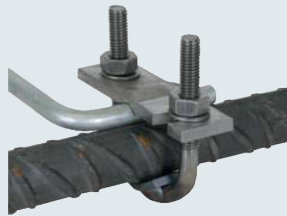
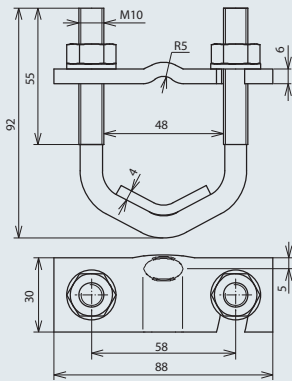
For T, cross and parallel connections with clamping frame



For flexible connection of round conductors or for fixed earthing terminals with simultaneous fixing in the formwork

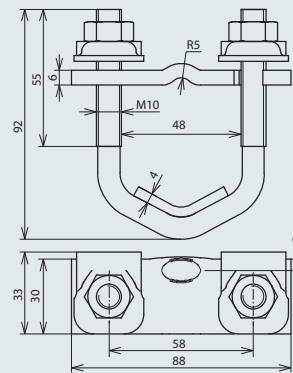
Part No.	308 035
Material	St/bare
Clamping range Rd / Rd	(+ / II) 6-22 / 6-10 mm
Clamping range Rd / FI	(+) 6-22 / 40 mm
Screw	● M10x60 mm
Material of screw	St/bare
Standard	EN 50164-1
Short-circuit current (50 Hz) (1 s; ≤ 300 °C)	1.0 kA

U-bolt clamp for large diameters



Part No.	308 045
Material	St/bare
Clamping range Rd / Rd	(II) 16-48 / 6-10 mm
Clamping range Rd / Fl	(II) 16-48 / 30-40 mm
Screw	stirrup bolt M10x48 mm
Material of screw	St/bare
Standard	EN 50164-1
Short-circuit current (50 Hz) (1 s; ≤ 300 °C)	16 kA

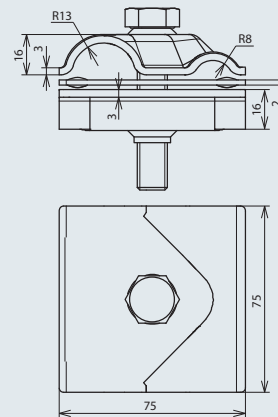
U-bolt clamp for large diameters with two additional clamping frames



Cross connections of round conductors (6-10 mm) or for the fixing with simultaneous connection of fixed earthing terminals

Part No.	308 046
Material	St/bare
Clamping range Rd / Rd	(+ / II) 16-48 / 6-10 mm
Clamping range Rd / Fl	(II) 16-48 / 30-40 mm
Screw	stirrup bolt M10x48 mm
Material of screw	St/bare
Standard	EN 50164-1
Short-circuit current (50 Hz) (1 s; ≤ 300 °C)	11 kA

MAXI MV clamps



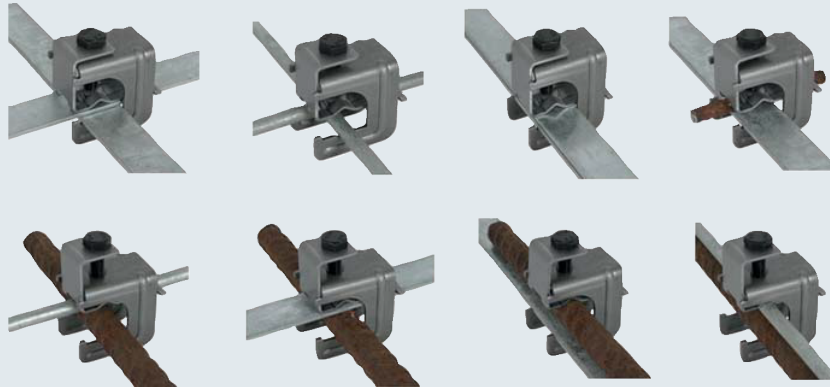
For T, cross and parallel connections

Part No.	308 041	308 040
Material	St/tZn	St/bare
Clamping range Rd / Rd	(+ / II) 8-16 / 15-25 mm	(+ / II) 8-16 / 15-25 mm
Screw	M12x65 mm	M12x65 mm
Material of screw	St/tZn	St/bare
Standard	EN 50164-1	EN 50164-1
Short-circuit current (50 Hz) (1 s; ≤ 300 °C)	6.2 kA	10.2 kA
UL certification	—	UL467B
Stock No.	5999-12-362-1557	—

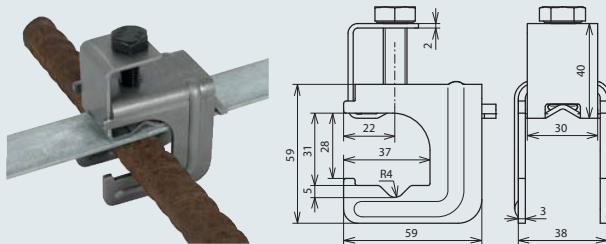
Clamps for connecting round and flat conductors in the concrete foundation or the reinforcing steel mesh and the reinforcement with round and flat conductors

Arrangement:
(II) = parallel
(+) = cross

Possible connections:



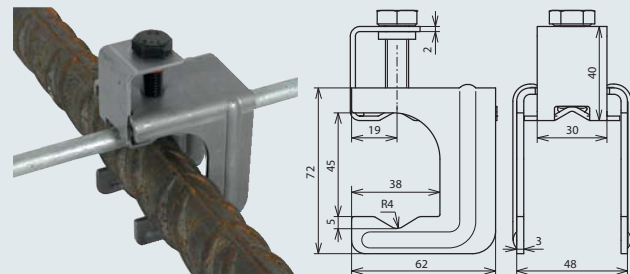
Pressure U-clamp



For T, cross and parallel connections

Part No.	308 031
Material	St/bare
Clamping range Rd / Rd	(+/II) 6-20 / 6-10 mm
Clamping range Rd / Fl	(+/II) 6-20 / 30x3-4 mm
Clamping range Fl / Fl	(+/II) 30x3-4 / 30x3-4 mm
Type of screw	T M10x25 mm
Material of screw	St/bare
Standard	EN 50164-1
Short-circuit current (50 Hz) (1 s; ≤ 300 °C)	8.4 kA

Pressure U-clamp MAXI



For T, cross and parallel connections

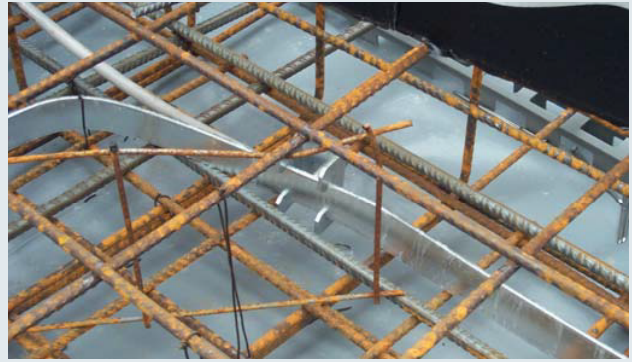
Part No.	308 036
Material	St/bare
Clamping range Rd / Rd	(+/II) 20-32 / 6-10 mm
Clamping range Rd / Fl	(+/II) 20-32 / 40x4-5 mm
Type of screw	T M10x25 mm
Material of screw	St/bare
Standard	EN 50164-1
Short-circuit current (50 Hz) (1 s; ≤ 300 °C)	14.0 kA

To connect round and flat conductors in the concrete foundation
For T, cross and parallel connections, no need of threading the conductors

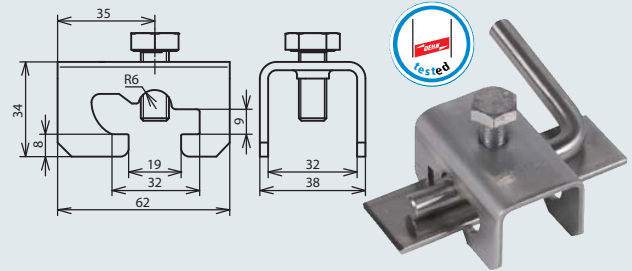
Arrangement:

(II) = parallel

(+) = crosswise



Part No.	308 120	308 129
Material	St/tZn	StSt
Clamping range Rd / Fl	(+) 10 / 30 mm	(+) 10 / 30 mm
Clamping range Fl / Fl	(+ / II) 30 / 30 mm	(+ / II) 30 / 30 mm
Screw	M10x25 mm	M10x25 mm
Material of screw	St/tZn	StSt
Standard	EN 50164-1	EN 50164-1

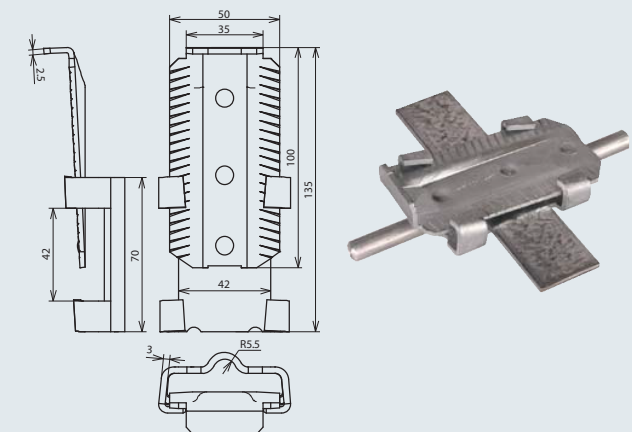


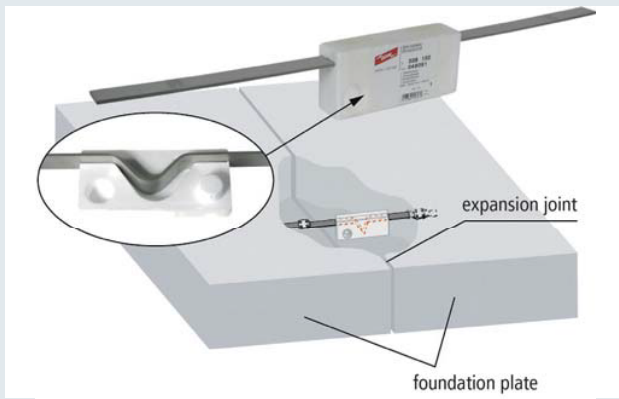
Wedge Connector

Wedge connector with latches for T, cross and parallel connections for use in concrete foundations

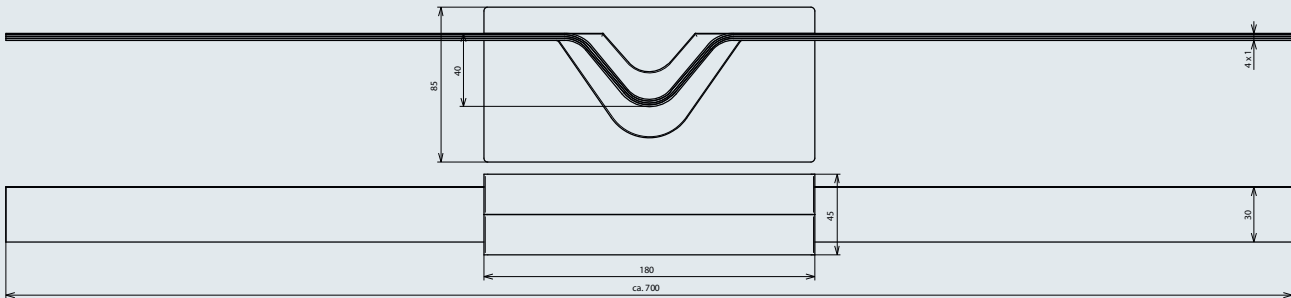


Part No.	308 001
Material	St/tZn
Clamping range Rd / Fl	10 / 30x3.5-40x4 mm
Clamping range Fl / Fl	30x3.5-40x4 / 30x3.5-40x4 mm
Material of wedge	St/tZn





Expansion strap to lead the foundation earth electrode through the expansion joints of extended foundations (several sections). It is not necessary to lead the earth electrode out of the base plate, because the polystyrene block can be concreted in the one section, the other end of the strap will be carried on loosely in the opposite section.

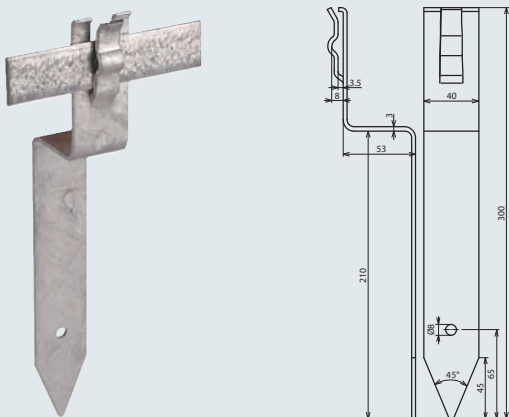


Part No.	308 150
Material of strap	StSt
Dimension of strap (l x w x d)	approx. 700x30x(4x1) mm
Cross section	120 mm ²
Material of block	polystyrene
Dimension of block (l x w x d)	180x85x45 mm
Standard	EN 50164-2
Short-circuit current (50 Hz) (1 s; ≤ 300 °C)	6 kA

Spacers

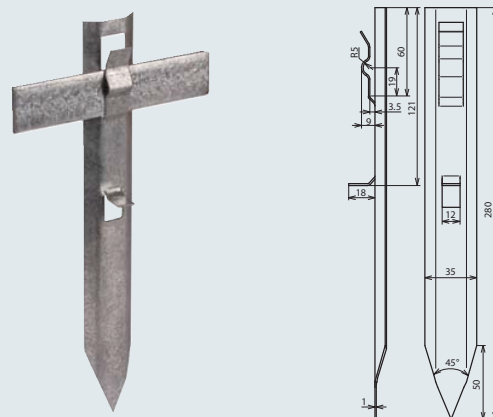
Spacers for installing earth conductors in the foundation slab with catch lug to avoid loosening of the conductor

Angled and reinforced design



Part No.	290 001
Material	St/tZn
Support Fl	40 mm
Support Rd	8-10 mm
Length	300 mm

Straight design



Part No.	290 002
Material	St/tZn
Support Fl	40 mm
Support Rd	8-10 mm
Length	280 mm

Method to improve and stabilise the earth electrode resistance

The highly swellable, powdery special clay has a high water binding capacity. Thus it provides a conductive enclosure for the earth electrode which has a positive effect concerning the earth electrode resistance.

The principle of the DEHNIT earthing method is to mix the fine-grained DEHNIT with water and sand and to enclose the earth electrode with this mixture. This conductive enclosure enlarges the earthing surface.

Compared with the conventional earthing method without enclosure the DEHNIT method has three important pros:

- A low earthing resistance can be achieved even in case of a poor ground conductivity.
- With the enclosure the achieved earth-electrode resistance will be approx. 50 % lower and thus less earthing material is needed.
- The earth electrode resistance will be largely independent of temperature and weather fluctuations and remain constant for years (see Figure 1).

Proceeding instructions:

For 1 m³ DEHNIT filling you need approx. 67 kg DEHNIT.

1. Surface earthing method

1.1 Excavate the duct for the earth conductor (approx. 0.6 ... 0.8 m deep).

1.2 Mix the DEHNIT (e.g. with a concrete mixer) as indicated:

- 5 parts of sand
- 1 part of DEHNIT
- 1/2 part of water

Mind the indicated sequence, otherwise heavy clodding is possible:
DEHNIT – sand – water

1.3 Fill this mixture into the duct to form a layer of approx. 5 cm.

1.4 Lay the straightened earth conductor directly on this DEHNIT layer.

1.5 Fill in another 5 cm layer of DEHNIT so that the earth conductor is completely enclosed.

1.6 Pound the filling mechanically or per foot.

1.7 Refill the earth excavation.

1.8 Make first resistance measuring of the earth-termination system.

Proceeding instructions:

Following this procedure, usually 2 kg of DEHNIT is needed per running metre of duct for the earth conductor.

2. Procedure for earth rods

2.1 Drill a hole as deep as the length of the earth electrode with a diameter of at least 10 cm wider than the diameter (d) or the outer dimensions of the earth rod.

2.2 Mix DEHNIT according to 1.2.

2.3 Put the earth rod into the centre of the hole and fill the remaining space with DEHNIT. Pound every 0.5 m filling level. Finally refill the upper approx. 0.5 m with natural soil.

2.4 Make the first resistance measuring of the earth-termination system.

Following this procedure, usually 0.84 kg of DEHNIT is needed per metre of earth rod depth (d = 20 mm).

The final earth electrode resistance will be achieved after about 3-4 months.

It is 1/2 – 1/3 of the value measured immediately after the filling with DEHNIT.

After this time the DEHNIT earth-termination system has an earth electrode resistance which is approx. 50 % lower than that of usual earth-termination systems without enclosure. This resistance value remains constant throughout years.

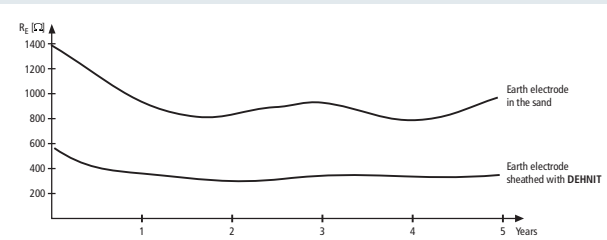


Figure 1

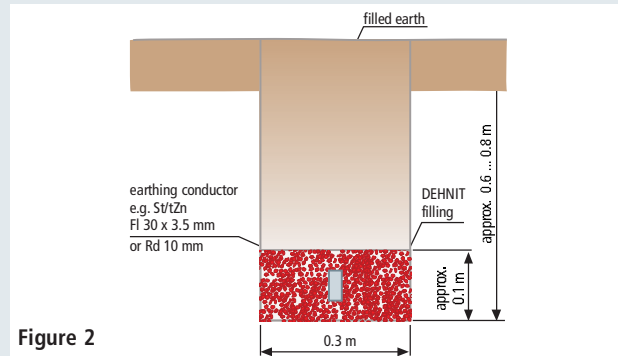


Figure 2

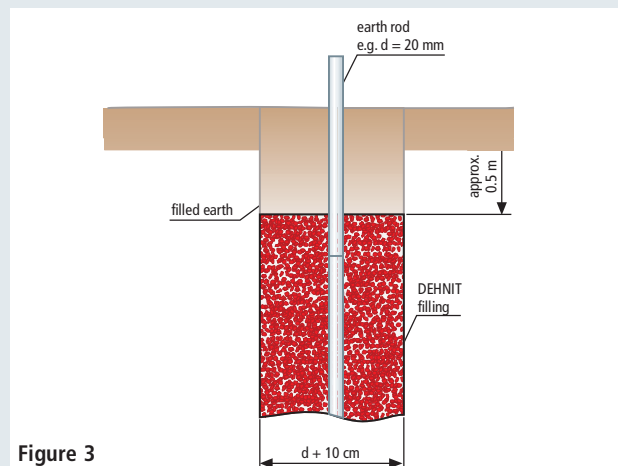


Figure 3



Part No.	573 000
Material	special clay
Mixing ratio	5 parts sand / 1 part DEHNIT / 0.5 parts water