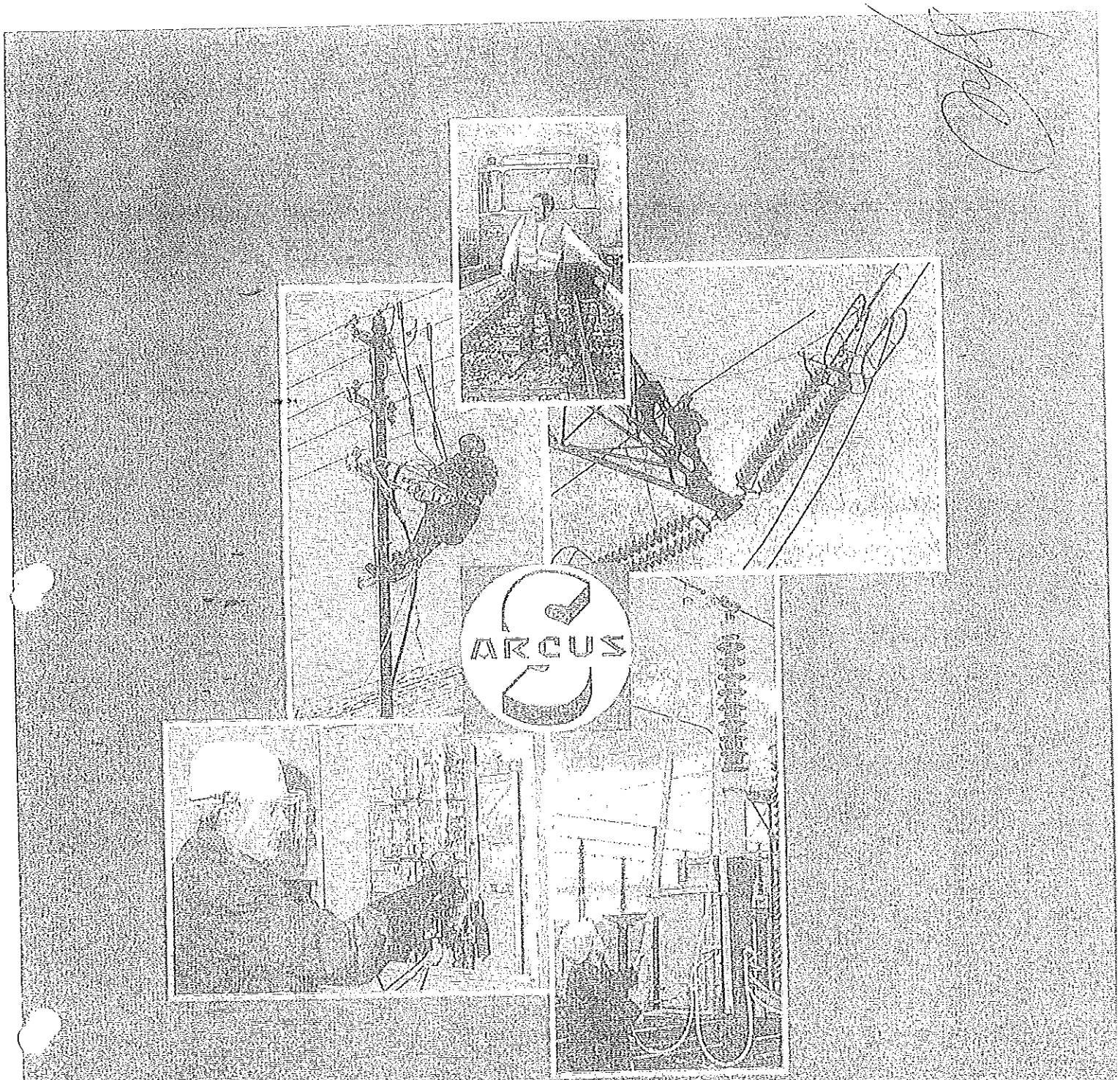

PORTABLE EARTHING AND SAFETY EQUIPMENT

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* "Earthing and short-circuiting devices" abbreviated to "E. and s.-c. devices"

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ВЯРНО С ОРИГИНАЛА

OUR PRODUCTS ARE DEVIDED INTO FOUR SEPARATE USER GROUPS:

UNDERGROUND CABLE CONNECTORS

- Cable branch terminals and cable branch ring connectors
- Cable connectors
- Connection terminals for flat and V-shaped conductors
- Transformer and switchgear connection terminals
- Tools and accessories

OVERHEAD LINE CONNECTORS

- Tap-off, termination and multi-purpose clamps
- Earth wire and earth strip clamps
- Surge arresters
- Tools and accessories

COMPRESSION CONNECTORS

- For cables and overhead lines:
- Compression cable lugs, compression links
- Compression connections for h.v. cables
- Compression tools and accessories

ELECTRICAL SAFETY EQUIPMENT

- Insulated tools, protection and safety equipment
- Current tapping devices
- High voltage live line testers, switching rods Fuse tongs
- Earthing and short-circuiting devices, earthing rods and lance earthing devices

General notes:

- All rights are reserved, especially those of photomechanical reproduction or reprints, of translations, microfilm, storage and processing in electronic systems, even in excerpts.
- This catalogue supersedes all previously published catalogue sheets on earthing and safety equipment which now become invalid.
- All information and illustrations refer to the publishing date of this brochure.
  We reserve the right to modify designs in the course of technical developments.
- All weights and dimensions are approximate values.
- During our 70 year-long experience in the field of safety equipment numerous specific solutions have been manufactured, e.g. for type-tested switchgear, airports, electrical railways, etc., which are not contained in this brochure.
  Ask for our capability in this respect !
- For quantity orders, special manufacture to customer's requirements can be considered (e.g. phase clamps with specific surface treatment).
- This catalogue contains among others complete earthing and short-circuiting devices.
  Because of space limitation it is not always possible to give a detailed description of all parts.
  For this reason all parts are summarized in a separate chapter.
  From these elements devices and rods can be assembled according to your specific requirements.

DELIVERY CONDITIONS

For all orders the "General Conditions for the Supply of Products and Services of the Electrical and Electronics Industry" of the Zentralverband Elektrotechnik and Elektronikindustrie (ZVEI) e.V. valid at the time of supply are applied, unless otherwise expressedly agreed.

ВЯРНО С ОРИГИНАЛА

This catalogue **"Portable Earthing and Safety Equipment"** was edited in the reversion time of the following VDE standards:

DIN VDE 0683: 1988 - 03 — *„Portable apparatus for earthing and short-circuiting"*,
Part 1: Freely guided devices for earthing and short-circuiting
Part 2: Guided earth rods and short-circuiting devices

into the new european standards:

DIN EN 61230
VDE 0683 part 100: 1996 - 11 — *„Live working / Portable equipment for earthing or earthing and short circuiting"*
IEC 1230: 1993, modified
German edition EN 61230: 1995

DIN EN 61219
VDE 0683 part 200: 1995 - 01 — *„Live working / Earthing or earthing and short-circuiting equipment using lances as a short circuiting device - Lance earthing"*
IEC 1219: 1993
German edition EN 61219: 1993

Our products comply with the respective national standard **DIN VDE 0683** part 1 and part 2 / 03.88 and will be adjusted to the European Standard under consideration of the specified reversion deadline:

Material to **EN 61230 part 100** until 01 July 2001
Material to **EN 61219 part 200** until 01 October 1999.

The subject of this brochure is limited to *portable earthing and short-circuiting devices.*

For mobile l*ance earthing devices with restricted guidance* please ask for our **prospectus No.423/1997T1**.

Stationary lance earthing devices with restricted guidance are dimensioned according to the specific switchgear design.
Please include the full data of the switchgear with your enquiry.

ВЯРНО С ОРИГИНАЛА

When working under the absence of voltage VDE 0105 part 100: 1997 - 10 requires the working place first of all to be clearly defined.
Next the requirement to obtain and maintain a voltage-free state have to be fulfilled under the observance of the **5 safety rules:**

1. Switch off,
2. Ensure supply cannot be re-energized,
3. Verify the absence of voltage,
4. Apply earthing and short-circuiting device,
5. Apply cover or partition against neighbouring live sections.

Any deviation from these 5 rules must have a substantial cause.

When using earthing and short-circuiting devices the following must be observed:

- The devices must be thoroughly examined for perfect condition before use.
  Damaged cable insulation or protruding bare wires will exclude further usage.

- The devices must only be used in switchgear where their short circuit rating is not exceeded.
  The maximum s.c.current is given on the short circuit and earth leads and on each short circuit bar.

- Any devices which have been subjected to a full short circuit must not be re-used.

- Short-circuit devices, cables and bus bars are dimensioned to be short circuit proof. Earthing cables such as the mutual earth cable of a 3-phase earthing and short-circuiting device do not need to be short circuit proof in 3-phase balanced systems since they only divert residual currents.
  In accordance with the information on page 37 and 38 the cross section of the earth cable may be smaller than the one of the main phase leads.

- Connections on earthing and short circuiting devices are either compressed or bolted.
  Welding or soldering is no longer applied due to the possibility of hardening of the conductor wires.

- Uninsulated leads for 3-phase earthing and short circuiting devices must not be used, due to the danger of sintering if the leads are contacting parts of the switchgear in the case of a short circuit, due to electro dynamic forces.
  Leads are insulated with PVC, which has been found is the best compromise for cost and durability. Leads with Hypalon insulation are more flexible at low temperatures but they tend to fracture when hitting parts of metal framework. Furthermore they do not allow visual inspection of the copper wires due to the colouring.

- The length of cable between two connections must not be less than 1.2 times the distance between the two connections. Excessively long short circuit cable will cause unnecessary movements and unadmissibly high voltages. The dynamic force generated in case of a short circuit is considerable and must be taken into account.

- When connecting short circuiting devices with cables in parallel the following conditions must be fulfilled:

  1. Cables must be of identical length,
  2. Identical lead type (cross-section, stranding, material)
  3. Identical connection parts and pieces,
  4. Any devices inserted must be close to each other, leads in parallel,
  5. Loading capacity per lead must be reduced to 75% in the case of uncertainty as to current sharing.

Current rating and determination of cross-section
(to DIN VDE 0683 part 1: 1988 - 03)

The current rating of the short circuit cables and bars depends on the material, the cross-section A, and the short circuit time T_k.

Earthing and short circuiting devices must have a current rating according to the data in the following diagrams.

Depending on the material, short circuiting bars must meet the current rating according to the diagrams in figs. 4 and 5.

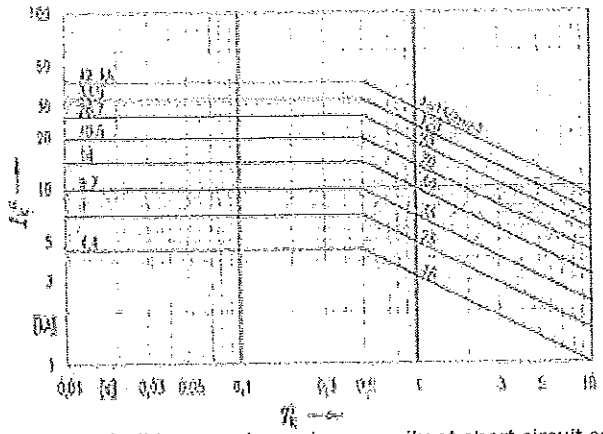
The formulae for calculation of minimum cross-sections A in sqmm are including each a numerical value (4.1/5.07/5.54/8.62), the maximum initial short circuit alternating current I_k" in kA and the short circuit time T_k in seconds.
The indicated rating allows for temperature reducing influences, and refers to lead end temperatures of 250°C or 400°C for devices for railway earthing.

In all calculation formulae the reference short circuit current is the initial short circuit alternating current I_k" which equals the sustained short circuit current I_k" resp. the disconnection alternating current I_a.
This complies with the most critical case, when the short circuit is most remote from the generator.
It is not permissible to reduce the minimum times T_k for the thermical rating of the leads or busbars stated in the tables as the dynamic effect of the instantaneous short circuit current must be considered. For this reason the curved shape in the diagrams for lower values is limited by horizontal lines.

The family of curves in the current load capacity diagrams is based on an initial short circuit alternating current I_k" in case of a short circuit most remote from the generator (κ =1.8).

The highest peak value of the instantaneous current I_s is calculated as follows:

$$I_s'' = \kappa \cdot \sqrt{2} \cdot I_k'' = 2{,}54 \cdot I_k''$$



Initial cable temperature: 20°C
Cable end temperature: 250°C

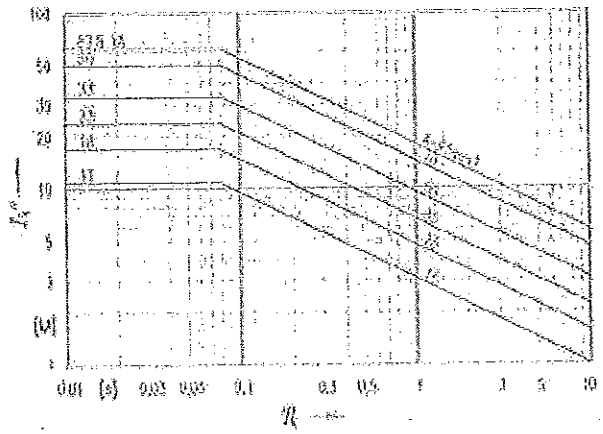
$$A = 5{,}07 \cdot I_k'' \cdot \sqrt{T_k}$$

for

$$T_k \geq 0{,}5\,s$$

Explanation:
A : Cable cross section sqmm
I_k'' : Max.init.short circ.altern. current in kA (to **DIN VDE 0102 part 1**)
T_k : Short circuit time in seconds.

Fig. 1: Admissible current carrying capacity of short circuit cables made of Cu for use in installations with alternating and 3-phase current



Initial cable temperature: 20°C
Cable end temperature: 250°C

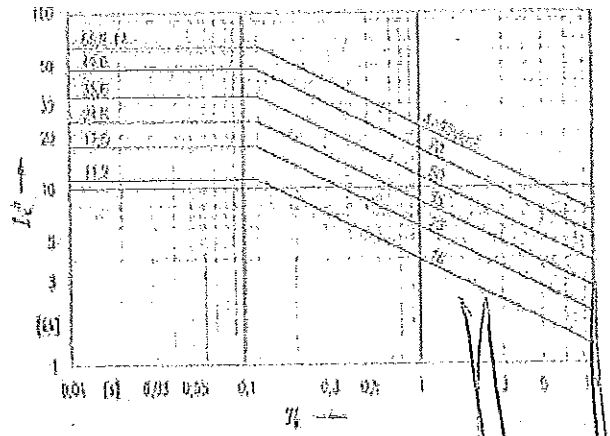
$$A = 5{,}07 \cdot I_k'' \cdot \sqrt{T_k}$$

for

$$T_k \geq 0{,}08s$$

Explanation:
A : Cable cross section sqmm
I_k'' : Max.short circuit current in d.c.installations in kA
T_k : Short circuit time in seconds.

Fig. 2: Admissible current carrying capacity of short circuit cables made of Cu for use in d.c.installations



Initial cable temperature: 20°C
Cable end temperature: 400°C

$$A = 4{,}1 \cdot I_k'' \cdot \sqrt{T_k}$$

for

$$T_k \geq 0{,}12\,s$$

Explanation:
A : Cable cross section in sqmm
I_k'' : Max. initial short circuit a.c. current in kA (to **DIN VDE 0102 part 1**)
T_k : Short circuit time in seconds.

Fig. 3: Admissible current carrying capacity of short circuit cables made of Cu for use on overhead contact wires on electric railways

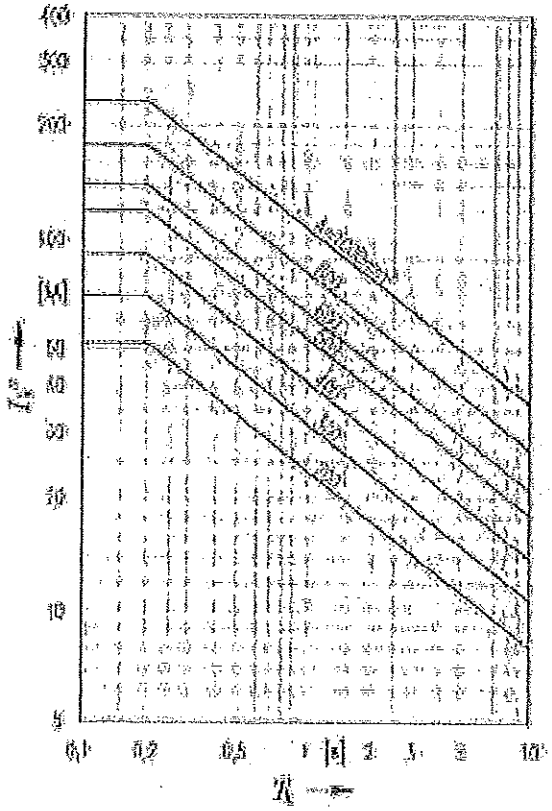


Fig. 4: Admissible current carrying capacity of short circuit bars made of pure aluminium E-Al F10

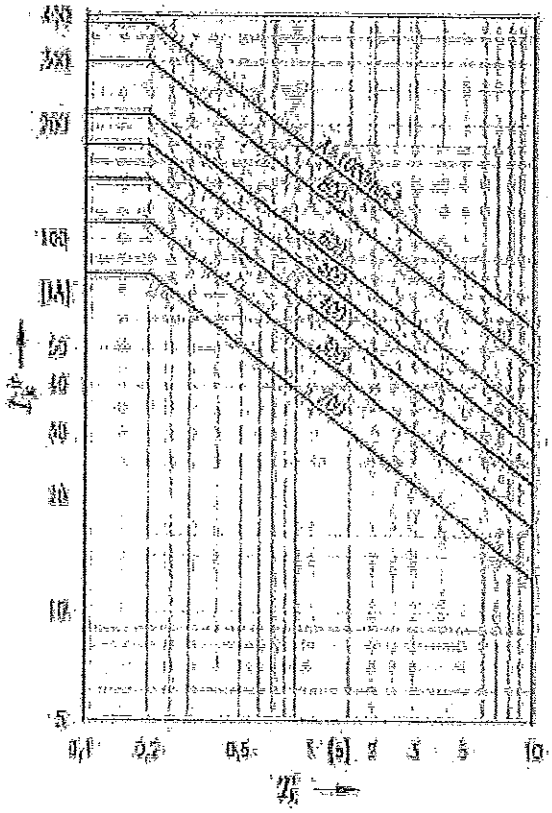


Fig. 5: Admissible current carrying capacity of short circuit bars made of electrolytic copper E-Cu 57 F20

Pure Aluminium E-Al F10

Initial temperature: 20°C
End temperature: 250°C

$$A = 8{,}62 \cdot I_K'' \cdot \sqrt{T_k}$$

for

$$T_k \geq 0{,}2\,s$$

Cross section of copper cable	Rated current (A) and rated time to EN 61230 VDE 0683, part 100			
sqmm	3s	2s	1s	0.5s
16	1850	2200	3200	4500
25	2800	3500	4900	7000
35	4000	4900	6900	10000
50	5700	7000	9900	14000
70	8000	9800	13800	19500
95	10800	13200	18700	26500
120	13700	16700	23700	33500
150	17000	20900	29600	42000

Electrolytic Copper E-Cu 57 F20

Initial temperature: 20°C
End temperature: 250°C

$$A = 5{,}54 \cdot I_K'' \cdot \sqrt{T_k}$$

Explanation:

A : Cable cross section in sqmm
I_K'': Max. initial short circuit a.c. current in (to **DIN VDE 0102 part 1**)
T_k : Short circuit time in seconds.

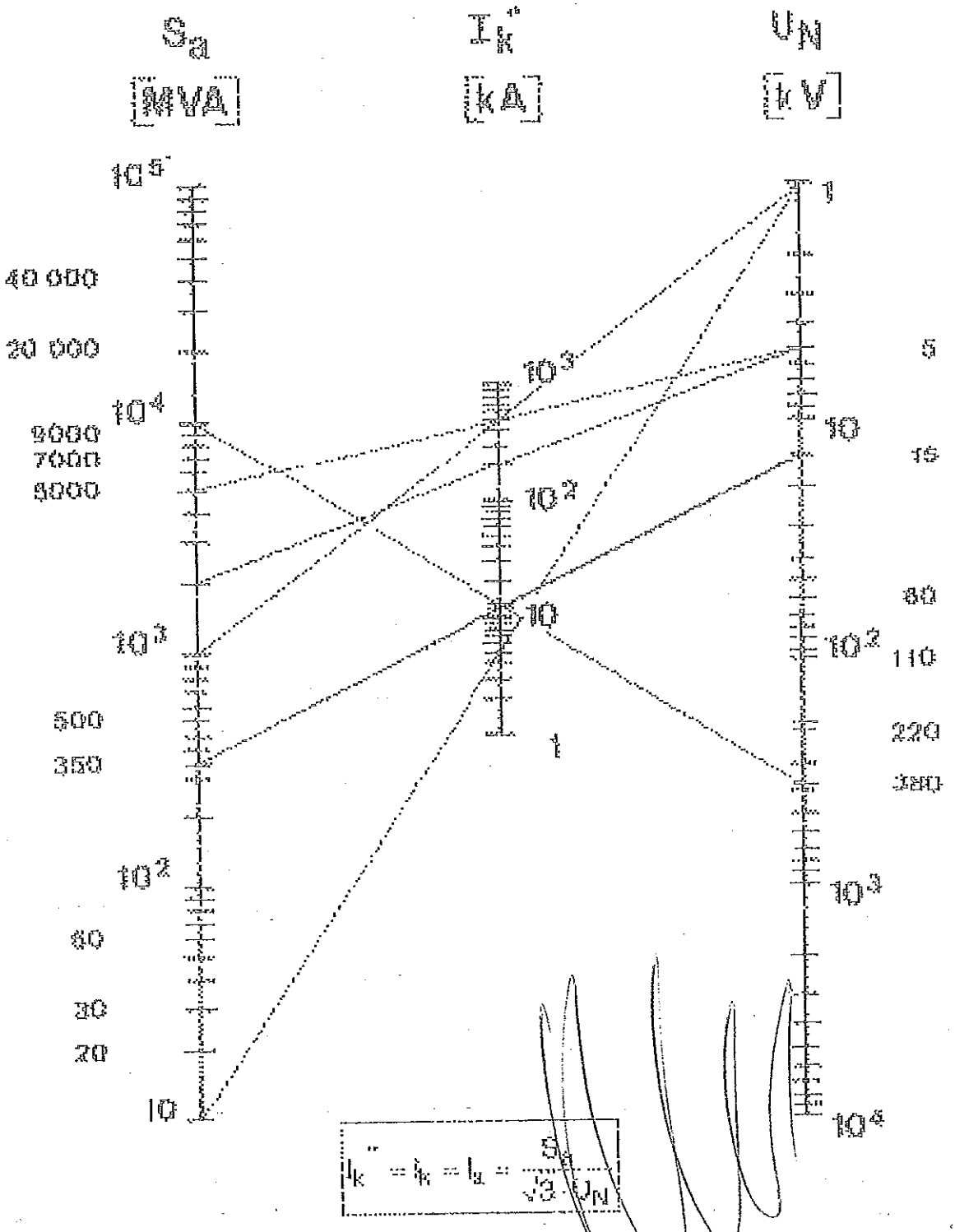


Fig. 6: Determination table short circuit current I_k'' of the mains breaking capacity S_a

Rated current I_r and rated time t_r

Each part of an earthing and short circuiting device which has to withstand a short circuit current is marked with the respective values I_r and t_r. These values state the highest effective value of the current and the highest Joule-integral ($I_r^2 \cdot t_r$)
The rated current I_r corresponds to the current I_k" in case of short circuits remote from the generator under observance of the d.c. aperiodic component (n = 2.5").

With total break times of ≥1s I_k" is approx. equal to I_r whilst with very low break times, e.g. 0.1 s, the additional heating of the earthing and short circuiting device by the d.c.component contained in I_k" has to be considered.

The rated times are standardized with 3s, 2s, 1s, 0.5s, 0.25s and 0.1s.*)

The rated current is stated as effective value in kA for one of these standardized times (p.e.:14 kA/0.5s).

Earthing and short circuiting devices must be loaded neither with higher currents than the rated current I_r nor with higher Joule-integrals than $I_r^2 \cdot t_r$.

The conversion of the electrical values must only be executed equivalent to the Joule rating at higher total break times.

European standard EN 61230 abandons the determination of temperature limits as per the cable end temperatures of 250°C or 400°C stated in the former DIN VDE 0683 part 1.

Consequently, short circuit cables can be exposed to higher loads resulting from an increased Joule-integral $I^2 \cdot t$.
Short circuit tests have confirmed this only within certain limits.An earthing and short circuiting device with a cable cross section of 70 sqmm according to its max. current carrying capacity to the old standard DIN VDE 0683 part 1, also in future will not be manufactured with a cross section of 50 sqmm.

*) Conversion table on page 11

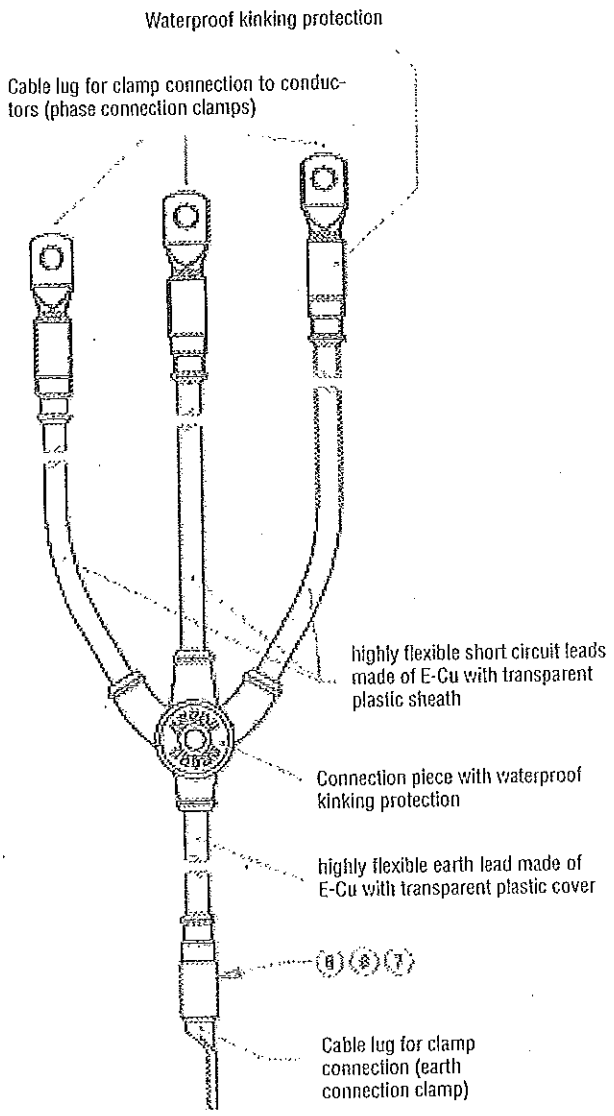


Fig. 1

Construction

All earthing and short circuiting devices are assembled from highly flexible copper leads with a transparent plastic insulation.

Connection pieces are compressed and additionally bolted.

Joints from the connection piece or cable lug to the cable insulation are enclosed by a stabilized tenacious elastic and transparent sleeve.

This mechanical kinking protection guarantees reliable sealing against moisture ingress.

Transparent insulation of the copper cables allows permanent visual inspection. Any damaged strands are recognized immediately.

In order to protect the cable lugs against torsion and to reduce the dynamic forces in case of a short circuit, each cable lug sleeve is equipped with a shear pin.

Finally the light-weight construction of the connection piece (reduction of the accelerated mass during a short circuit) together with the soft kinking protection offers an improved protection for persons and installation.

All leads are processed under observation of the required pulling strength values to DIN EN 61230 part 100: 1996-11.

The devices are rated for a temperature range of -25°C up to +70°C. This corresponds to the usual usage to DIN EN 61230 part 100 as well as the category W.

Cable flexibility is slightly reduced at low temperatures.

ВЯРНО С ОРИГИНАЛА

Marking of the cables

according to **DIN VDE 0683 part 1: 1988 -03:**

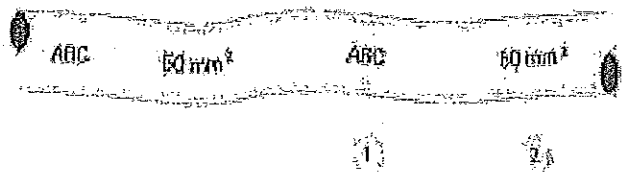


Fig.1

according to **DIN EN 61230 part 100: 1996-11:**

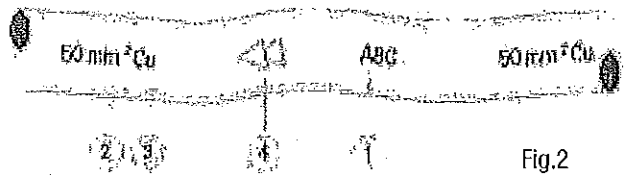


Fig.2

Marking of the earthing and shor t circuiting device

① Name and code of the cable manufacturer

②[1] Cross section in sqmm

③[1] Conductor material

④[1] Double triangle

⑤ Name or trademark of the manufacturer of the device (see page 14, Fig. 1)

⑥ Year of production of the device (see page 14, Fig. 1)

⑦ Type of device (see page 14, Fig. 1)

[1] to **DIN EN 61230 part 100: 1996-11** printing at intervals of approx. 1 m

Copper leads to EN 61230 used in the assembly of earthing and short circuiting devices

Type no.[1]	Cross section [sqmm]	Cond.resist. [Ω/km]	Strands	Cable diameter [mm]	Insulation thickness [mm]	Outer diameter [mm]
505 040	16	1,160	525	5,7±0,2	1,3	8,4±0,2
505 041	25	0,758	800	7,1±0,2	1,3	9,8±0,2
505 042	35	0,536	1120	8,6±0,2	1,4	11,4±0,3
505 043	50	0,379	1615	10,1±0,3	1,8	13,8±0,3
505 044	70	0,268	2250	12,2±0,3	1,8	15,8±0,4
505 045	95	0,198	3085	14,2±0,3	2,0	18,2±0,4
505 046	120	0,155	3820	16,0±0,4	2,0	20,1±0,5
505 047	150	0,125	4800	18,0±0,4	2,0	22,0±0,5

[1] Please state required length, when sending cables for repair.

ВЯРНО С ОРИГИНАЛА

Notes on application:

The plug-in blades are fitted with leashes for connection to DIN fuse grips or in covers for DIN-fuse holders and sockets. The metal contact of the blade must only be short circuited with disconnected spring contacts of fuse holders which have been tested for the absence of voltage.

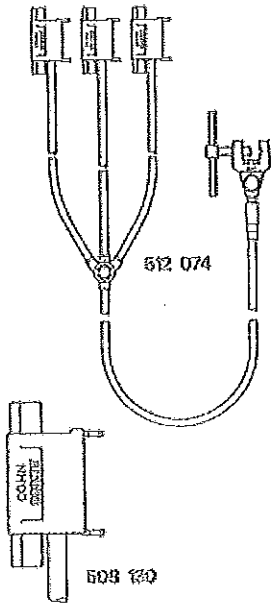


Fig. 1

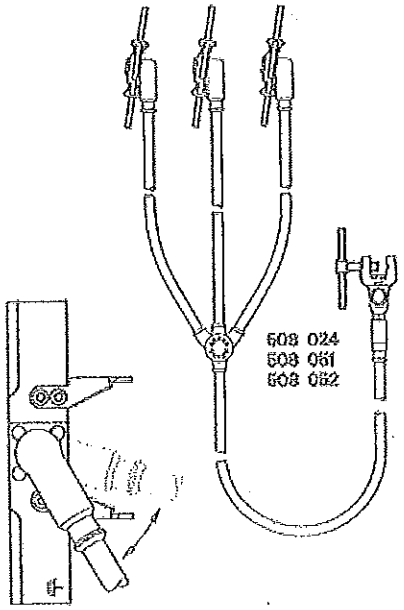


Fig. 2

Construction features:

Plug-in blade type 508 130 (red polyamide) with fixed cable connection.

Plug-in blade with fixed swivel cable connection, one half made of plastic material.

Short circuiting parts made of copper alloy tin -plated,
T-shaped parts for handle made of galvanized steel,
short circuiting cables graded to their lengths of 320, 520 and 720 mm,
earth cable 1200 mm long,
cables made of highly flexible copper cable with transparent insulation,
connection piece compressed, bolted and equipped with a moulded,
transparent and waterproof protection cover,
with earth connection clamp type 502 016 or as required *)

Type no.	fuse holder size HRC	Cable cross sect. sqmm	Ir/√tr kA/s	Weight each appr. kgs
512 074	00	16	4.5 / 0.5	1.1
508 024	0-3	25	7.0 / 0.5	2.2
508 051	0-3	35	10 / 0.5	2.5
508 052	0-3	50	14 / 0.5	3.0

*) see page 39,42

UNIVERSAL EARTHING AND SHORT CIRCUITING DEVICE

for distribution boards with DIN-type fuse holders size 00 up to 0-4a, insulated systems and cable conductor ends

3-phase earthing and short circuiting device

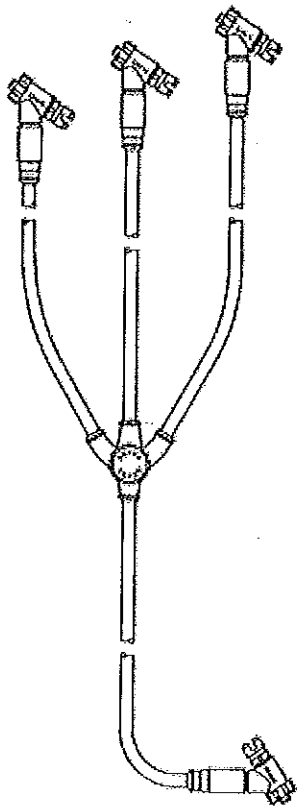


Fig. 1

Cables made of highly flexible copper leads, cross section 35 sqmm, with PVC-insulation.

Connection piece compressed, bolted and equipped with a moulded, transparent and waterproof protection cover.

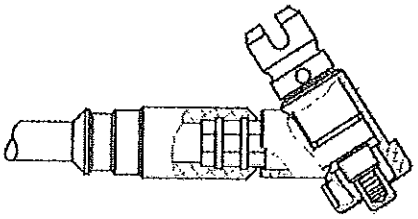
Fully insulated screw-in connection couplings to be fixed with the handle described on page 18.

Short circuiting cables supplied in lengths:
320 / 520 / 720 mm

Length of the earthing cable: 1000 mm.

Rated current and time (I_r / t_r): 10 kA / 0.5 s.

Type no. 512 257



Fully insulated connection coupling Fig. 2

Plug-in blades for DIN-fuse holders to DIN 43620

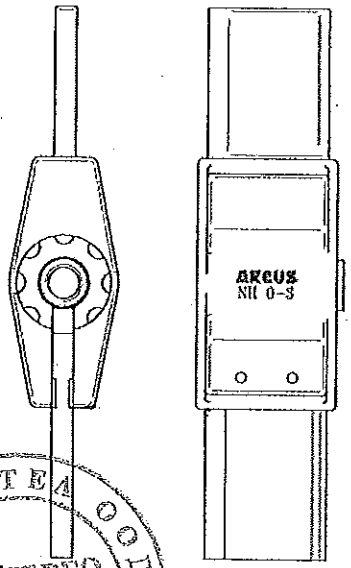


Fig. 3

Plug-in blades made of red plastic material, metal part with threaded hole for torsion-safe connection to fully-insulated connection coupling, fitted using the earthing handle (see page 18).

Sizes of plug-in blades	
Type no.	for HRC holder
508 141[1]	00
508 142	0-3
508 143	4a

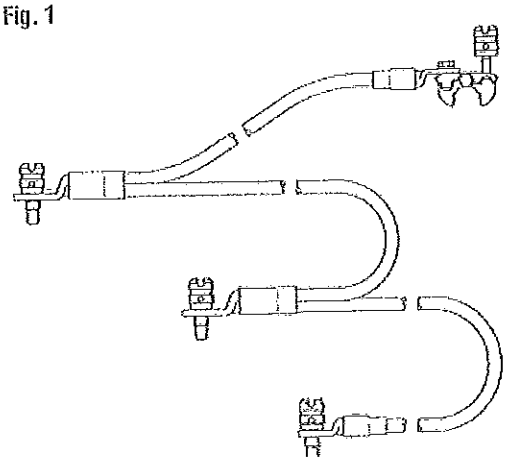
[1] Also suitable for earthing and short circuiting device for service boxes, type 512 258.

UNIVERSAL EARTHING AND SHORT CIRCUITING DEVICE

for distribution boards with DIN-type fuse holders size 00 up to 0-4a, insulated systems and cable conductor ends

Earthing and short circuiting device for service boxes

Fig. 1



Type no.: 512 258

Cables made of highly flexible copper lead cross section 25 sqmm, with transparent PVC insulation.
Graded lengths of the cables 180 / 180 / 260 mm.
With partially insulated couplings for connection to plug-in blades
DIN 00 or threaded fuse-links E27 and E33 with earthing handle type 508 145.

The earth connection clamp type 502 067 is suitable for

flat conductors	from 9 to 18 mm,
round conductors	up to 18 mm diameter,
hexagon	SW17 and SW19 (M10, M12).

Rated current and time (I_r / t_r): 7 kA / 0.5s.

Earthing handle

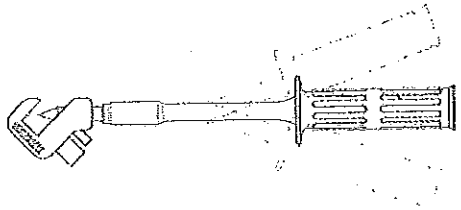
Fig. 2

Type no.: 508 145

Earthing handle, one end is used to insert the plug-in blades and on the other end to fix the earthing and short circuiting devices types 512 257 and 512 258.

Earth connection clamp for e. and s.-c. device type 512 257

Fig. 3



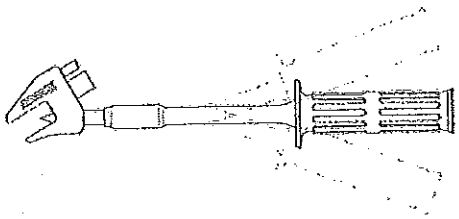
Type no.: 502 064

Insulated earth connection clamp with flexible handle for screwing onto flat bars (width 3-6 mm), to be clamped from below.

The flexible handle allows connections to be made when depth is limited.

Earth connection clamp for e. and s.-c. device type 512 257

Fig. 4



Type no.: 502 065

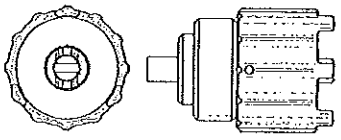
This earth connection clamp is similar to type 502 064. The clamping head is suitable for clamping onto PEN-bars (width 3-8mm) from the top side.

UNIVERSAL EARTHING AND SHORT CIRCUITING DEVICE

for distribution boards DIN and DIAZED fuse holders size 00 up to 0-4a, insulated systems and cable conductor ends

Threaded fuse-links for "DIAZED" elements for e. and s.-c. devices types 512257 and 512 258 fitted with earthing handle type 508 145

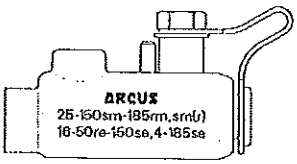
Fig. 1



Threaded fuse-link Type no.	Size	with Pin earth	Ring earth
597 064	E27	X	
597 066	E27		X
597 063	E33	X	
597 065	E33		X

Cable end sleeve for e. and s.-c. device type 512 257 with earthing handle 508 145

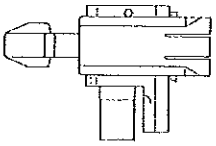
Fig. 2



Type no.: 508 147
insulated, suitable for cable cores
25-150 sect. stranded, -185 rd. str., sect.str.(rounded)
16-50 rd.sol. - 150 sect.sol., 4x185 sect.sol.
Application e.g. to earth disconnected cable loops.
Suitable T-box wrench SW6 (not shown).

Connection element for KKV for e. and s.-c. device type 512 257 with earthing handle type 508 145

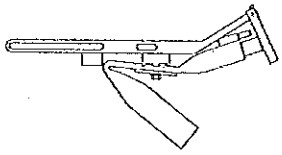
Fig. 3



Type no.: 508 144
Connection piece for plug-type cable distribution systems Jean Müller or equivalent.

Earth insert for e. and s. c. device type 512 257 and earthing handle 508 145

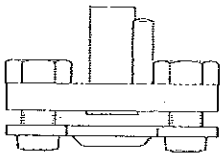
Fig. 4



Type no.: 508 148 (400 A), 508 149 (630 A)
Earth inserts for connecting blocks brand Driescher, system 403 for 400 A and 630 A with threaded connection for fully insulated couplings.

Earth connector with connection leash for additional stationar y installation in cable distribution boxes

Fig. 5

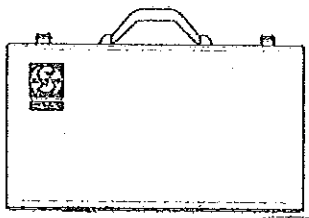


Type no.: 515 228
Earth connector tin plated, distorsion-safe, on galvanized steel connection grip with 2 mounting bolts M10.

Other connectors available on request!

Carrying & storage case

Fig. 6



(615 060)

Manufactured from steel plate, tough red varnish, with separations for earthing handle, e.and s.-c.device, plug-in blades, etc.

Type no.	Dimensions W	H	D
615 053	440	330	130
615 059	390	245	110
615 060	450	250	190

Current tapping blades for DIN fuse holders size 00 to DIN 43 620

Fig. 1

Plug-in blade type 508 130 (page 16) is equipped with rubber-sheathed cable (length appr.200 mm, cross-section = 16 sqmm). The fully insulated and protected housing accepts threaded fuses up to 63 A max.

Conductor connection with separated clamping of the insulation, cross-section 10-25 sqmm, 4 x 35 sqmm, one-polar.

Weight: appr. 0.2 kgs
Type no.: 517 022

Plug-in cartridge for DIN fuse holders size 0-3 to DIN 43 620

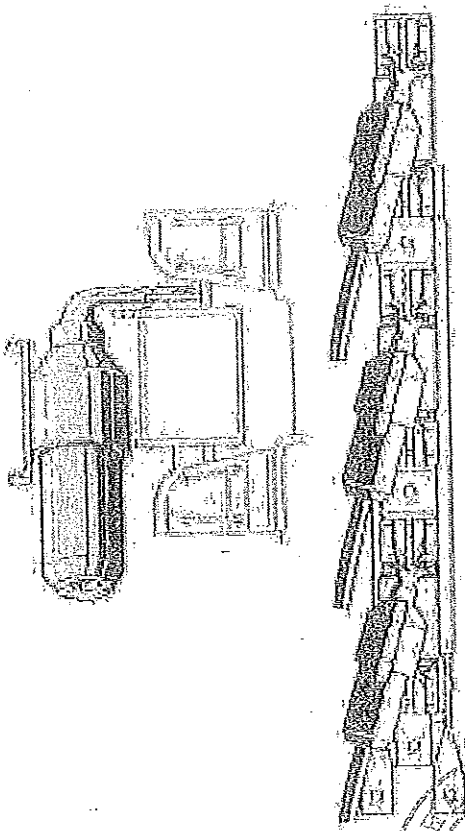


Fig. 2

The plug-in cartridge consists of a fully insulated housing for a threaded fuse up to max. 63 A and an angular expanding contact with external spring. The cartridge is inserted to an operating DIN fuse by means of a commercially available DIN handle.

Conductor connection with separate clamping of the insulation, cross-section 10-25 sqmm, 4 x 35 sqmm, single pole.

Weight: appr. 0.3 kgs
Type no.: 517 006
517 044 for DIN connection blocks

Short Circuiting Devices

with rods and spring-type clamps for low voltage overhead lines

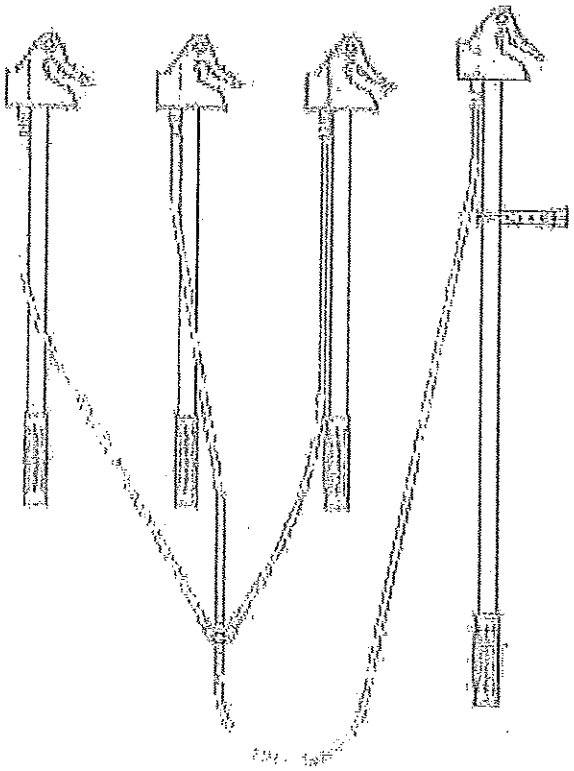


Fig. 1: 512 210

Application:

Urban networks with neutral conductor at top or bottom.

Suitable for Aluminium or Copper conductors, 3-14 mm dia., (6 sq.mm round solid to 120 sq.mm round stranded).

Rated current and time (I_r / t_r): 4.5 kA / 0.5 s.

Construction features:

Contact parts are totally insulated.

Permanent and firm contact provided by the spring mechanism.

Operating rods and covers made of impact-resistant plastic material.

Short circuiting rod type 508 117, length 600 mm
Short circuiting rod type 508 119, length 900 mm

Short circuiting rod with LED glow lamp type 508 120 upon request.

Short circuiting and earthing cables made of highly flexible copper lead 16 sqmm, with waterproof and transparent cover, length 600 mm.

Connection piece and kinking proctection made of transparent and waterproof plastic material.

Type no.	Connection rod per device appr. kgs	Weight
512 210	3 x 508 117 1 x 508 119	2.7
512 212	4 x 508 117	2.5

Short Circuiting Devices

with rods and spring-type clamps for low voltage overhead lines

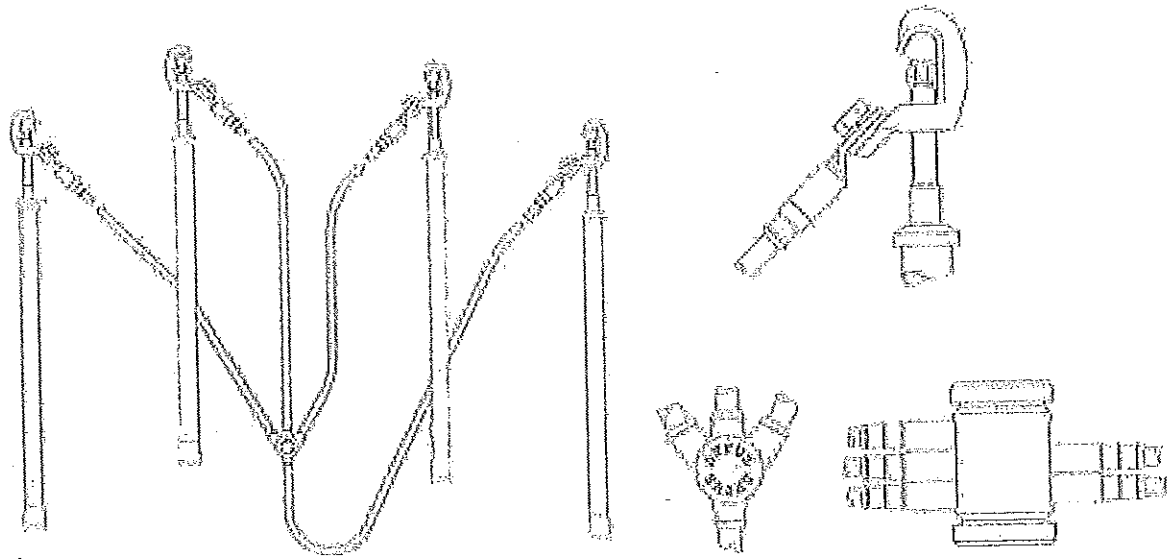


Fig. 1

Application:

Urban networks with neutral conductor at top or bottom.
Suitable for Aluminium or Copper conductors, 3-14 mm dia. (6 sq.mm round solid to 120 sq.mm round stranded).
Earthing and short circuiting cables 25 sqmm *)length 600 mm, made of copper, highly flexible and with a transparent cover.

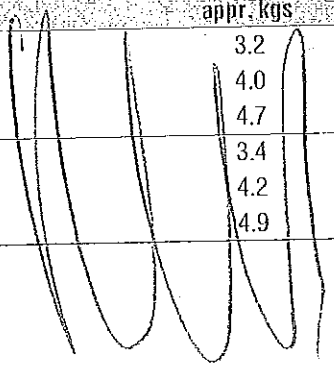
Rated current and time (I_r / t_r): 7 kA / 0.5 s.

Construction features:

Connection rods with screw-type clamps made of tin-plated heavy duty copper alloy, type 507 050.
Clamping surfaces with transverse and longitudinal grooves for removal of foreign and oxide layers on the conductor.

Connection rods made of impact-proof PVC.
Devices 512 103 - 512 105 are equipped with connection rods type 507 032 (length 500 mm).
For urban networks with neutral conductor on the top side a connection rod type 507 033 with a length of 900 mm is available.

Type no.	No of conn.rods	Length of conn.rods	Weight per device appr. kgs
512 103	4	4 x 500	3.2
512 104	5	5 x 500	4.0
512 105	6	6 x 500	4.7
512 106	4	1 x 900 + 3 x 500	3.4
512 107	5	1 x 900 + 4 x 500	4.2
512 108	6	1 x 900 + 5 x 500	4.9



*) Upon request also available with short circuiting cables 16, 35, 50 and 70 sqmm

ВЯРНО С ОРИГИНАЛА

CURRENT TAPPING RODS

for various connections to low voltage overhead lines

Notes on application:

These rods can be installed on live lines to provide long-term power supply to building sites, etc.
The outgoing cables are to be attached to the pole so as to reduce vertical stress. For this purpose we recommend the use of the strain-relief bracket type 517 036 shown on page 24.

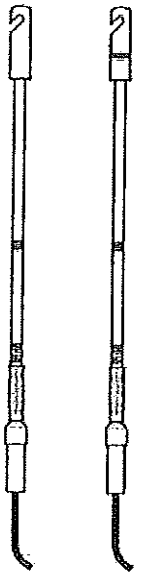
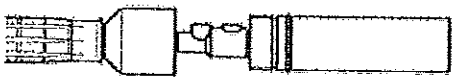


Fig. 1 517 035 517 043

517 042



517 035
517 041
517 043

Fig. 2

Application:

Aluminium and copper conductors 5-15 mm diameter (16 sq.mm round solid to 120 sq.mm round stranded).

Single phase current-tapping connections for rubber-sheathed cables H07RN-F (resp. AD7RN-F) to DIN VDE 0282 part 810 with cross-sections 10 to 25 sqmm, 4 x 35 sqmm.

Types 517 035, 517 043 and 517 041 for:
separately fused worksite distribution boards with max. 100 A and neutral conductor connections.

Type 517 042 for:
worksite distribution boards without fuse protection for max. 63 kA threaded fuses.

Construction features:

Contact-proof construction with a 1 m long insulated rod for safe attachment to lines.

Clamp made of tin-plated aluminium alloy.
Connection of the rubber-sheathed cables with separate clamping of conductor and insulation.

Threaded fuse and cable conductor socket are situated in a threaded housing to protection type IP54.

Type no.	for use to	colour marking	max. current (A)	for threaded fuses	Weight per rod in kgs
517 042	phase volt.	black	63	up to 63 A	1.2
517 035	phase volt.	black	100		
517 043	neutral	yellow/green	100		
517 041	neutral	blue	100		

STRAIN RELIEF SLEEVE

for various connections to low voltage overhead lines

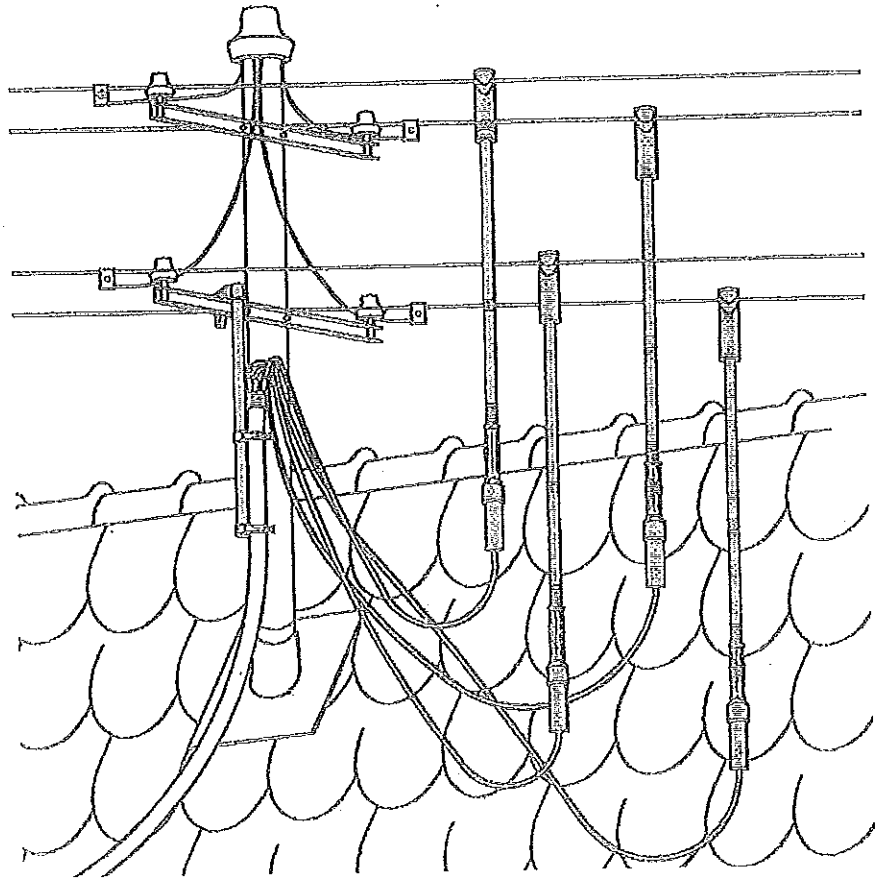


Fig. 1

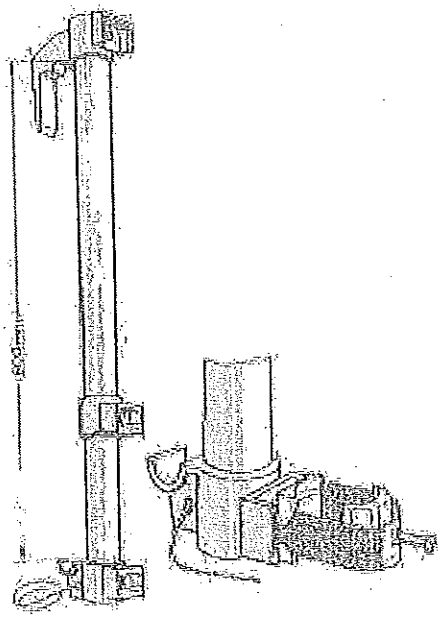


Fig. 2

Fully insulated construction made of plastic material resistant to ultraviolet light, equipped with 2 clamps made of galvanized steel for cables up to 42 mm.

The strain relief sleeve can be attached as illustrated or suspended from a hook.

Fixing can be reinforced at the mast with a nylon cord.

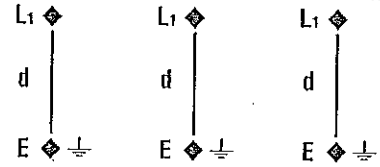
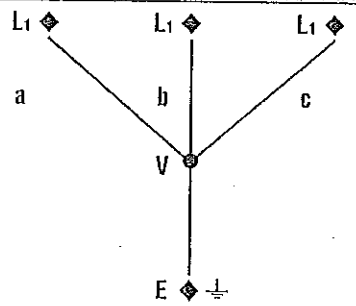
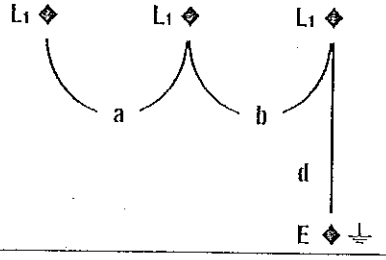
Tensile strength max. 1000 N

Weight appr. 0.75 kgs
Type no. 517 036

EARTHING AND SHORT CIRCUITING DEVICES WITH CABLES

Ordering information

Apart from the standard devices in the catalogue we supply devices for medium and high voltage installations made up to the customer's specification.

Components used in the device	Selection of parts assembly according to page	Data required	Example for order
Single phase e. and s.-c. devices mainly for high voltage installations			
	Page 43, 46, 47	Phase clamp no. ...	L_{1-3} = 507 006
	Page 8-15 and 35	Cable cross section Length [1]	a = 70 sqmm d = 5000 mm
	Page 39-43	Earth clamps no. ...	⏚ E = 502 019
Three-phase e. and s.-c. devices with connection piece for indoor and outdoor medium voltage switchgear			
	Page 43, 46, 47	Phase clamp no. ...	L_{1-3} = 507 006
	Page 8-15	Cable cross section Length [1]	a,b,c = 70 sqmm a,b,c = 800 mm
	Page 36-38	Connection piece no.	V = 504 162
	Page 8-15	Lead cross section Length [1]	d = 70 sqmm d = 2500 mm
	page 39-43	Earth clamp no. ...	⏚ E = 502 019
Three-phase e. and s.-c. devices without connection piece mainly for indoor medium voltage switchgear			
	Page 43, 46, 47	Phase clamp no. ...	L_{1-3} = 507 006
	Page 8-15 and 35	Cable cross section Length [1]	a,b = 120 sqmm a,b = 650 mm
	Page 8-15 and 35	Cable cross section Length [1]	d = 120 sqmm d = 3000 mm
	Page 39-43	Earth clamp no. ...	⏚ E = 502 019

1) The length of the lead must be determined according to the information on page 9.

In the order please also state the rated cur rent I_r (kA) and the rated time t_r (s).
Order example :

3 pieces of single phase e.and s.-c.device

L_{1-3} = 507 006
a = 70 sqmm
d = 5000 mm
E = 515 044

1 piece of three-phase e.and s.-c. device with connection piece

L_{1-3} = 507 003
a,b,c = 70 sqmm
a,b,c = 800 mm
V = 504 162
d = 70 sqmm
d = 2500 mm
E = 502 019

Apart from those devices assembled from single parts also the standard devices on pages 26,28,29 and 30 can be adapted to different requirements such as length of cable or clamps.

Application: Intended for outdoor medium voltage installations

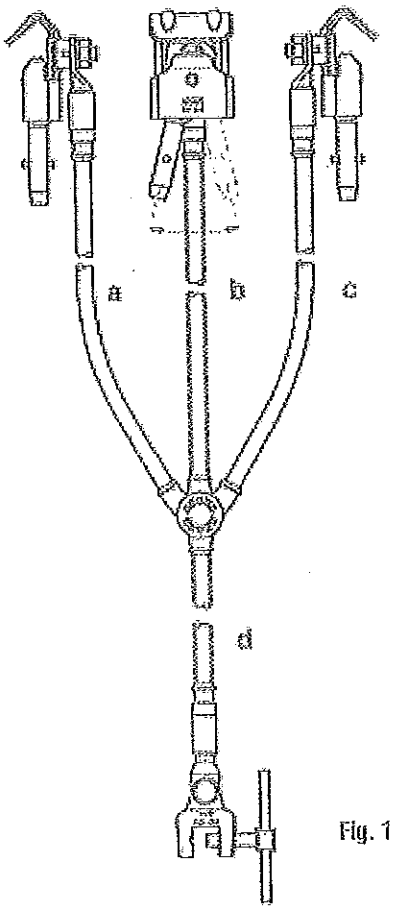


Fig. 1

This device is equipped with the well-proven phase clamps made of tin-plated copper alloy with large contact surfaces, type 507 003.
The swivel bayonet spindle is a particular advantage when mounting the clamp from an angular position.

Clamping range: Line 16 - 240 sqmm
round 4.5 - 20 mm
flat up to 20 mm,

aluminium and copper conductors.

The connection pieces are compressed, bolted and moulded with a transparent and waterproof protection cover.

The earth connection is made by means of a strap-type earth clamp type 502 016 made of high-quality copper alloy with a hand screw of galvanized steel.

Type no	Cable cross section [sqmm]	Ir/tr kA/s	Cable lengths [mm] a,b,c	Cable lengths [mm] d	Weight per device kgs
512 148	25	7/0.5	2000	3000	6.5
512 149	35	10/0.5			7.6
512 150	50	14/0.5			8.8
512 151	70	19.5/0.5			12.2

For further details please see

Phase clamps: Page 46
Connection pieces: Page 37, 38
Earth clamps: Page 42
Earthing rods: Pages 63-66

ВЯРНО С ОРИГИНАЛА

Earth cable extensions for three-phase earthing and short-circuiting devices (page 26)

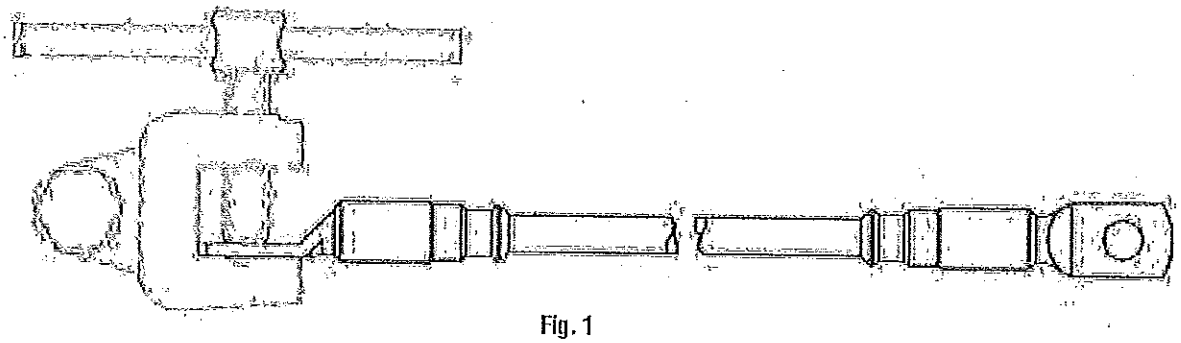


Fig. 1

Type no.	Cross sect.	Weight each appr. kgs
504 121	25	3.5
504 122	35	5.0
504 123	50	6.6

Construction:

Highly flexible copper lead with transparent insulation cover, at the earth side with compression cable lug for thread M12, on the phase side with counter-sunk cable lug which allows secure fastening to the hand screw of the earth clamp. Length of earth cable 10 m.

Earth spikes

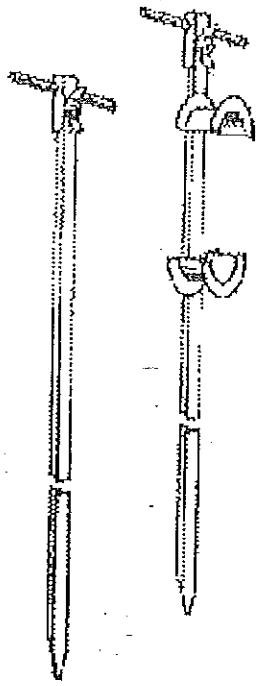


Fig. 2

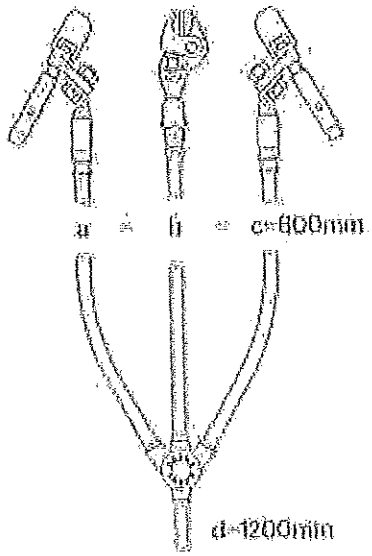
Construction:

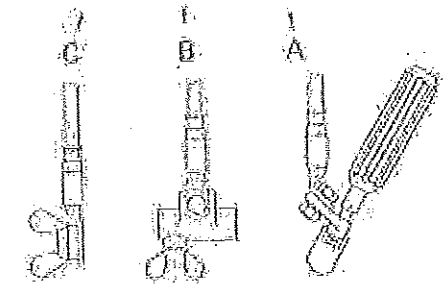
The spikes of T-iron have a solid driving head piece, cross-handle and wing screw M12 for connection to the earth cable.

All parts are hot-dip galvanized.

Type no.	Model	Length m	Weight each kgs
616 015	without take-up device		3.0
616 016	with take-up device for 10 m / 50 sqmm	1.3	4.0

Application: for medium voltage switchgear





515 047 515 044 508 056
515 061...066 508 060

Type no.	Earth cable connection	Cable cross section [sqmm] Short circ. cable	Earth cable	I_p / I_t [kA/s]	Weight per device appr. [kgs]
Short circuiting device with spherical tong type 508 057 (Ø20)					
512087	A(Ø20)				1,7
512088	B	25	25	7 / 0,5	1,65
512089	C(M12)				1,45
512090	A(Ø20)				1,9
512091	B	35	35	10 / 0,5	1,8
512092	C(M12)				1,6
512093	A(Ø20)				2,8
512094	B	50	50	14 / 0,5	2,7
512095	C(M12)				2,5
512096	A(Ø20)				3,8
512097	B	70	70	19,5 / 0,5	3,7
512111	C(M12)				3,6
512112	A(Ø20)				5,1
512113	B	95	95	26,5 / 0,5	5,0
512114	C(M12)				4,9
Short circuiting device with spherical tong type 508 059 (Ø25)					
512115	A(Ø25)				5,4
512116	B	95	95	26,5 / 0,5	5,3
512117	C(M16)				5,2
512118	A(Ø25)				7,1
512119	B	120	120	33,5 / 0,5	7,0
512120	C M16				6,9

For further details please see

Spherical tong for phase connection: Page 43
Connection pieces: Page 37,38
Earth clamps: A= page 43, B = page 41, C = page 40
Ball point connectors: pages 44, 45
Earthing rods: Pages 63-66

THREE-PHASE EARTHING AND SHORT-CIRCUITING DEVICES

with universal phase clamp

Application:

Use in medium and high voltage installations. Universal clamps are suitable for connection to flat and round conductors as well as T-bolts and ball point connectors.

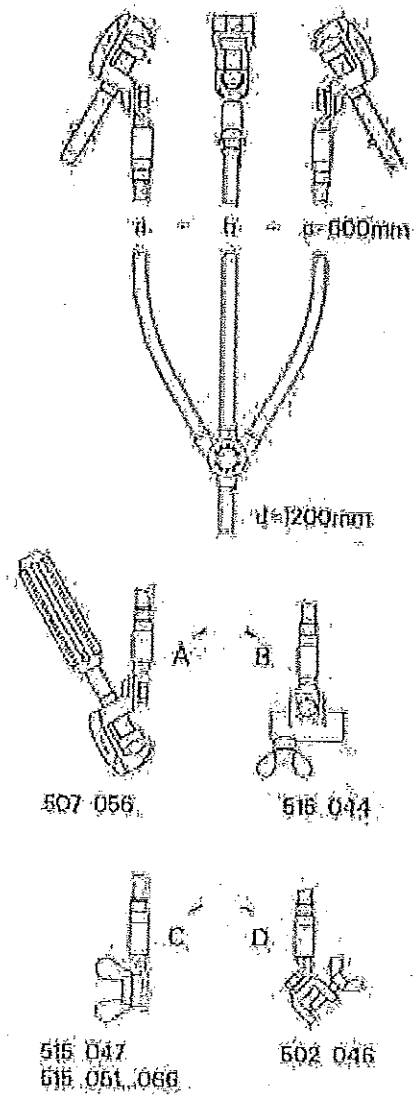


Fig. 1

Type no.	Earth connection	Cable cross section (sqmm) Short circ. cable	Earth cable	I_r / t_r kA/s	Weight per device appr. [kgs]
Device with universal clamp type 507 042 (ball Ø20)					
512156	A(Ø20)				2,10
512157	B	25	25	7 / 0,5	1,80
512158	C(M12)				1,60
512159	D				1,60
512160	A(Ø20)				2,50
512161	B	35	25	10 / 0,5	2,20
512162	C(M12)				2,0
512163	D				2,0
512164	A(Ø20)				2,90
512165	B	50	25	14 / 0,5	2,70
512166	C(M12)				2,50
512167	D				2,50
512168	A(Ø20)				3,90
512169	B	70	35	19,5 / 0,5	3,70
512170	C(M12)				3,50
512171	D				3,50
512187	A(Ø20)				4,20
512 188	B	95	35	26,5 / 0,5	3,90
512189	C(M12)				3,80
512190	D				3,80
Device with universal clamp type 507 043 (ball Ø25)					
512172	A(Ø25)[1]				4,80
512 173	B	95	35	26,5 / 0,5	4,50
512174	c(M12)[2]				4,40
512175	D				4,40
512176	A(Ø25)[1]				5,70
512177	B	120	50	33,5 / 0,5	5,50
512178	C(M12)[2]				5,40
512179	D				5,40

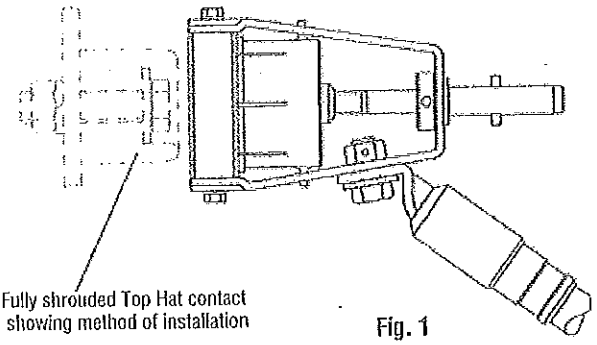
[1] also available for ball point conn. 25 mm (507 057)
[2] also available for fixed points with thread M16 (515 132)

For further details please see

Universal phase clamps: Pages 46, 47
Connection pieces: Page 37,38
Earth clamps: A= page 43/47, B = page 41, C = page 40, D = page 42
Earthing rods: Pages 63-66

THREE-PHASE EARTHING AND SHORT-CIRCUITING DEVICES

with phase clamps for Top Hat contacts



Fully shrouded Top Hat contact showing method of installation

Fig. 1

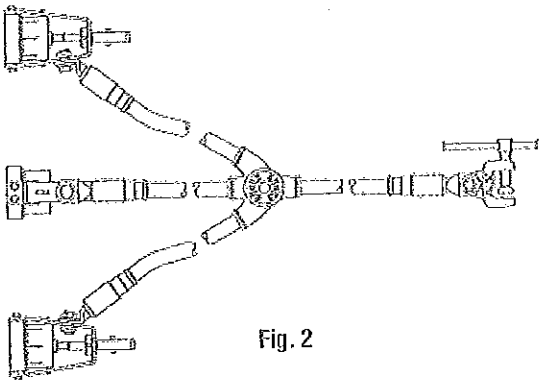


Fig. 2

3-phase e.and s.-c. device	Type no. Phase connection clamp	Top-hat Ø [mm]	I_r / t_r [kA/s]	Remark
512 260	512 260 10	60	26.0 / 1.0	Torque
512 181	512 181 09	45	28.0 / 1.0	
512 181 and 3x 504 124 [1]	512 181 09 and 1x 504 124 [1]	25	28.0 / 1.0	= 20 Nm[2]

1) Reduction sleeve
2) Use earthing rod with cross pin, type 597 330 !

Application :
- Medium voltage switchgear with top-hat contacts
- Primary test of current transformers

Construction features:

Concentric phase clamp with slotted conical clamp sleeve and screw spindle.
Current carrying parts made of tin-plated copper alloy, mechanical parts made of galvanized steel.
3-phase device with short circuiting and earth cable cross section of 120 sqmm, short circuit cables 500 mm, earth cable 900 mm long.
Connection piece type 504 164 compressed, bolted and with transparent protection cover.

The earthing and short circuiting cables are made of highly flexible copper leads with transparent insulation. The transitions to cable lugs and connection piece are enclosed by a stabilized tenacious elastic and transparent sleeve.

For earth connection strap-type clamp type 502 022 with hand screw M16 was selected.

Earthing rod type 597 330 consists of an epoxy resin tube, glasfibre reinforced, with safety bayonet head and cross pin.
Length of the earthing rod = 1000 mm.

For further details please see:

E. and s.-c.device: Pages 7-15
Connection pieces: Page 37
Earth clamps: Page 42
Earthing rods: Pages 60, 61

THREE-PHASE EARTHING AND SHORT-CIRCUITING DEVICES

with short circuiting bus bars and clamping pieces for indoor medium voltage installations

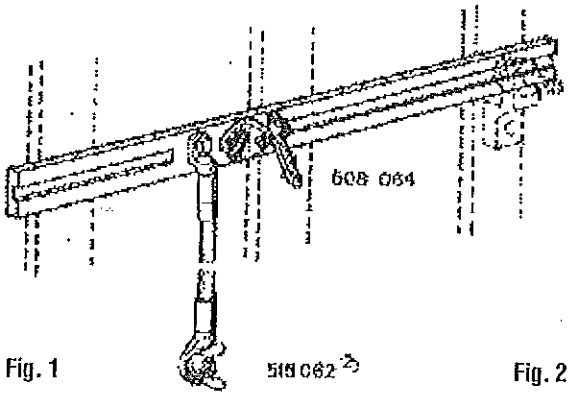


Fig. 1

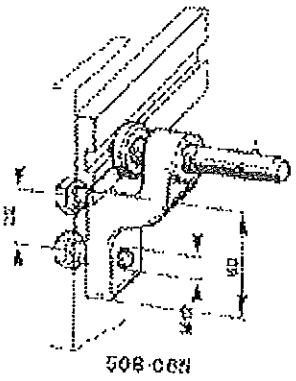


Fig. 2

In the case of extremely high short circuit currents rigid short circuiting bus bars are of advantage. They offer simple assembly, little floor space and high resistance to short circuit strength.

The bus bar is laid on the clamping pieces type 508 065 by means of an earthing rod (see page 63) and is tightened.

Feeding bolt 508 064 can be mounted horizontally or vertically and at any angle to the bus bar. The clamping pieces are securely tightened by fitting into a grooved slot on the bus bar.

The clamping pieces are made of galvanized steel and are equipped with a bayonet screw spindle and pressure plates.

Clamping piece Weight appr. 0.75 kgs
Type no. 508 065

Type no.	Cross sect. [mm]	Length [1] [mm]	Material	I_r / I_r [3] [kA/s]	Earth cable [2]	Weight each appr. kgs
508 079	40 x 10		Copper	95 / 0.5	A = 50 sqmm	4.0
508 075	40 x 10	650	Aluminium	60 / 0.5	L = 2000 mm	2.3
508 076	60 x 10		Aluminium	85 / 0.5		2.7

[1] the length refers to a distance between phases of 250 mm, please state other distances
[2] other earth connections and cable lengths also available
[3] the instantaneous short circuit current refers to Kappa $\kappa = 1.3$ ($I_S = 1.3\sqrt{2} = 1.84$)

For further details please see

Earth clamps: Pages 40-42
Earthing rods: Pages 60, 63

SINGLE PHASE EARTHING AND SHORT-CIRCUITING DEVICES

for high voltage overhead lines with carrier frequency transmission

appr. 4620

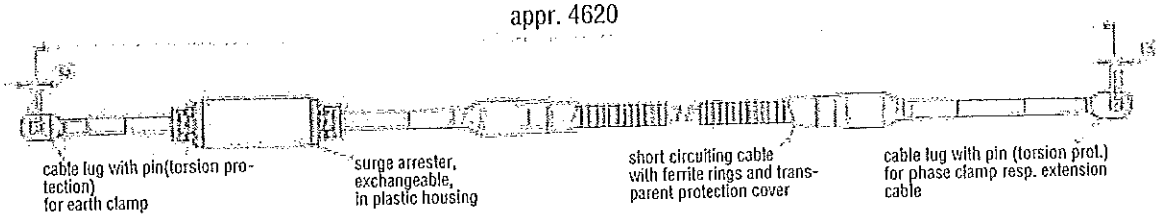


Fig. 1

Type no.:	**504 074**
Lead cross section:	70 sqmm
Rated current and time (I_r / t_r):	19.5 kA / 0.5 s
Weight:	appr. 7.3 kgs.

Application:

The device will earth and short circuit without interruption of the carrier frequency which is transmitted along the phase conductor. The carrier frequency range permitted is 35 – 490 kHz.

Construction features:

The ferrite rings on the short circuiting cable have the function of a frequency interruptor. They provide an inductance "L" of appr.1 mH. Above 100 kHz the impedance is 600 Ohm. For the lower frequencies the effectiveness of the barrier should be checked since the impedance will be less.

With 5 to 10 A the ferrite rings reach their saturation and are no longer effective. This must be taken into consideration especially with induced currents from neighbouring live systems. In the event of a short circuit peak voltages occur on the earthing and short circuiting cables which are limited to 150 V by a surge arrester which is connected in parallel to the cable.

The length of the cable is determined by about 300 ferrite rings mounted on the earthing and short circuiting cable. If required an extension is possible by means of a cable of the same cross-section. For easy handling and in order to protect the ferrite rings against mechanical damage the short circuiting cable with carrier frequency barrier should be fixed to the earth end side.

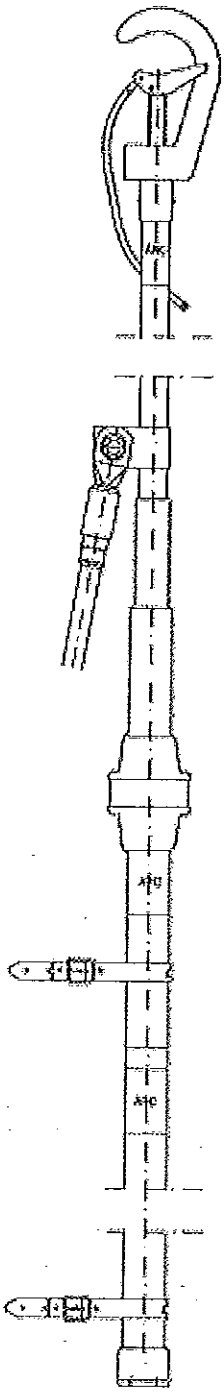
When extending and completing the carrier frequency device, the instruction for use no.22 which is enclosed with the equipment must be followed.

For further details please see:

E. and s.-c.devices:	Pages 7-15
Phase clamps:	Pages 46, 47
Earth clamps:	Pages 41-43
Earthing rods:	Pages 63-66.

SHORT-CIRCUITING DEVICE WITH EARTHING ROD

with conductive mid-section
for high voltage installations 220 kV



General:

Manual earthing and short circuiting of high voltage installations with high short circuit currents is hindered by increased conductor heights and large cable cross sections.

In order to facilitate the installation, 2-section earthing rods are used. The conductive upper section is made of aluminium tubes and the lower section of epoxy-resin tubes glasfibre-reinforced.

The cable is connected to the lower part of the aluminium tube by means of a bracket.

The length of the earthing and short circuiting cable and the earth clamp must be ordered according to local requirements.

The rod is equipped with an aluminium phase clamp similar to type 507 040 (page 47) with an additional sliding strap made of stainless steel.

The earthing rod is supplied with 2 leather straps to bind the two rod parts together, during transport.

Clamping range: ∅10-65 mm.

Earthing rod with conductive mid-section					
Type no.	max. cross sect. of earth cable sqmm.	I_r / t_r [kA/s]	Length max. [mm]	Transp. length [mm]	Rod weight [kgs]
511 136 D	120	33.5 / 0.5	6000	3150	5.0

For further details please see:

Earth clamps: Pages 41-43

511 136 D

Fig. 1

View A

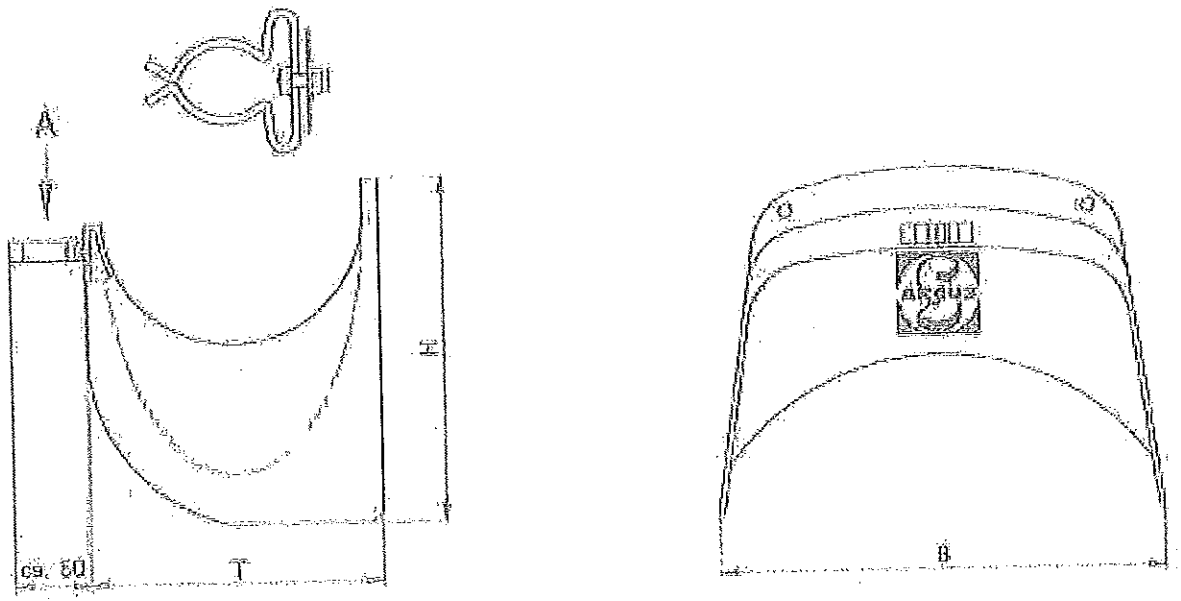


Fig. 1

Type no.	H [mm]	W [mm]	T [mm]	Material	with grip roller for earthing rod	without grip roller for earthing rod
615 057 615 058	215	273	185	Plastic	X	X
615 009 615 014	140	280	127	Steel with plastic covering	X	X

The storage brackets serve for the suitable storage of an earthing and short circuiting device and the earthing rod belonging to it.

The brackets are available either in plastic or steel plate.

In order to hold the earthing rod (tube Ø30-40 mm) a brace of spring steel is used.

In order to protect the highly flexible cables the load bearing-surface areas are specially rounded.

ВЯРНО С ОРИГИНАЛА

SINGLE PHASE EARTHING AND SHORT-CIRCUITING CABLES

with cable lugs

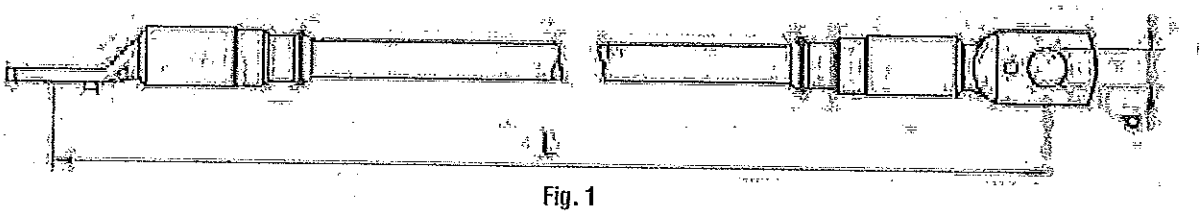


Fig. 1

Construction

All earthing and short circuiting cables are assembled from highly flexible copper leads and transparent plastic insulation. The transitions from cable lug towards lead cover are enclosed by a stabilized tenacious elastic transparent sleeve.

This mechanical kinking protection guarantees a reliable seal against the intrusion of moisture. Transparent insulation allows visual inspection of the lead right up to the copper sleeve. Consequently, damaged strands are easily recognised.

In order to protect the cable lugs against torsion and to reduce the dynamic forces in case of a short circuit each cable lug sleeve is equipped with a shear pin.

All leads are processed in accordance with the required pulling strength values to *DIN EN 61230 part 100: 1996-11.*

Type no.	cable cross section [sqmm]	I_r / t_r [kA/s]	Dimensions [1] L [mm]	Ø d [mm]	Weight each appr. kgs
504 097	25	7/0,5	2000	10,5	0,70
504 098			3000		1,0
504 099			4000		1,30
504 100			5000		1,60
504 101	35	10/0,5	2000		1,0
504 102			3000		1,50
504 103			4000		2,0
504 104			5000		2,40
504 105	50	14/0,5	2000		1,40
504 106			3000		2,0
504 107			4000		2,60
504 108			5000		3,20
504 109	70	19,5/0,5	2000		2,0
504 110			3000		3,0
504 111			4000		3,80
504 112			5000		4,70
504 113	95	26,5/0,5	2000	13,0	2,70
504 114			3000		3,90
504 115			4000		5,10
504 116			5000		6,30
504 117	120	33,5/0,5	2000		3,50
504 118			3000		5,20
504 119			4000		6,80
504 120			5000		8,40

[1] Other lengths and hole diameters possible on request.

CONNECTION PIECE WITH DETACHABLE CONNECTIONS

for earthing and short circuiting cables

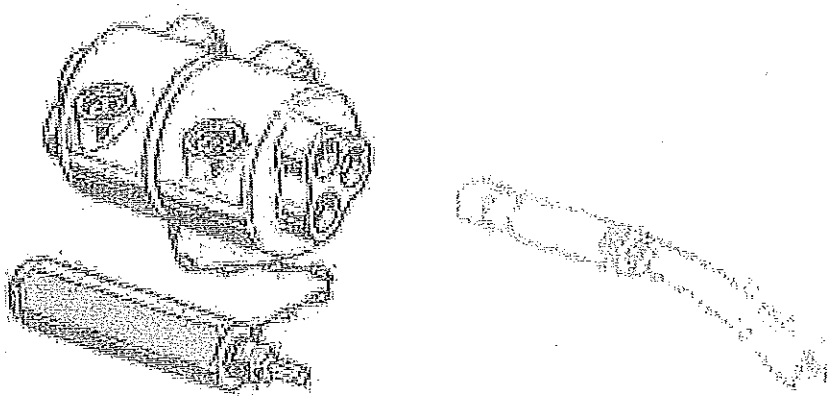


Fig. 1

Application:

The connection piece is intended for use in conjuction with earthing and short circuiting devices for low voltage overhead lines.

The cross section of connecting cables is 25 sqmm, rated current and time (I_r / t_r): 7 kA/0.5 s.

Construction features:

The connection piece is fully insulated.

Up to six earthing cables can be fed onto the connection piece and firmly attached by means of the insulated undetachable Allan key.

In this way the number of connecting clamps required for additional earthing and short circuiting of street lighting and control wires can be adjusted to practical needs.

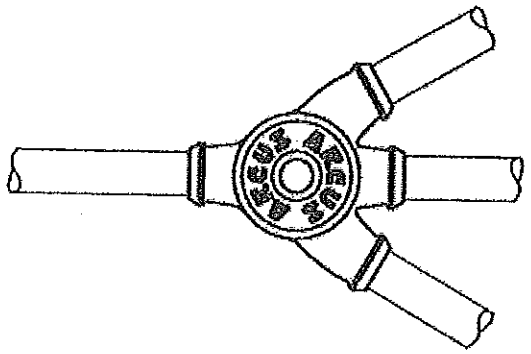
The cable ends are fitted with copper end sleeves. As a kinking protection, the passive part of the sleeve is moulded with a transparent, stabilized tenacious elastic and waterproof plastic sleeve.

The clamping body is of copper alloy, the Allen key of steel. The casing and the insulated grip are made of shock resistant plastic.

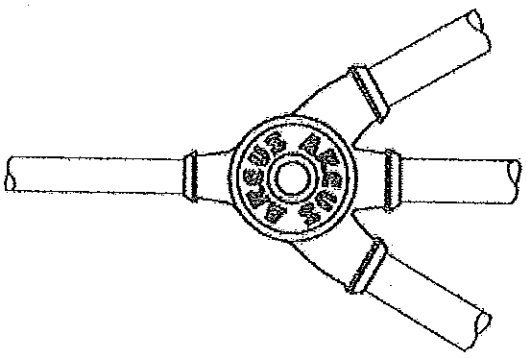
Type no.: 508 004

CONNECTION PIECE WITH UNDETACHABLE CONNECTIONS

for earthing and short circuiting devices with common earthing cable



Connection piece with equal cross sections		
Type no.	Lead cross section [sqmm]	(I_r/t_r) [kA/s]
504 158	4 x 16	4,5 / 0,5
504 159	4 x 25	7 / 0,5
504 160	4 x 35	10 / 0,5
504 161	4 x 50	14 / 0,5
504 162	4 x 70	19,5 / 0,5
504 163	4 x 95	26,5 / 0,5
504 164	4 x 120	33,5 / 0,5
504 165	4 x 150	42 / 0,5



Connection piece with reduced cross sections of earth cable		
Type no.	Lead cross section [sqmm]	(I_r/t_r) [kA/s]
504 181	3 x 35 +1 x 16	10 / 0,5
504 166	3 x 35 +1 x 25	10 / 0,5
504 167	3 x 50 +1 x 25	14 / 0,5
504 168	3 x 70 +1 x 35	19,5 / 0,5
504 169	3 x 95 +1 x 35	26,5 / 0,5
504 170	3 x 120 +1 x 50	33,5 / 0,5
504 171	3 x 150 +1 x 50	42 / 0,5

Construction

The connection pieces are compressed, bolted and coated with a transparent protection cover.

The transitions from the connection piece to the lead cover are enclosed by a stabilized tenacious elastic and transparent sleeve.

This mechanical kinking protection guarantees a reliable sealing against the intrusion of moisture.

Due to the transparent insulation the copper leads remain visible up to the copper sleeves. In this way damaged strands are quickly recognized.

In order to protect the cable lugs against torsion and to reduce the dynamic forces in case of a short circuit each cable lug sleeve is equipped with a shear pin.

Finally the lightweight construction of the connection piece (reduction of the accelerated mass in case of a short circuit) as well as the soft kinking protection offer an improved protection for personnel and installations.

All leads are processed in accordance with the required-values for tensile strength to DIN EN 61230 part 100: 1996-11.

Fully insulated connection pieces with leads of the same cross section:

All leads with equal cross sections are connected inside the connection piece uncut and short circuit-proof.

Fully insulated connection piece with reduced cross section of earth cable:

Earthing cables for use in three phase systems without neutral (no star point) may have a smaller cross-section than the phase cables.

When the length of earthing cable is reduced, the two outside phase cables are uncut and are bonded firmly into the connection piece with the separate middle phase cable and the earth cable.

Devices with reduced earth cable cross section offer good savings in weight to facilitate transportation - especially when long earthing cables are fitted.

CONNECTION PIECE WITH CABLE LUGS

for earthing and short circuiting devices with identical earthing cable

Construction features:

The connection consists of 4 copper compression cable lugs which are bolted together with a copper alloy high tensile bolt.

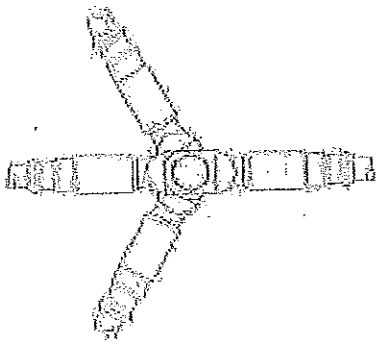


Fig. 1

The bolt is secured by a lock nut against accidental loosening.Bolt, lock nut and cable lug sleeve are uninsulated.

The transitions from the cable lugs to the lead are moulded with a transparent, stabilized tenacious elastic plastic material. This mechanical kinking protection seals against intrusion of moisture.

Connection piece with equal cross sections		
Type no.	Cable cross section [sqmm]	(I_F/t_F) [kA/s]
504 044	4 x 25	7 / 0,5
504 045	4 x 35	10 / 0,5
504 046	4 x 50	14 / 0,5
504 047	4 x 70	19,5 / 0,5
504 048	4 x 95	26,5 / 0,5
504 049	4 x 120	33,5 / 0,5
504 050	4 x 150	42 / 0,5

Connection piece with cable lugs for leads with identical cross section:

Short circuit cables and earth cable have leads with identical cross section.

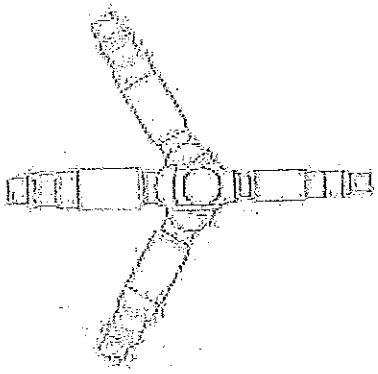


Fig. 2

Connection piece with reduced cross sections of earth cable		
Type no.	Cable cross section [sqmm]	(I_F/t_F) [kA/s]
504 085	3x 35 +1 x 25	10 / 0,5
504 086	3x 50 +1 x 25	14 / 0,5
504 087	3x 70 +1 x 35	19,5 / 0,5
504 088	3x 95 +1 x 35	26,5 / 0,5
504 089	3x 120 +1 x 50	33,5 / 0,5
504 090	3x 150 +1 x 50	42 / 0,5

Connection piece with cable lugs for reduced cross section of earth cable:

3-pole earthing and short circuiting devices for use in three phase systems without neutral (no star point) may have earth cables with smaller lead cross section than the respective short circuit cables.
When the length of earth cables is reduced, the two outside phase cables are uncut and are bonded firmly into the connection piece with the separate middle phase cable and earth cable.

Devices with reduced earth cable cross-section offer good savings in weight to facilitate transportation - especially when long earthing cables are fitted.

The connection pieces are similar to the above mentioned types 504 044 - 504 050.

ВЯРНО С ОРИГИНАЛА

EARTH CONNECTION CLAMPS

with flexible handle

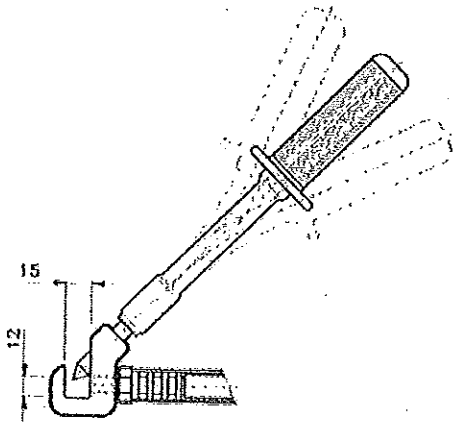


Fig. 1: 502 055 (with compressed connection)

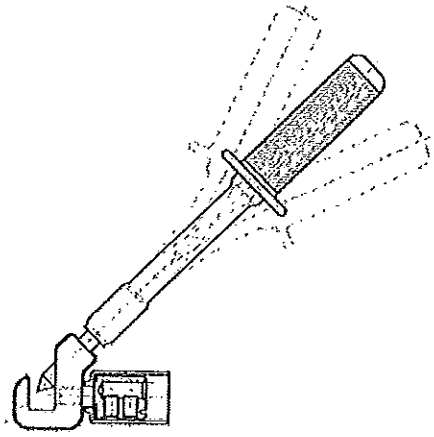


Fig. 2: 502 056 (with clamping connection)

Type no. earth conn.	for earth lead [sqmm]	Type no. compr. conn.
502 055	16	598 457 02
	25	512 227 06
	35	512 228 03

Type no. Earth conn.	Description
502 056	with clamping connection for 16-35 sqmm max. 1x35 sqmm H07RN-F

Suitable for:

Earth connections of single phase earthing and short circuiting devices with a cross section of max. 35 sqmm.

Earth connections of 3-phase earthing and short circuiting devices with short circuiting leads max. 95 sqmm and earth lead max. 35 sqmm.

The width of th clamp head of appr.20 mm only requires small space when clamping to the PEN bar.

Connections to earth bars with thickness of 3-8 mm.

Rated current and time (I_r / t_r): 10 kA / 0.5 s.

Construction features:

Clamp head, handle and lead connection are insulated, only the pressure bolt and the slot for the PEN-rail in the clamp head are bare.

The handle is flexible and can be bent when space is limited, e.g. when distribution boxes are closed.

The clamp head is of high quality copper alloy.The flexible handle is equipped with a threaded spindle of galvanized steel with a hardened cone shaped top.

Application note:

In the event of a short circuit the electro-dynamic forces will oppose the mechanical force which holds the clamp in position. Consequently it is essential that clamps are securely attached, especially for single phase earthing systems.

EARTH CONNECTION CABLE LUGS FOR FIXED POINT EARTHING

with threaded bolt

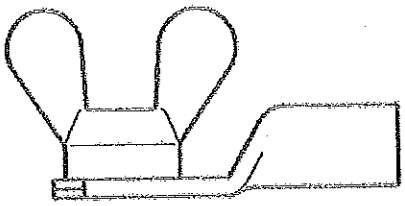


Fig. 1: 515 047, 515 061 - 515 066
515 132, 515 133, 598 335

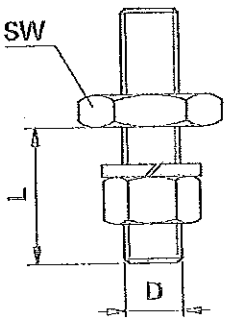


Fig. 2: 515 090, 515 091

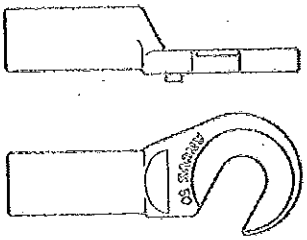


Fig. 3: 111 094 - 111 096

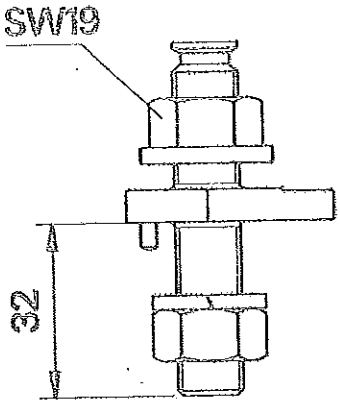


Fig. 4: 515 031

Construction features:

Connection part: copper compression cable lug with non-detachable wing nut[1] made of copper alloy.
Both parts are tin-plated.

[1] Also available with non-detachable wing bolt.

Type no.	Cross section of earth lead	Thread	Weight each appr. kgs
515 047	25		0,18
515 061	35		0,20
515 062	50	M12	0,22
515 063	70		0,23
515 066	95		0,24
515 132	35		024
515 133	50		0,25
598 335	70	M16	0,26
515 064	95		0,26
515 065	120		0,30

Fixed point: Threaded bolt of steel 8.8 with hexagonal brass disc of copper alloy, incl. nut and spring plate. All parts are tin-plated.

Type no.	Bolt dimensions D	L	Key size (SW)	Weight each appr.[kgs]
515 090	M 12	28	30	0,07
515 091	M 16	38	36	0,07

Connection part: Copper grooved cable lug with torsion safety device (cross pin).

Type no.	Cross section of earth lead [sqmm]	Weight each appr. [kgs]
111 094	25	0,07
111 095	35	0,07
111 096	50	0,07

Fixed point: Disc with torsion safety device and threaded bolt M12 made of copper alloy, pressed, incl. non-detachable collar nut, nut and spring plate.

Weight: appr. 0.15 kgs
Type no.: **515 031**

EARTHING CLAMPS FOR FIXED POINT CONNECTION

for cylindrical bolts with ring nut

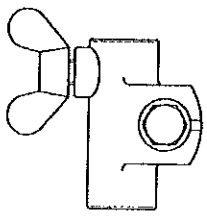


Fig. 1: 515 044

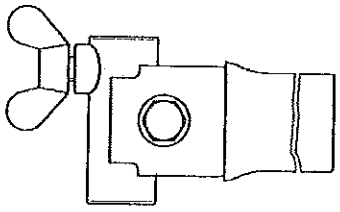


Fig. 2: 515 128

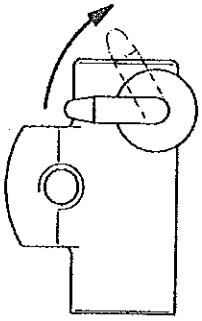


Fig. 3: 515 122

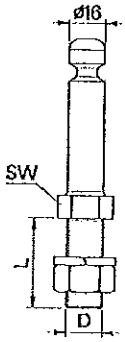


Fig. 4: 515 148, 515 149

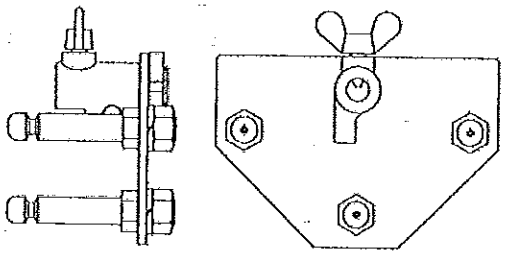


Fig. 5: 515 129
Weight: appr. 2.3 kgs

Construction features:

Connection parts:

Plug earth connection clamp with cable lug connection M12 and wing bolt for secure mounting on fixed point bolts. Plug clamp made of copper alloy, wing bolt of steel. All parts tin-plated or galvanized.

Type no.: 515 044

Plug earth connection clamp similar to type 515 044, but in addition with a C-shaped insulated handle in order to ensure an optical inspection of the copper lead.

Type no.: 515 128

Plug earth connection clamp with automatic locking catch mechanism. To remove the clamp from the fixed point the angle-lever is rotated in the required direction. Other features as type 515 044.

Type no.: 515 122

All plug clamps can be used with leads up to 120 sqmm cross section.
Rated current and time (I_r / t_r): 33.5 kA/ 0.5 s

Fixed points:

Cylindrical bolts with ring nut made of CuNiSi tin-plated, with nut and safety ring of galvanized steel. Rated current and time (I_r / t_r):

for cylindrical bolts M12: 33.5 kA / 0.5 s
and for cylindrical bolts M16: 41 kA / 0.5 s.

Type no.	Thread D x l	Key size SW	Weight each appr. [kgs]
515 148	M16 x 40	22	0,22
515 149	M16 x 40	22	0,20

Earth connection plate:
Plate made of tin-plated copper, thickness 5 mm, with modified plug clamp type 515 044 and 3 cylindrical bolts with ring nut. Suitable for earthing and short circuiting of 3 single phase short circuit cables with plug earth connection clamp.

Rated current and time (I_r /t_r):

for cylindrical bolts M12: 33.5 kA / 0.5 s
and for cylindrical bolts M16: 41 kA / 0.5 s.

Type no.: 515 129

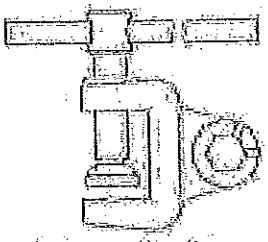


Fig. 1

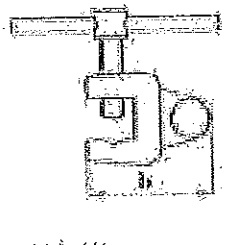


Fig. 2

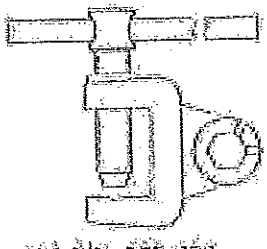


Fig. 3

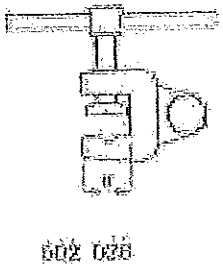


Fig. 4

Notched clamps may also be used on tubular or round conductors.

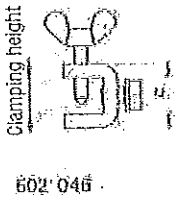


Fig. 5

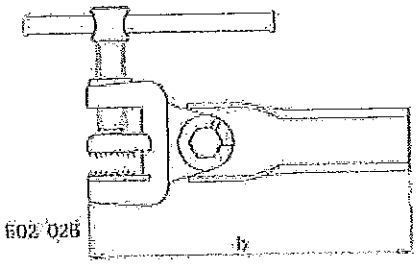


Fig. 6

Clamp type 502 026 is tightened to the earth connection and by means of the handle it can be rotated at an angular range of appr.20 °, tightening the hand screw repeatedly. After the serrated contact surfaces have removed paint or other insulating layers on both sides of the earth connection the hand screw can be tightened completely.

Application notes:

In the event of a short circuit the electrodynamic forces will oppose the mechanical force which is holding the clamp in position. Consequently it is essential that clamps are securely tightened, especially for single phase earthing and short circuiting devices.

Type no.	Cable cross section [sqmm]	(I_F / t_F) [kA/s][2]	Clamping height [mm]	Thread size Ø	Clamping section [mm] a[3]	b	c	d	Weight/each appr. kgs
Description:	Wing nut with hardened conical top. Steel U-section. All part are galvanized.								
502 046[1]	16 - 50	10 / 0,5	20	M 10	30	30	36	23	0,2
Description:	Galvanized steel hand screw with circular grooves. Copper alloy U-section with notched base.								
502 016	16 - 70	19,5 / 0,5	20	M 10	26	60	44	23	0,4
502 019	35 - 70	19,5 / 0,5	41	M 10	32	85	73	32	0,9
502 020	95 - 120	33,5 / 0,5	41	M 12	32	85	73	32	0,9
Description:	Galvanized steel hand screw with end pressure piece. Copper alloy U-section with notched base.								
502 028	16 - 70	19,5 / 0,5	15	M 10	26	60	44	23	0,4
502 021	35 - 70	19,5 / 0,5	31	M 10	32	85	73	32	0,9
502 022	95 - 120	33,5 / 0,5	31	M 12	32	85	73	32	0,9
Description:	Contacts with serrated steel surface, hardened and galvanized. Paint and oxyde layers can be removed by sliding the clamp whilst tightening it.								
502 026	35 - 120	33,5 / 0,5	24	M 12	32	185	73	32	1,1

1) For earth connection of 3-phase earthing and short-circuiting devices.
2) The listed rated values in each case refer to the maximum short circuit cable cross section.
For rated values for smaller cross sections please see table on page 11.
3) Clamp dimension "a" refers to the width of the U-section.

ВЯРНО С ОРИГИНАЛА

SPHERICAL TONGS AND UNIVERSAL PHASE CONNECTION CLAMPS

for ball point connectors

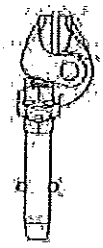


Fig. 1

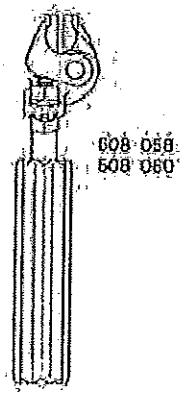


Fig. 2

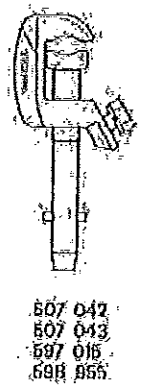


Fig. 3

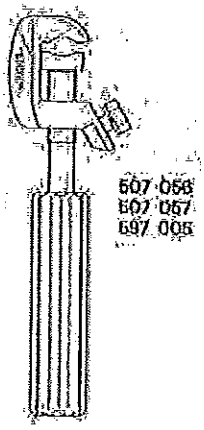


Fig. 4

Construction features:

Spherical tong

The compact construction allows installation under limited space conditions. Both clamping sections are equipped with large-area spherical caps.This avoids distortion or abrasion of the ball point connector. For connection, the opened spherical tong is placed onto the ball point connector and then tightened free from the weight of the device.

Universal phase clamp

The fork-shaped clamping piece ensures a connection to the ball point connector secure against the dynamic forces in case of a short circuit.The universal phase clamps are equipped with a pressure piece and are suitable for use with round and flat conductors as well as ball point connectors and T-bolts. The clamping surfaces are equipped with vertical grooves for use with flat and round conductors. The connection bolts for the cable lugs are notched to take up the cable lugs with pin against torsion.

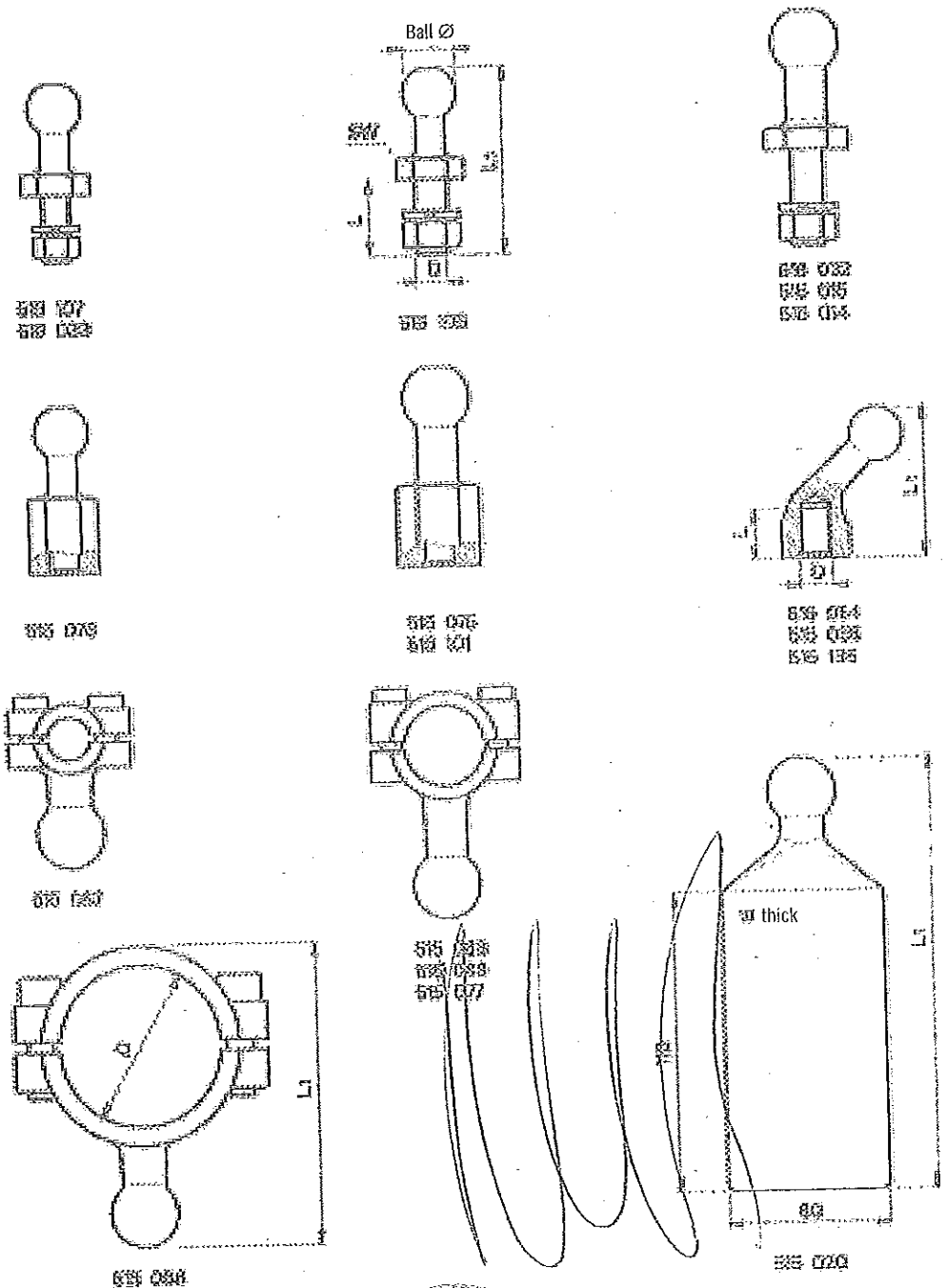
The earth connection clamps and tongs are provided with plastic handles. The clamping pieces are of a high-quality copper alloy, hand screw, bolt and spring plates are made of galvanized steel.

Type no.		Clamping range mm							Weight each [kgs]	
Clamp for connection to		Conductor		Fixed point		Cable cross sect.	I_r / t_r	Connection bolt	Clamp for connection to	
phase	earth	round	flat	Ball p.c.	T-bolt	[sqmm]	[kA/s]		phase	earth
Spherical tong										
508 057	508 058	-	-	20	-	max. 95	26,5/0,5	M10	0,40	0,50
508 059	508 060	-	-	25	-	max. 120	33,5/0,5	M12	0,50	0,60
Universal phase clamp										
507 042	507 056	9-22	up to 20	20	15	max. 70	19,5/0,5[1)]	M10	0,60	0,70
507 043	507 057	9-22	up to 20	25	20	max. 120	33,5/0,5	M12	0,80	0,90
597 166	-	9-22	up to 20	20/25	20	max. 95	24/0,5	M12	0,80	-
597 015	597 005	9-22	up to 20	25/30	20	max. 95	26,5/0,5	M12	0,80	0,90
598 955	-	9-22	up to 20	25/30	20	120	33,5/0,5	M12	0,80	-

1) The high current test of the universal clamp type 507 042 with ball point connector type 515 076 resulted in 23 kA/1.3 s.

Advantages in use of fixed points:

- Defined connections to conductor and earth installation for earthing and short circuiting.
- The secure connection between fixed point and connection clamp guarantees safety in case of high dynamic and thermal loads during a short circuit.



The spherical heads of the fixed points are manufactured with a very high-quality surface.

The threaded bolts are dimensioned for high dynamic forces.

Construction features/Type no.:

Type no.	Ball Ø [mm]	I_r / t_r [kA / s]	Connection thread resp. hole Ø [mm]	Fixed points: Length of thread L	Fixed points: Total length L	Key size SW	Weight each appr. kgs
Ball point connectors with threaded bolt in one piece, nut and spring washer							
515106	20	14 / 0,5	M 10	25	67	22	0,15
515107	20	26,5 / 0,5	M 12	28	70	22	0,20
515033	20	26,5 / 0,5	M 12	36	77	22	0,20
515032	25	33,5 / 0,5	M 12	36	88	27	0,40
515015	25	33,5 / 0,5	M 16	27	79	27	0,35
515014	25	33,5 / 0,5	M 16	47	99	27	0,40
Ball point connectors straight, with female thread (without bolt)							
515076	20	26,5 / 0,5	M 12	18	62	22	0,20
515075	25	33,5 / 0,5	M 12	18	74	27	0,35
515101	25	33,5 / 0,5	M 16	24	77	27	0,35
Ball point connectors angled at 45° with female thread (without bolt)							
515054	20	26,5 / 0,5	M 12	18	56	22	0,10
515136	25	33,5 / 0,5	M 12	24	76	27	0,20
515055	25	33,5 / 0,5	M 16	24	76	27	0,20
Ball point connectors for round conductors, conductor clamping piece retained by 2 screws							
515067[1]	25	33,5 / 0,5	to Ø16[2]	-	58	-	0,25
515068[1]	25	33,5 / 0,5	Ø 16-22[2]	-	75	-	0,35
515069[1]	25	33,5 / 0,5	Ø 22-30[2]	-	75	-	0,35
515077[1]	25	33,5 / 0,5	Ø 30-40[2]	-	85	-	0,45
515086[1]	25	33,5 / 0,5	Ø 50-60[2]	-	110	-	0,70
Ball point connector with lug for connection to busbar packages							
515020	25	33,5 / 0,5	Lug 60 x 10, Length: 110 mm				0,75

[1] Ball point connectors made of copper F20, tin plated
[2] Please state conductor diameter in your order

Material:

Ball point connectors made of high tensile copper alloy F65, tin plated, nuts and spring washers made of galvanized steel, bolts (in connectors for round conductors) made of stainless steel.

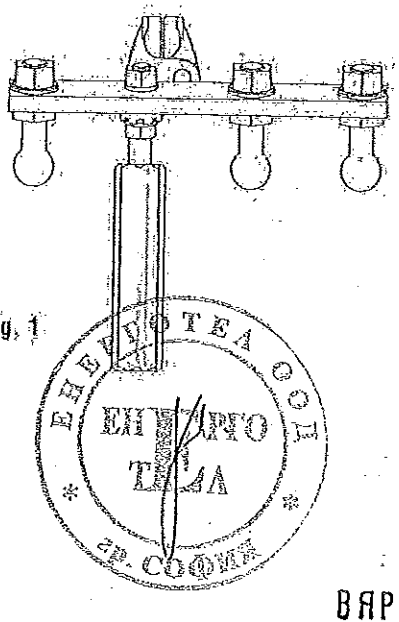


Fig. 1

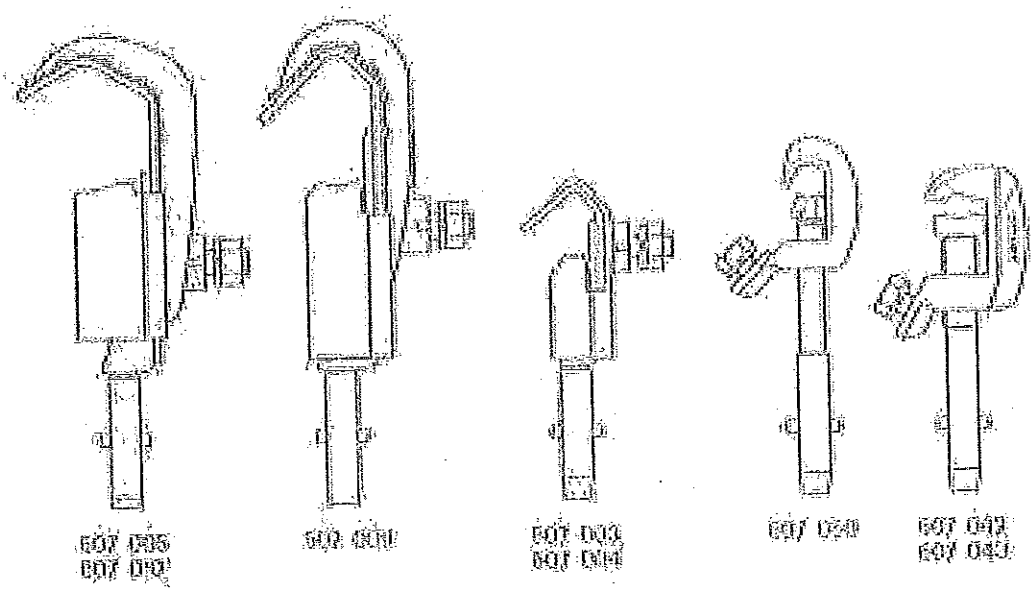
Multiple earth connection with ball point connectors

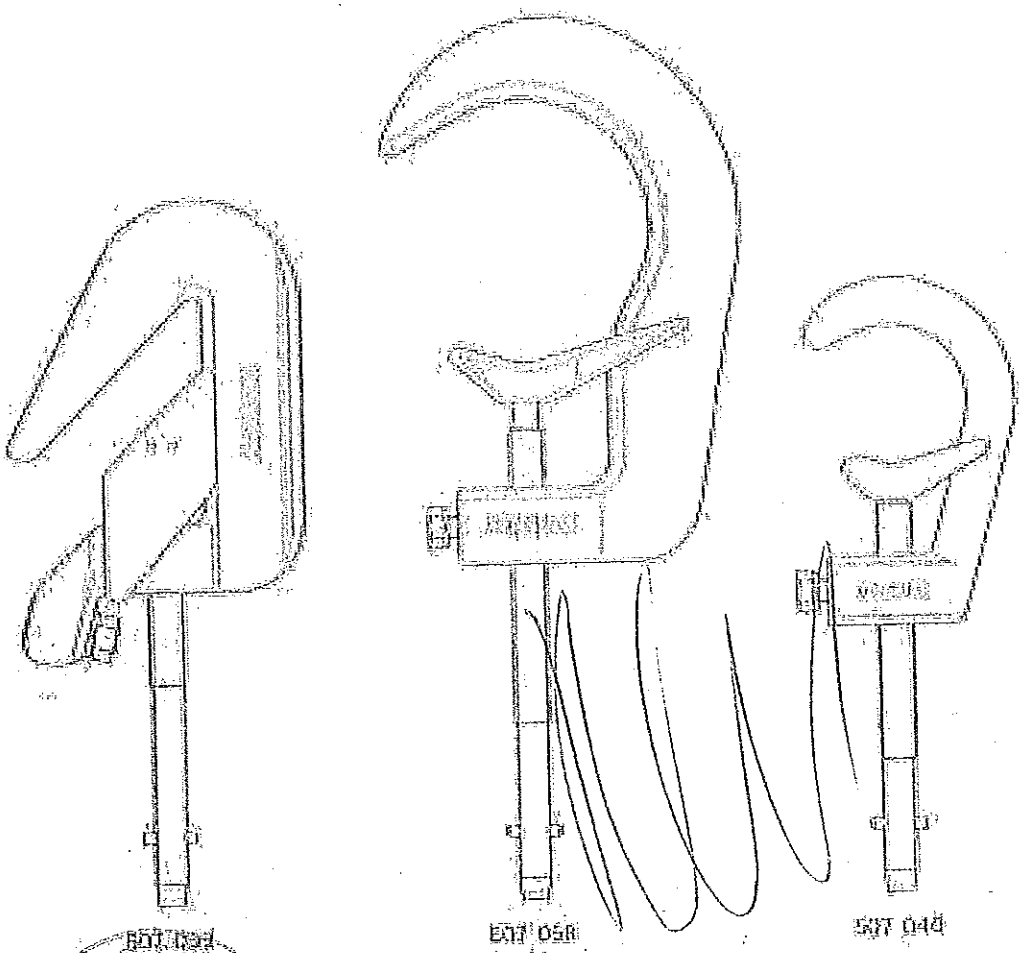
Bar for earth connection with 3 ball point connectors

The bar is equipped with 3 ball point connectors Ø = 25 mm and one spherical tong with plastic handle, type 609 060. For connection to the earth installation there is one ball point connector Ø = 25 mm.

Rated current and time (I_r / t_r): 33.5 kA / 0.5s

Weight: appr. 2.25 kgs
Type no. 515 134





ВЯРНО С ОРИГИНАЛА

PHASE CONNECTION CLAMPS FOR AL AND CU / CONSTRUCTION

screw clamps especially for round conductors

Type no.	Clamping range [sqmm/mm]	Cable cross section max. [sqmm]	I_r / t_r [kA / s]	Connection bolt thread	Construction	Weight each appr. kgs
507 050 [1]	16-120² Ø 4–14	95	26,5 / 0,5	M 10	Compact construction, contact surfaces finely grooved	0.35
507 004 [3]	10-150² Flat 15	95	26,5 / 0,5	M 10	High tensile sheet construction, large contact surfaces, swivel spindle	0.32
507 003 [2]	16 - 240² Flat 20	95	26,5 / 0,5	M 10	High tensile sheet construction, large contact surfaces, swivel spindle	0.55
507 042 [1]	Ø9-22 Flat 20	70	19,5 / 0,5	M 10	Compact construction, also for use with ball point connectors 20 mm and T-bolts 15 mm	0.60
507 043 [1]	Ø9-22 Flat 20	120	33,5 / 0,5	M 12	Compact construction, also for use with ball point connectors 25 mm and T-bolts 20 mm	0.80
507 006 [3]	Ø6-35 Flat 30	120	33,5 / 0,5	M 12	High tensile sheet construction, large contact surfaces, swivel spindle	0.88
507 010 [3] **507 005** [2]	Ø20-60	120	33,5 / 0,5	M 12	High tensile sheet construction, large contact surfaces, swivel spindle	0.87 1.60
507 099 [3]	Ø5-35	150	42 / 0,5	M 12	Heavy section die cast	1.30
507 040 [3]	Ø10-65	120	33,5 / 0,5	M 12	Heavy section die cast	0.95
507 058 [3]	Ø50-120	120	33,5 / 0,5	M 12	Heavy section cast aluminium alloy	1.30

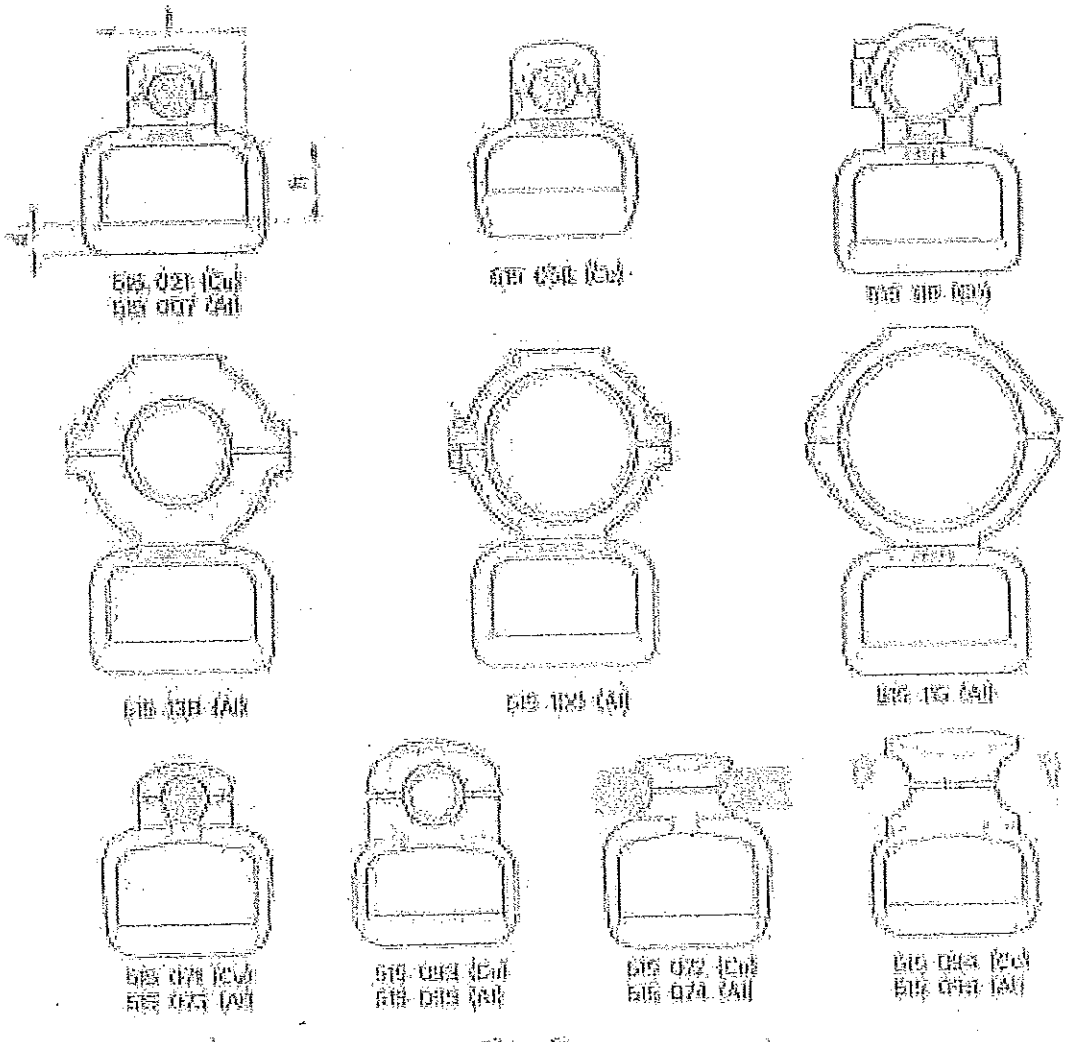
[1] Strap and pressure piece made of tin plated copper alloy, spindle galvanized steel
[2] Heavy duty copper alloy, tin plated, type 507 005 plain copper (only for copper conductors)
[3] Tempered aluminium alloy, type 507 040, 507 099 and 507 058 spindle of galvanized steel

ВЯРНО С ОРИГИНАЛА

ЕНЕРГОТЕХ ООД гр. СОФИЯ

Advantages in the use of fixed points:

- Defined connections for earthing and short circuiting on conductor and earth installation
- The secure connection between fixed point and connection clamp guarantees safety in case of high dynamic and thermal loads during a short circuit.



ВЯРНО С ОРИГИНАЛА

Construction features / Type no.

Cond. fixed point type no. Material Cu	Al	for cond. ⌀ or ● mm	Dimensions of fixed point in mm d	l	h	for phase connection clamp type no.	for nominal voltage max. kV	Weight each appr. kgs Cu	Al
Strap-type fixed points for round conductors parallel and transverse to the conductor									
515021	**515007**	⌀10-30	20	95	50		220	1,80	0,65
515056	-	⌀10-30	30	90	35			2,20	-
515116	-	⌀60	20	95	50	507 005[2] 507 006 507 010		1,75	-
-	**515138**	⌀60-95	20	95	50	507 040 507 042 507 043		-	1,40
-	**515100**	⌀100	20	95	50	(fixed point 515 056 not suitable		-	1,10
-	**515115**	⌀120	20	95	50	for 507 042 and 507 043)		-	1,20
Strap-type fixed points for round conductors transverse to the conductor									
515071	**515073**	⌀10-30	20	90	50	507 005[2] 507 006 507 010	150	1,50	0,45
515093	**515095**	⌀30-50	20	90	40	507 040 507 042 507 043	220	270	0,70
Strap-type fixed points for round conductors parallel to the conductor									
515072	**515074**	⌀10-30	20	90	50	507 005[2] 507 006 507 010	220	1,50	0,45
515094	**515096**	⌀30-50	20	90	40	507 040 507 042 507 043		2,70	0,70
Shell-type fixed points for round conductors									
	515079	⌀20-28	35	95	-	507 006 507 010 507 040	220	-	0,35
Strap-type fixed points for flat conductors parallel and transverse to the conductor									
515012	**515 013**	flach 12 [3]	20	95	50	507 003 507 004 507 005[2] 507 006 507 010 507 040 507 042 507 043	220	1,70	0,55
Strap-type fixed points for flat conductors parallel and transverse to the conductor									
515022	**515008**	flach80x10	20	95	50	507 005[2] 507 006 507 010 507 040 507 042 507 043	220	2,30	0,75
Strap-type fixed points for 2 flat conductors parallel and transverse to the conductor									
515034	-	max. - 2 x 80 x 10	20	95	50	507 005[2] 507 006 507 010 507 040 507 042 507 043	150	1,70	-
-	**515123**	⌀10-30	25	-400[4]	-	507 006 507 010 507 040	220	-	1,50

[1] Please state the exact conductor-⌀ in your order
[2] Phase connection clamp 507 005 only for use with copper fixed points
[3] Attached by drilling two 8.5 mm holes, 40 mm between centres
[4] Length of strap suitable for 2 phase connection clamps.

Material:

Cu: Straps made of copper and copper alloy (bare), bolts high-tensile copper alloy
Al: Straps made of high tensile aluminium alloy, bolts of stainless steel

Fig. 1: 507 009

Fig. 2: 507 037

Fig. 3: 507 077

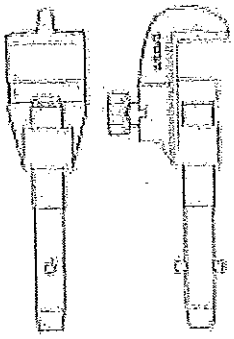


Fig. 4: 507 007

Construction features:

Pointed clamps 507 009, 507 037:
The clamping parts are closed by thightening the cone which is mounted on a threaded spindle.
One clamping part has fine cross grooves, whilst the second one has a flat surface which is angled to correspond with the swinging action as the cone is tightening.

Type 507 037 has a stud in the serrated clamping part. The bus bar to be clamped should have a hole of appr. 6,5 mm to accomodate this stud.

These clamps are especially designed for use on bus bars, flat switching contacts and disconnecting switches.

Pointed clamps for contact blades type 507 077:
This clamp is designed for use in encapsulated switchgear or on contacts with limited access space.

The compact construction is a specific feature of this clamp. It can be used in a bushing with dimensions 50 x 36 cm. Pointed clamps are suitable for vertical or horizontal bus bars (e.g. on isolators).

U-shaped clamp 507 007:
This type is mounted at right angles on flat conductors.

The contact surfaces in the strap are finely cross grooved.

The pressure piece pivots on the threaded spindle so as to adapt to possible surface irregularities without affecting the contact.

Type no.	Clamping range [mm]	Cable cross section max. [sqmm]	I_r / t_r [kA / s]	Connection bolt thread	Weight each appr. kgs
			Pointed clamps		
507 009	flat up to 12	70	19,5 / 0,5	M 10	0,50
507 037	flat up to 6 with boring	95	26,5 / 0,5	M 10	0,50
507 077	Contact blade 5-15	120	33,5 / 0,5	M 10	0,90
			U-shaped clamps		
507 007	flat up to 20	120	33,5 / 0,5	M 10	0,50

Clamping parts and bolts are made of high tensile copper alloy.

Application notes: In case of a short circuit dynamic forces are opposing the secure connection of the clamp to the conductor. For this reason ensure that the clamps are tightened properly.

EARTHING AND SHORT CIRCUITING DEVICES, EARTHING RODS

for electric railway contact wires

These devices are fully approved by the Deutsche Bahn / DB (German Railway System)

Electrical load values for complete devices (according to the DB):

I_{sw} = 78 kA I_k'' = 35.6 kA t_k = 0.06 sec

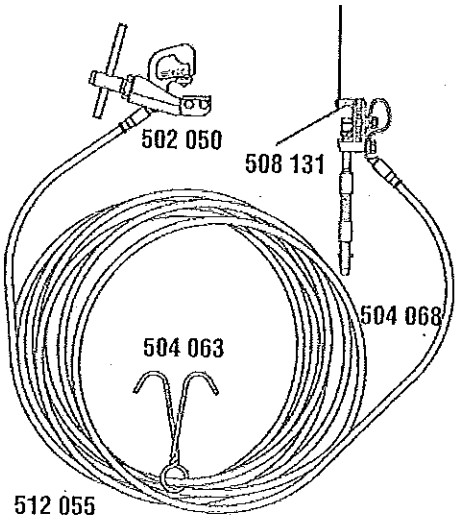


Fig. 1

Type no. clearing track-profile	Type no. not clearing track-profile	consisting of 1)		Weight each appr. kgs
for local storage				
512 055	–	508 131 504 063	502 050 504 068	12,5
–	512 056	508 131	502 050 504 153	10,0
512 036	–	512 055	511 188	18,0
–	512 034	512 056	511 188	15,5
can be fitted on electrical track maintenance vans				
–	512 042	512 056	511 130	14,9

1) for parts please see page 53

Fig. 2

Telescopic earthing rods in two sections with securable locking head. Insulating tubes made of fibre glass reinforced polyester, inner tube square. Rod head, coupling and rod end cap are made of metal. The robust construction is designed to withstand occasional dropping onto the track without damage.

Total length (Lg):	5.0 m
Transport length (Lt):	2.9 m
Weight:	appr. 5.5 kgs
Type no.:	511 188

Telescopic earthing rod in three sections with securable locking head, insulated tubes made of fibre glass reinforced polyester. Due to its reduced transport length this rod is specially suitable for transport on electrical trains.

Total length (Lg):	5.0 m
Transport length (Lt):	2.2 m
Weight:	appr. 4.9 kgs
Type no.:	511 130

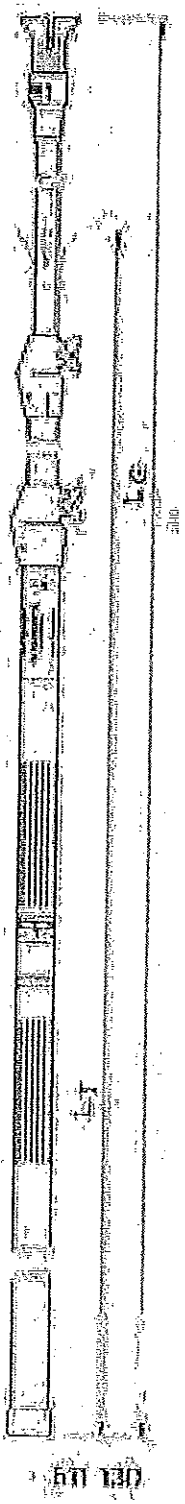


Fig. 3

EARTHING AND SHORT CIRCUITING DEVICES, FIXED POINTS EARTHING RODS

for feeder cables and contact wires of electric railways

These devices are fully approved by the Deutsche Bahn / DB (German Railway System)

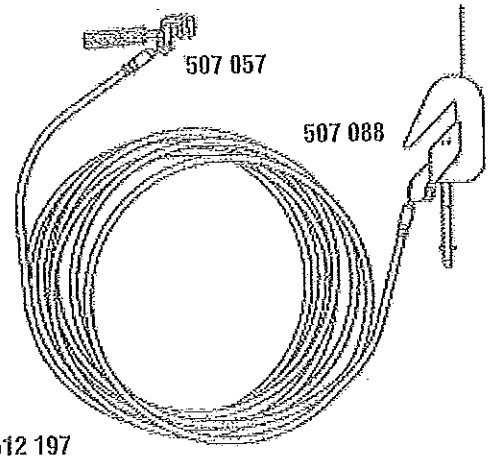


Fig. 1: 512 197

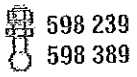


Fig. 2

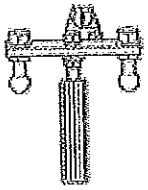


Fig. 3: 515 130

The earthing and short circuiting device consists of:

Phase connection clamp 507 086
with test strip, for conductors Ø6-35 mm.

Earthing and short circuiting cable 504 126
cross section 50 sqmm, length 4000 mm, made of highly flexible copper lead with transparent insulation cover.

Earth connection clamp 507 057 with handle
for ball point connectors Ø25 mm and flat conductors up to 20 mm.

Weight appr.	10.5 kgs
Type no.	**512 197**

Telescopic earthing rod in two sections
with safety bayonet head, insulated tube made of fibre glass reinforced epoxy resin.

Total length (Lg):	3.5 m
Transport length (Lt):	1.9 m
Weight:	appr. 3.0 kgs
Type no.:	**511 167**

Fig. 4

Fixed points as required:

Ball Ø:	25 mm
Thread:	M16 x 47
Weight:	appr. 0.40 kgs
Type no.	**598 239**
Thread:	M16 x 27
Weight:	appr. 0.35 kgs
Type no.	**598 389**

Multiple earth connection consisting of:

Star point bar made of copper, with 2ball point connectors Ø25 mm fixed to an earth connection clamp for ball point connectors Ø25 mm.

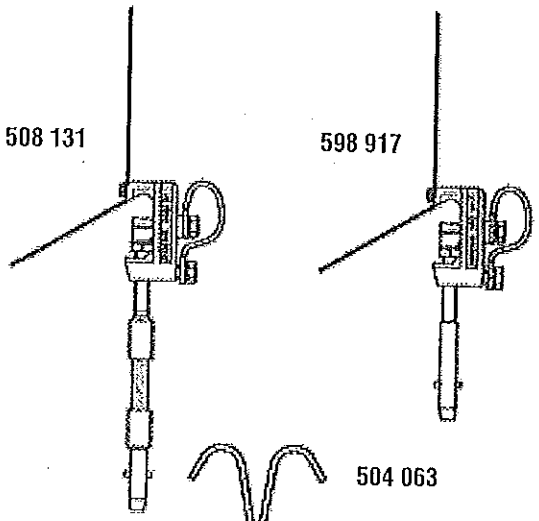
The multiple earth connection may be used with two single-phase short circuiting devices.

Weight:	appr. 1.75 kgs
Type no.:	**515 130**

COMPONENTS FOR EARTHING AND SHORT CIRCUITING DEVICES

for contact wires of electric railways

These devices are fully approved by the Deutsche Bahn / DB (German Railway System)

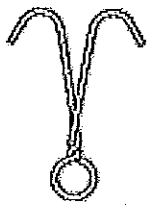


Connection clamp for contact wires

with spring plates and direct cable connection to the clamp body and pressure plate.

For grooved contact wires Ri 80-120 to DIN 43141 and round contact wires Ø10.6 up to 13.2 mm.

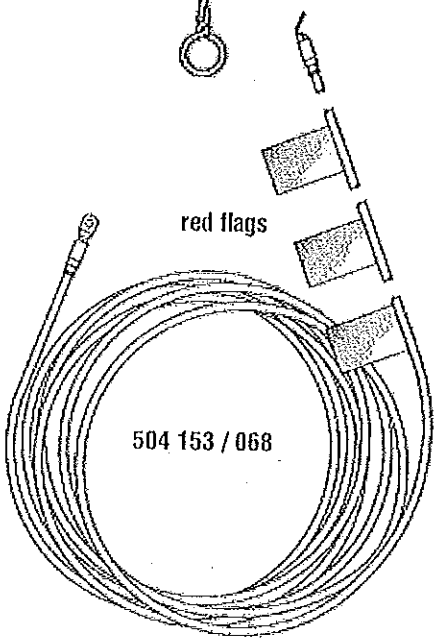
Weight: appr. 1.25 kgs
Type no.: 508 131 with flexible bayonet spindle
598 917 with rigid bayonet spindle



Suspension hook

for earthing and short circuiting cables to obtain clearance-free fixing.

Weight: appr. 0.2 kgs
Type no.: 504 063



Earthing and short circuiting cable

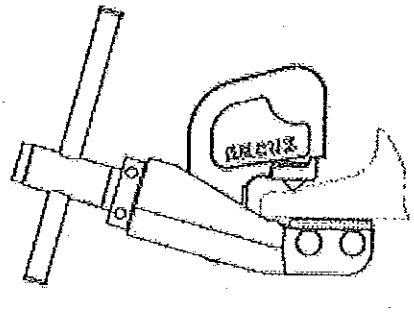
highly flexible multi-stranded copper lead 50 sqmm, length 8.5 m, with transparent and waterproof insulation cover, compression cable lug on both sides, with 3 red flags. Not for clearance-free earthing.

Weight: appr. 5.4 kgs
Type no.: 504 153

Earthing and short circuiting cable

as above, length 12 m.
For clearance-free earthing.

Weight: appr. 7.6 kgs
Type no.: 504 068



Rail foot earthing clamp

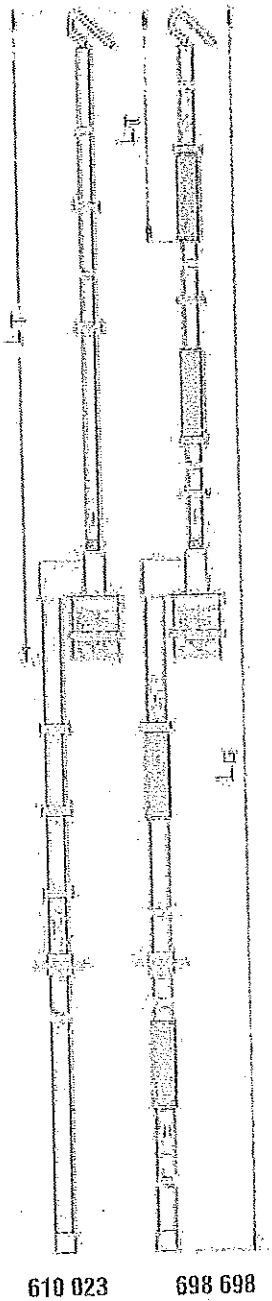
with replaceable contact cutting piece for penetration of foreign matter.
For rail profiles S 49, S 54, S 64, UIC 60.

Weight: Appr. 3.4 kgs
Type no.: 502 050 with hand screw
Type no.: 502 059 with ratchet

HIGH VOLTAGE LIVE LINE TESTERS AND EARTHING ROD, MULTI-SECTIONAL

for contact wires of electric railways

These devices are fully approved by the Deutsche Bahn / DB (German Railway System)



610 023 698 698

Fig. 1

Voltage tester ARCUSLIGHT CE

for 15 KV, 16 2/3 Hz, with optical indication, self-testing device, glasfibre-reinforced epoxy resin tubes with rain shields.

May be used in precipitation

Supplied in a tough woven plastic carrying bag, cold-resistant.

2-section type for contact and reeder wires

Total length (Lg):	4.6 m
Transport length (Lt):	2.4 m
Weight:	appr. 3.1 kgs
Type no.:	**610 023**

5-section type with sealed screw-type couplings

The reduced transport length makes his device ideal for fire brigades and emergency services.

Total length (Lg):	4.6 m
Transport length (Lt):	appr.1 m
Weight:	appr. 3.5 kgs
Type no.:	**698 698**

5-section telescopic earthing rod

with securable locking head, insulated fibre glass tubes, plug-in couplings with push-button locking.
Due to its reduced transport length this rod is especially useful on board electric trains and emergency accident vehicles.

Supplied in a tough woven plastic carrying bag, cold-resistant.

Total length (Lg):	5.0 m
Transport length (Lt):	appr. 1.05 m
Weight:	appr. 5.0 kgs
Type no.:	**511 189**

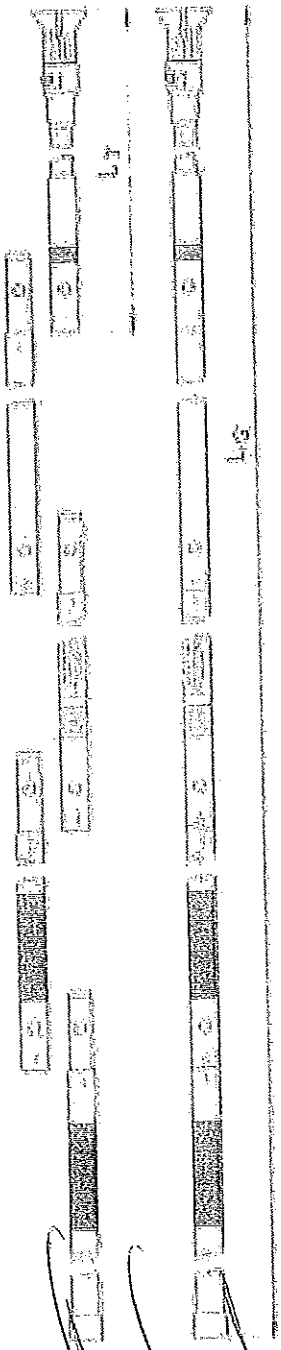


Fig. 2: 511 189

SHORT CIRCUIT DEVICE FOR THIRD RAIL SYSTEMS

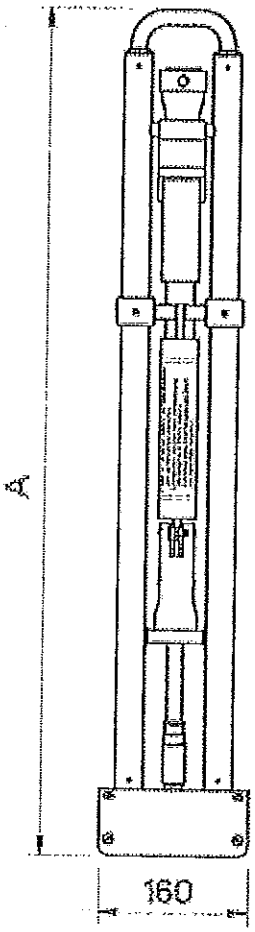


Fig. 1

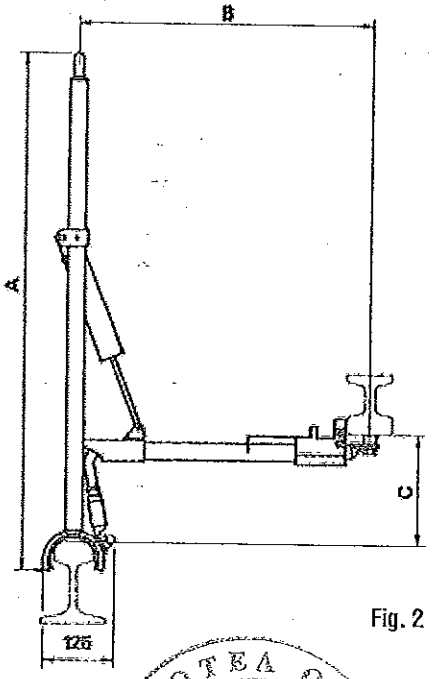


Fig. 2

This device is used for short circuiting tracks with a lateral contact rail.

It is attached to the running rail adjacent to the contact rail. The short-circuit is effected by swinging over the fully insulated handle. The fast-operating system may be used in an emergency to short circuit the live contact rail.

Short-circuit rating:

Up to 30 kA/ 0.025 s with 700 V d.c.

The compact construction of the earthing device allows it to be stored under the train driver's seat.

All electrical wearing parts are exchangeable.

References: Munich, Berlin, Hamburg, Vienna, London Docklands, Prague, Singapore and others.

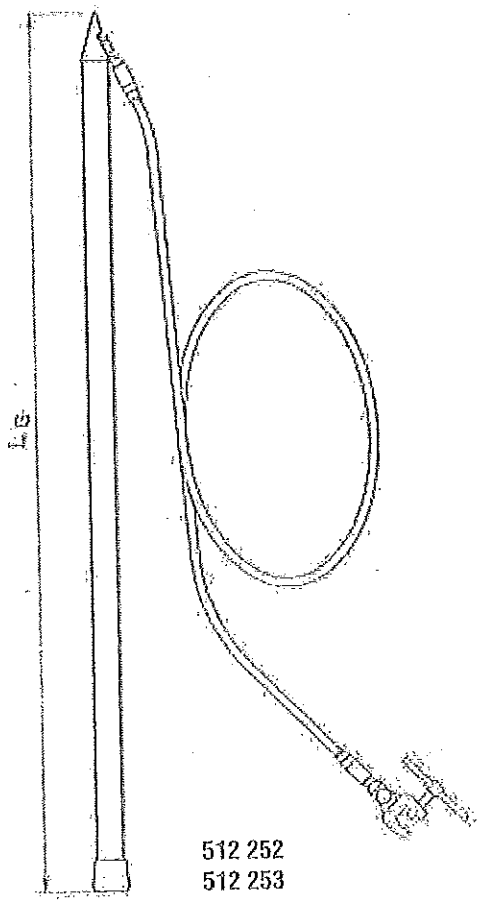
Please state the distance A and B (between the rails), according to picture 2.

Storage dimensions:

appr. ≤ 1100 x 160 x 125 mm

Weight:	appr. 5.0 kgs
Type no. for standard construction:	515 105

Short circuit devices for other rail configurations on request.



512 252
512 253

Fig. 1

These devices are designed to equalise for a short time differences in potentials.
For this purpose the earthed test tip is brought in contact with the part to be restored to earth potential.

The devices are firmly connected to the earthing rod:

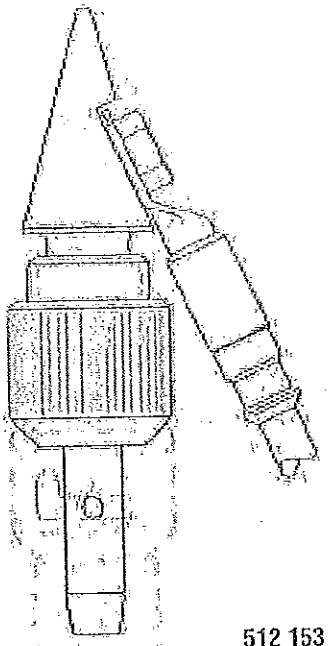
Construction:

Earthing rod made of fibre glass reinforced epoxy resin tube, total length (L_g) = 1000 mm, firmly connected to test tip of aluminium.
Earth cable 25 sqmm, length 3000 mm, with earth connection clamp 502 016.

Weight: appr. 1.8 kgs
Type no.: 512 252

As above, but earthing rod with a total length of 1500 mm.

Weight: appr. 2.0 kgs
Type no.: 512 253



512 153

Fig. 2

Device for mounting to existing earthing rods:

Construction:

Test tip with screw-on quick fastening device to earthing rods 510 194 - 510 210, earth cable 25 sqmm, length 3000 mm, with earth connection clamp 502 016.

Weight: appr. 1.2 kgs
Type no: 512 153

For more information please see:

Earthing rods	page 63
Earth cables	page 35
Earth connection clamps	page 42

JUMPER CONNECTION DEVICES

for equalising induction cur rents in cables and pipelines

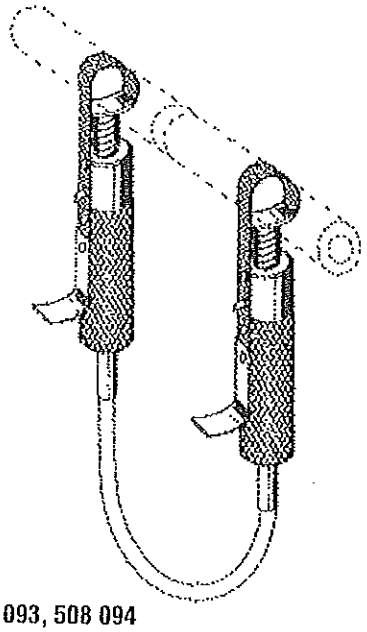


Fig. 1: 508 093, 508 094

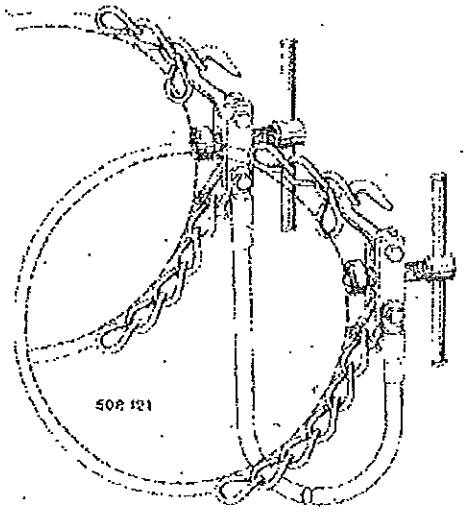


Fig. 2: 508 121

1.) Working on cable networks

Working on insulated metal sheathed cables which are influenced by adjacent strong a.c. current paths, or by earth-fault currents of high voltage lines with a star neutral earth point is highly dangerous.
According to DIN VDE 0105-100: 1997 - 10, para. 6.2.4.1.101, any insulated metal conductor under the electro-magnetic influence of an alternating current path, or a star neutral point of an h.v. network, must have a bridging electrical contact made of at least 16 sqmm before cutting.
Our devices types 508 093 and 508 094 are especially designed for this application and have been proven in practice to be highly effective.
Previous devices were either too heavy, caused deformations on the metal sheath of cables or worked loose during working. The ARCUS system fully overcomes these problems.

2.) Working on pipelines

Before the separation of electrically conductive house connection pipelines and pipelines in buildings, e.g. when exchanging fittings, meters, or in case of repair works, a provisional electrical bypass with 25 sqmm can be applied.

Jumper connection device type 508 121 is also suitable for coated pipes.

The clamps are connected by a highly flexible copper cable of 2500 mm length, with transparent insulation.

Type no.	Clamping range [mm] Outer∅ of the cable screen	for bare and insulated pipes	Construction features	Weight per device appr. kgs
508 093	13,5 – 90	-	Flexible tin plated conductor band, stainless steel pressure spring, plastic handles	1,0
508 094	90 – 220	-		1,10
508 121	-	60 – 250	Pressure plate with circular grooves of hardened burnished steel, hand screw, chain and threaded section	3,7

PLASTIC SAFETY HOOKS

for rescue of accident victims

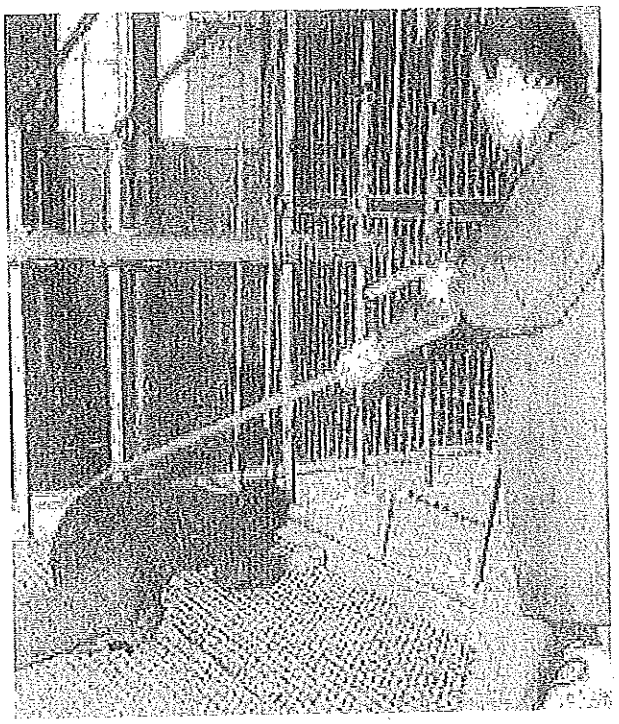


Fig. 1

S-shaped hook for the rescue of persons from l.v. current circuits, working machines, etc., for example by: pulling on arms, legs, arm pits, neck or ankle, etc.

Material:
Polyethylene-HD, highly heat-stable, good chemical resistivity.

Technical Data:

Density:		0,950 g/cm³
Creep resistance:		600 V
Breaking stretch:		300 %
Bending e-module:		800 N/sqmm
Pulling e-module	>=	600 N/sqmm
Bending stress:	>=	15 N/sqmm
Inflamability	appr.	350 °C

Range of temperatures:

Permanent use: -50 up to +70°C

1 kV safety hook (509 048) with special stabilisation against ultraviolet light suitable for outside use.
Do not store under direct solar radiation.

Durability:

For safety reasons the safety hook should be exchanged after 10 years.
The year of production is marked on the hook.

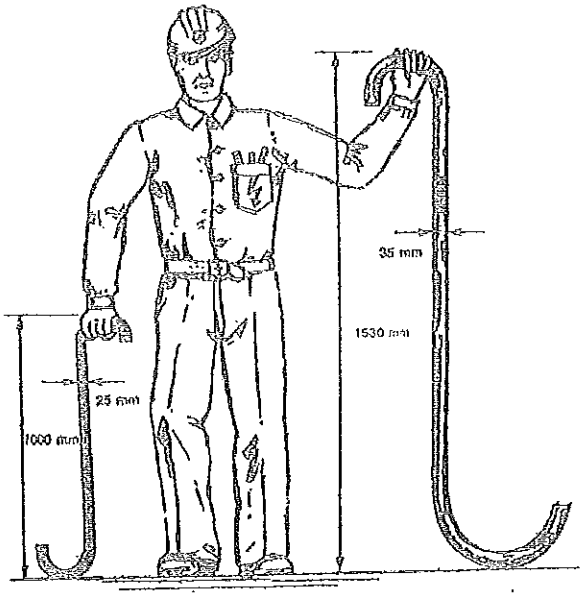


Fig. 2

For low voltage up to 1 kV :

Length:	1000 mm
Bar diameter:	25 mm
Colour:	black
Type no.:	**509 048**

For high voltage up to 60 kV

Length:	1530 mm
Bar diameter:	35 mm
Colour:	ivory
Type no.:	**509 049**

ELECTRICAL SAFETY GLOVES

made of latex

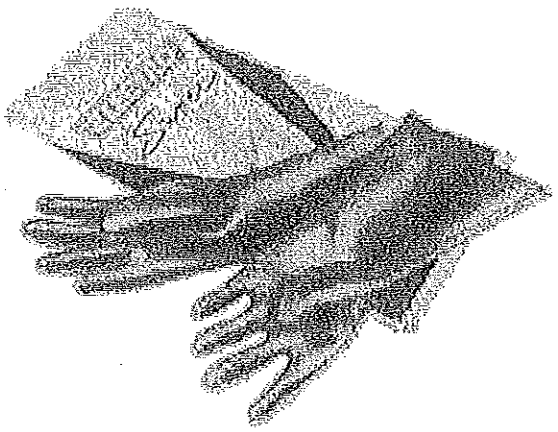
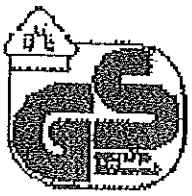
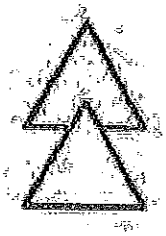


Fig. 1

Type no.	Class	Size	Length appr. [mm]	Strength appr. [mm]
622 006	00	10	360	0,5





Application:

Insulated safety gloves are suitable for live working up to 500 V.

They conform to DIN EN 60903, VDE 0682 part 311 of October 1994.

Material:

Special natural latex with good properties against tearing and abrasion and very good cold flexibility.

Resistant against acid and ozone.

Shape and properties:

Anatomical shape with good flexibility and good touching sensitivity.

Long-term skin protection due to antibacterial treatment.

ВЯРНО С ОРИГИНАЛА

Earthing rods

Earthing rods are used for the approach and connection of phase clamps to dead conductors.
Earthing rods are divided by the "black ring" into the insulating section Li and the handle section Lh.
The length of the insulating section is ≥ 500 mm and is independent of the nominal voltage of the switchgear in which the earthing rod is to be used.

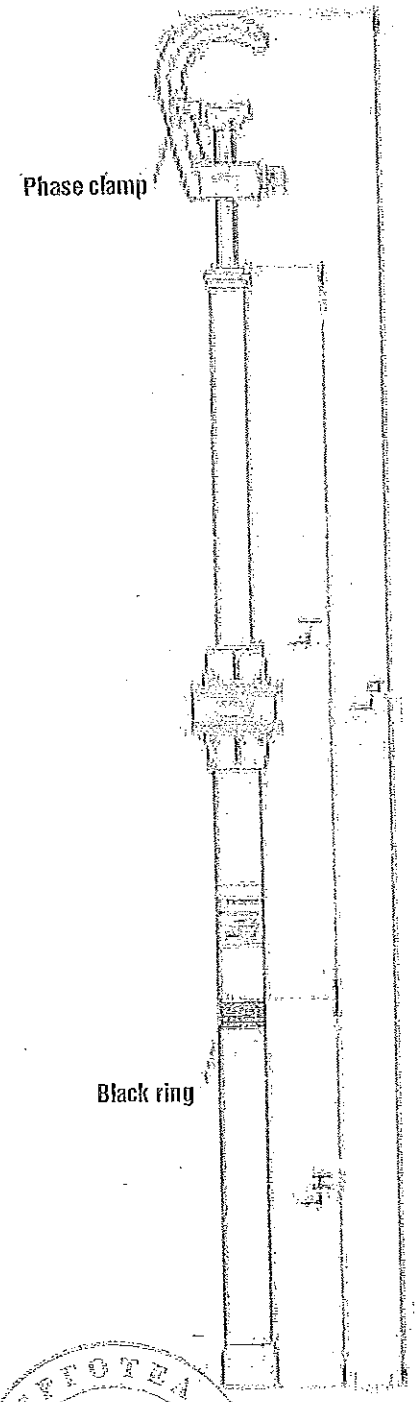


Fig. 1: Telescopic earthing rod

The length L_0 of an earthing rod is mainly not determined by the insulating properties but by the condition to keep the operator at the necessary distance from live parts of the installation.

Conductor connection
If the total length L_0 required for earthing and short circuiting is inconvenient for transport and storage, the use of telescopic or multi-sectional types is recommended.

Also the weight of the earthing rod together with the earthing and short circuiting device to be directed safely to the line influences the bending strength and flexibility of the earthing rods made of fibre glass reinforced epoxy resin.
To *EN 61230: 1996-11* they are divided into three cathegories:
Black ring

light (L)	**bending strength ≥ 25 N,**
normal (S)	**bending strength ≥ 50 N,**
reinforced (R)	**bending strength ≥ 100 N.**

This definition replaces the weight information on the type labels of the rods to the old standard.

In the chapter "earthing rods" in this brochure (from page 63 on) you will find a large number of long-term approved earthing rods which fulfill all present demands.

From now on the labels on the earthing rods will show the marking according to the new European Standard, as the example below:

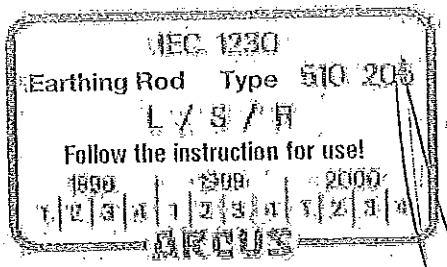


Fig. 2: Example of a label to *IEC 1230*

TECHNICAL INFORMATION

Coupling heads for earthing and operating rods [1]

The working heads shown below are suitable for use with phase clamps, switching rod heads and other operating equipment with a spindle according to DIN 48 087.
A special feature of these heads is their fast and simple operation.

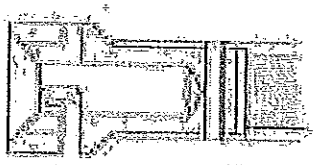


Fig. 1

Normal bayonet head (Fig. 1)

Protection with bayonet slot against accidental loosening.

Material: Impact resistant plastic material.

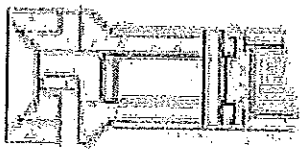


Fig. 2

Spring bayonet head (Fig. 2)

Protection against accidental loosening in addition with a spring.

Material: Impact resistant plastic material
Elastomere spring

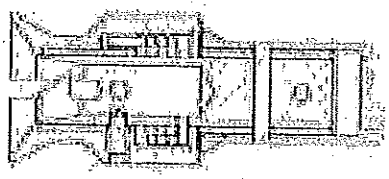


Fig. 3

Safety rod head (Fig. 3) [1]

A plastic head which can be turned around a steel bayonet equipped with a spring control device prevents accidental loosening or detachment of the phase clamp.

Material: Impact resistant plastic material steel parts galvanized

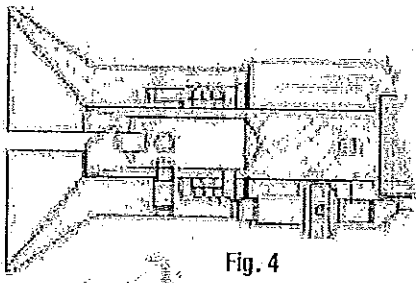


Fig. 4

Safety bayonet head with locking function (Fig. 4) [1]

The function is the same as with the safety bayonet head. In addition the head can be locked by a threaded nut. This robust head is intended for rough handling as with railways or mining.

Material: All parts metal
steel parts galvanized

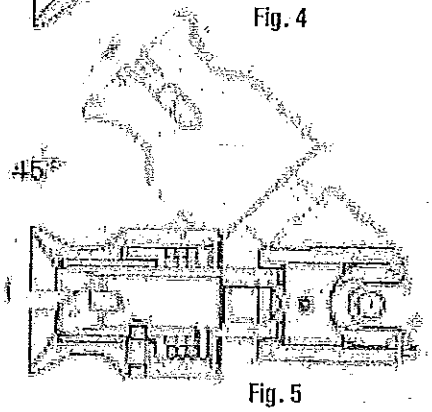


Fig. 5

Safety joint head (Fig. 5) [1]

Construction as the safety bayonet head, but in addition with a steel joint and threaded ring to allow the head to swivel to all sides at an angle of 45°.

Material: Impact resistant plastic material
steel parts galvanized

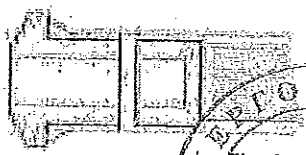


Fig. 6

Connection piece (Fig. 6)

For a non-detachable connection between insulated rod and phase clamp.

Material: Impact resistant plastic material

1) Due to the metal parts the safety bayonet heads may only be used with operating rods under certain conditions.

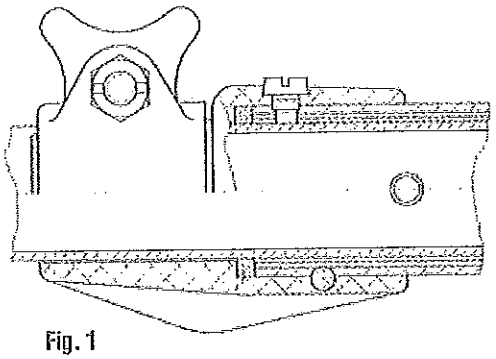


Fig. 1

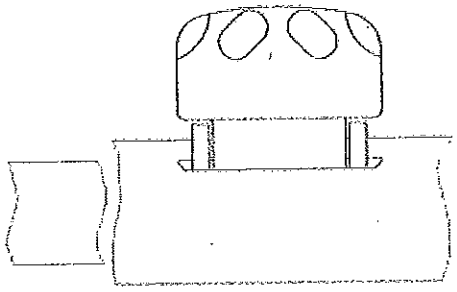


Fig. 2

Connection with slotted sleeve for telescopic rods (Fig. 1)

The inner rod is to be fully extended and is clamped into a slotted sleeve secured against torsion. The clamp screw is non-detachable.

Material: Sleeve and grip screw made of plastic material, bolted screw made of galvanized steel.

Clamping connection for telescopic rod type 511 188 (Fig. 2)

The inner rod can be fully extended up to the stop position and secured against torsion and tensile forces with the tightening strap and pressure screw.
All parts are covered with shock resistant material.

This clamping connection is suitable for earthing rods for use under rough conditions (railway tracks, mining).

Material: Hand knob of aluminium, all other parts of galvanized steel.

Locking connection for telescopic rods (Fig. 3)

Once the locking ring is slackened, the inner rod can be telescoped between 0,4 and 0,5 mtrs, and then locked to ensure it can neither rotate nor extend. The locking function is assisted by a spring. This feature enables different operating lengths to be safely achieved.

Material:

Locking pin and spring stainless steel.
Joint parts made of impact-resistant plastic material.

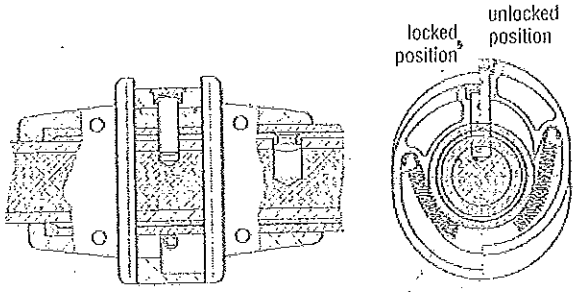


Fig. 3

Plug-in connection for multi-section rods (Fig. 4)

To connect separate rods these are inserted and locked by means of the locking ring, to secure against torsion and tensile forces. Foamed tubes with rain shields and multi-sectional operating rods for use in precipitation can be manufactured if required (see page 69).

Material:

Locking pin and spring stainless steel, joint parts made of impact-resistant plastic material.

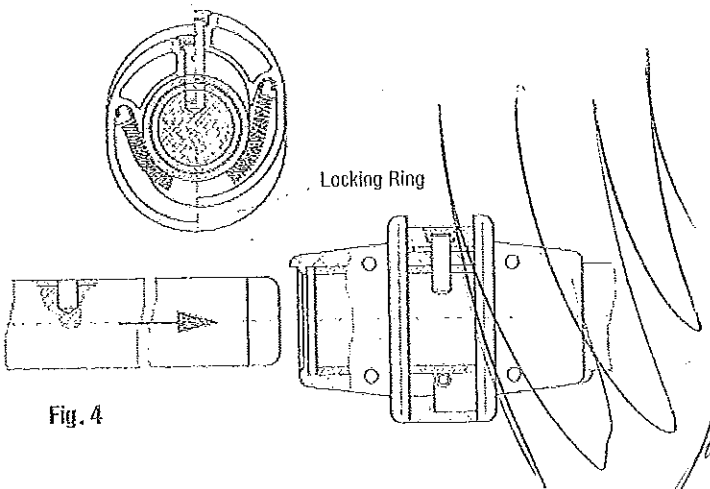
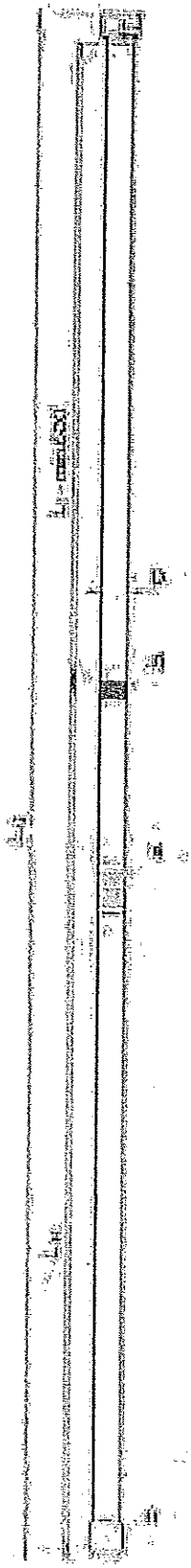


Fig. 4

SINGLE SECTION EARTHING RODS

for nominal voltages above 1 kV



Coupling heads / construction:

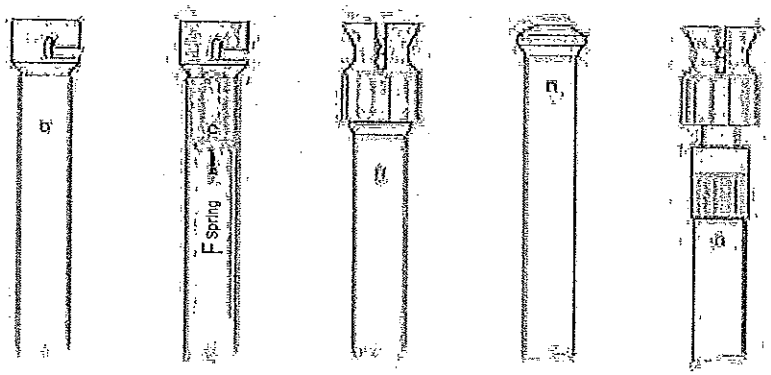


Fig. 2

		Single section earthing rods						
Dimensions	L_G[mm]	1000	1500	1750	2000	2700	3500	4500
	L_H[mm]	440	940	1140	1440	2140	2940	3840
	D[mm]	30	30	30	30	40	40	40
Rod category	(VDE 0683 Part 100)	R	R	S	S	R	S	L
Weight [5]	[kgs / each]	0,8	1,0	0,9	1,1	2,0	2,5	3,1
Con-struc-tion	with coupling head	Type no.						
A	normal bayonet head	510 194	510 195	-	510 196	510 197	510 198	510 199
B	spring bayonet head	510 205	510 206	-	510 207	510 208	510 209	510 210
C	safety rod head	510 216	510 217	-	510 218	510 219	510 220	510 221
D	connection piece [1]	510 238	510 239	-	510 240	510 241	510 242	510 243
F	safety joint head	510 244	510 245	510 246	-	-	-	-

1) Please state type of phase clamp (page 47, 48) in your order.
2) Upon request the rod can be supplied with a hand protection disk instead of the black ring.
3) Label made of PVC, colour yellow, with abrasion resistant printing.
4) Rod end made of non-slip rubber with holes against condensation water.
5) The stated weights refer to those rods with safety rod head.

Material: Rods made of fibre glass reinforced epoxy resin, colour yellow, rod heads impact-resistant plastic material.

For earthing rod details please see pages 60-62.

Fig. 1

TWO- AND THREE-SECTION TELESCOPIC EARTHING RODS

with slotted sleeves
for nominal voltages above 1 kV

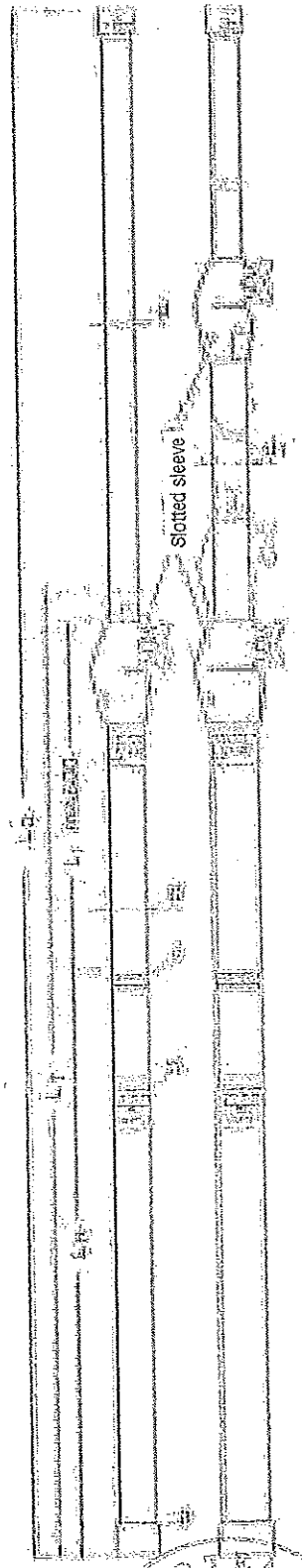


Fig. 1

Coupling heads / construction:

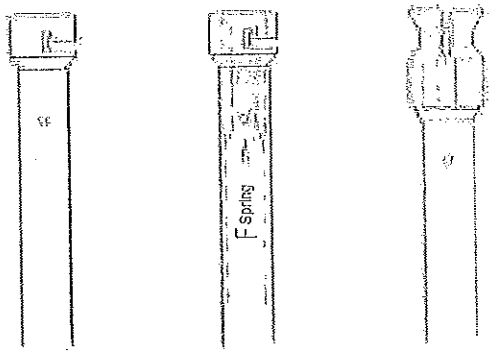


Fig. 2

Telescopic earthing rods with slotted sleeves						
		two-section type				
Dimensions	L_G [mm]	1500	2000	2700	3500	4500
	L_H [mm]	300	700	950	1350	1950
	L_T [mm]	900	1250	1500	1900	2500
	D/d [mm]	40/30	40/30	40/30	40/30	40/30
Rod category	(VDE 0683 Part 100)	R	R	S	S	L
Weight[4]	[kgs/each]	0,90	1,15	1,50	1,90	2,30
Con-struc-tion	**with coupling head**	**Type no.**				
A	Normal bayonet head	511 140	511 141	511 142	511 143	511 144
B	Spring bayonet head	511 145	511 146	511 147	511 148	511 149
C	Safety rod head	511 150	511 151	511 152	511 153	511 154
		three-section type				
Dimensions	L_G [mm]	3500	4500			
	L_H [mm]	750	1000			
	L_T [mm]	1400	1700			
	$D/d_1/d$ [mm]	50/40/30	50/40/30			
Rod category	(VDE 0683 Part 100)	S	L			
Weight[4]	[kgs/each]	2,20	2,80			
Con-struc-tion	**with coupling head**	**Type no.**				
A	Normal bayonet head	511 155	511 156			
B	Spring bayonet head	511 157	511 158			
C	Safety rod head	511 159	511 160			

1) Upon request the rod can be supplied with a hand protection disk instead of the black ring.
2) Label made of PVC, colour yellow, with abrasion resistant printing.
3) Rod end made of non-slip rubber with holes against condensation water.
4) The stated weights refer to those rods with safety rod head.

Material: Rods made of fibre glass reinforced epoxy resin, colour yellow, rod heads impact-resistant plastic material.

For earthing rod details please see pages 60 - 62.

TWO- AND THREE-SECTION TELESCOPIC EARTHING RODS

with locking connection
for nominal voltages above 1 kV

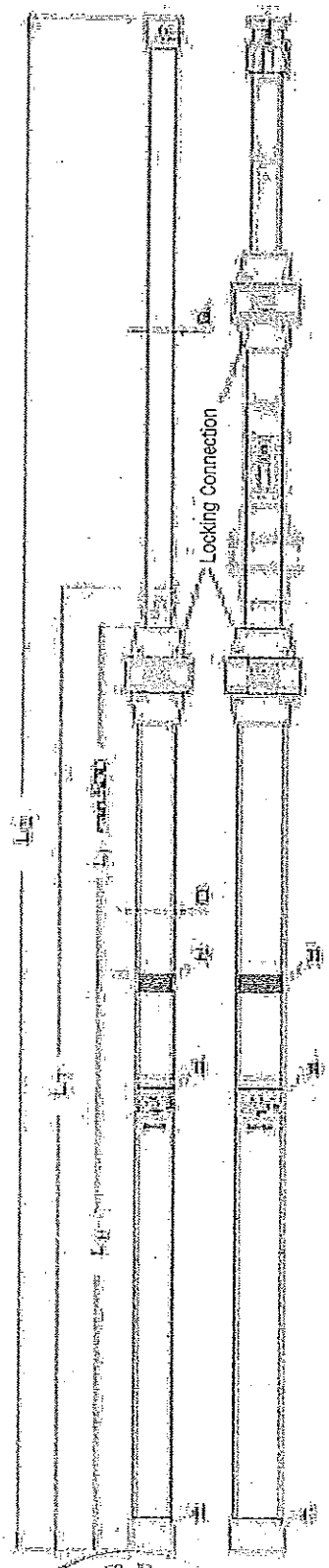


Fig. 1

Coupling heads / construction:

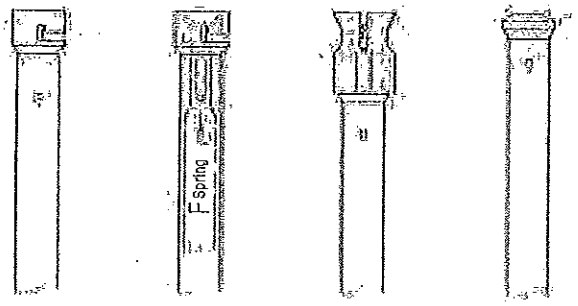


Fig. 2

Telescopic earthing rods with slotted sleeves						
		two-section type				
Dimensions	L_G [mm]	1800	2100	2700	3500	4500
	L_H [mm]	400	450	750	1150	1650
	L_T [mm]	1025	1175	1475	1875	2375
	D/d [mm]	40/30	40/30	40/30	40/30	40/30
Rod category	(VDE 0683 Part 100)	R	R	S	S	L
Weight[4]	[kgs/each]	0,90	1,20	1,50	1,90	2,30
Construction	with coupling head	Type no.				
A	Normal bayonet head	511 196	511 197	511 198	511 199	511 200
B	Spring bayonet head	511 201	511 202	511 203	511 204	511 205
C	Safety rod head	511 206	511 207	511 208	511 209	511 210
D	Connection piece	511 211	511 212	511 213	511 214	511 215
		three-section type				
Dimensions	L_G [mm]	3500	4500			
	L_H [mm]	540	870			
	L_T [mm]	1345	1675			
	$D/d_1/d$ [mm]	50/40/30	50/40/30			
Rod category	(VDE 0683 Part 100)	S	L			
Weight[4]	[kgs/each]	2,20	2,80			
Construction	with coupling head	Type no.				
A	Normal bayonet head	511 216	511 217			
B	Spring bayonet head	511 218	511 219			
C	Safety rod head	511 220	511 221			
D	Connection piece[1]	511 222	511 223			

1) Please state type of phase clamp (page 47, 48) in your order.
2) Upon request the rod can be supplied with a hand protection disk instead of the black ring.
3) Label made of PVC, colour yellow, with abrasion resistant printing.
4) Rod end made of non-slip rubber with holes against condensation water.
5) The stated weights refer to those rods with safety rod head.

Material: Rods made of fibre glass reinforced epoxy resin, colour yellow, rod heads impact-resistant plastic material.

For earthing rod details please see pages 60 - 62.

MULTI-SECTION EARTHING RODS, PLUG-IN TYPE

for nominal voltages above 1 kV

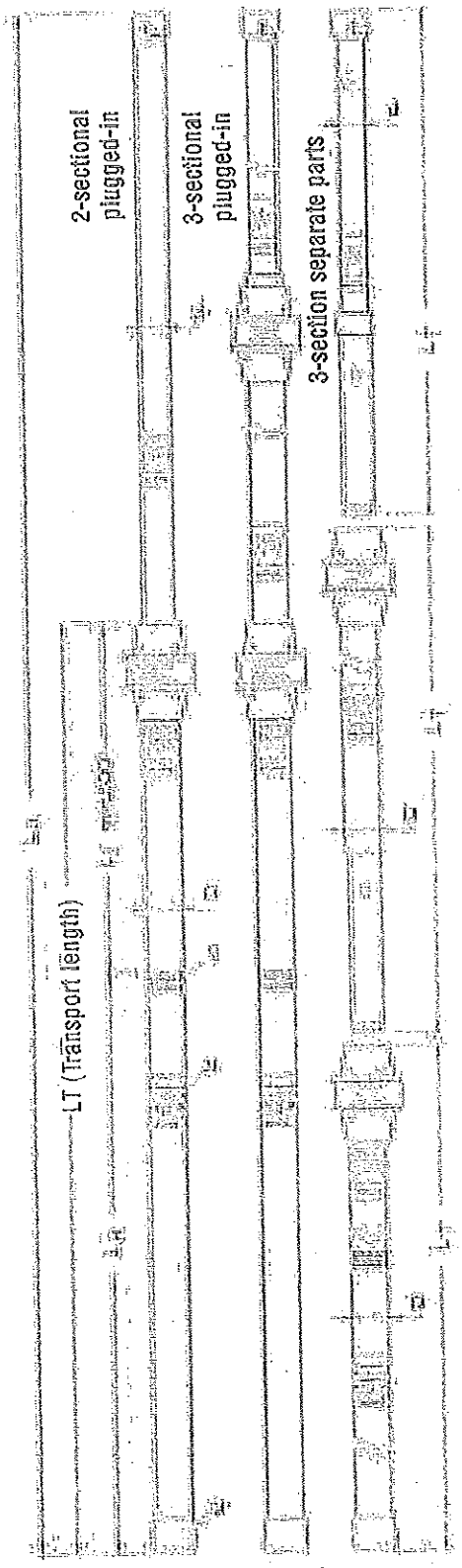


Fig. 1

Coupling heads / construction:

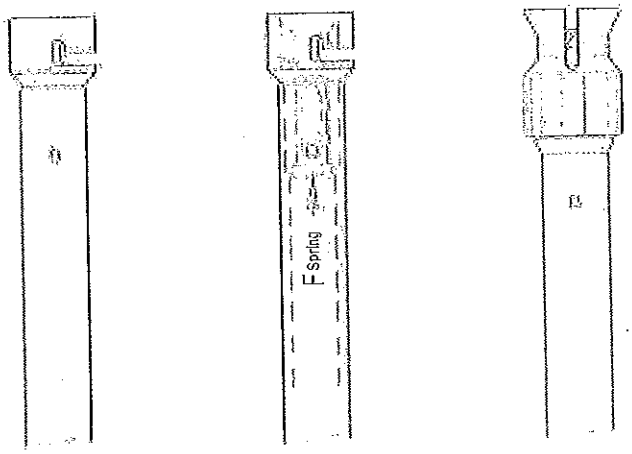


Fig. 2

Multi-section earthing rods, plug-in type			
Construction		**2-sect.**	**3-sect.**
Dimensions	L_G [mm]	3500	4500
	L_H [mm]	1200	985
	L_T [mm]	1860	1675
	D/d [mm]	40/30	40/40/30
Rod category	(VDE 0683 Part 100)	S	L
Weight[4]	[kgs/each]	3,00	3,60
Con-struc-tion	**with coupling head**	**Type no.**	
A	Normal bayonet head	511 224	511 227
B	Spring bayonet head	511 225	511 228
C	Safety rod head	511 226	511 229

1) Upon request the rod can be supplied with a hand protection disk instead of the black ring.
2) Label made of PVC, colour yellow, with abrasion resistant printing.
3) Rod end made of non-slip rubber with holes against condensation water.
4) The stated weights refer to those rods with safety rod head.

Material: Rods made of fibre glass reinforced epoxy resin, colour yellow, rod heads impact-resistant plastic material.

For earthing rod details please see pages 60 - 62

TECHNICAL EXPLANATION

Operating rods for nominal voltages above 1 kV

Operating rods

Operating rods are devices for manual use for testing and operating live parts.
Construction of rods is as follows:

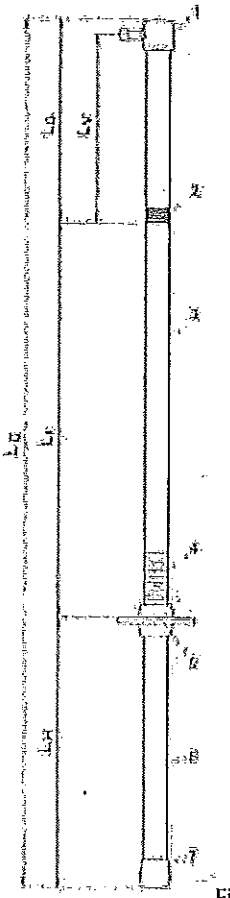


Fig. 1

1 Operating head
2 "Red ring"
3 Insulating section (length L_I)
4 Label with type indication
5 Hand protection disk
6 Length of handle (L_H)
7 Rod end cap
L_V Length of the extension section
L_O Length of the top section
L_G Total length of the operating rod
L_I Length of the insulating section

Between the hand protection disk and the "Red ring" the insulating section (L_I) is located which gives the operator the protective distance and sufficient length of insulation for safe handling. The minimum length of the insulating section is between 500 and 3200 mm and depends on the nominal voltage for which the operating rod is marked on the label. Discharge currents must not exceed 0.2 mA in dry conditions and 0.5 mA under precipitation.

The top section (L_O) is the rod section between the insulating section and upper end of the operating head.

The extension section (L_V) is located between the insulating section and the operating element. It enables the operator to reach distant parts of the installation. In this case it is permitted to reach with the operating head along live installation parts.

Operating rods are manufactured in 2 categories:

1.) For indoor and outdoor use but not with precipitation.
Label is marked: "Do not use with precipitation !".

2.) For use indoors and outdoors with any kind of weather.
Label is marked: "May be used in precipitation".

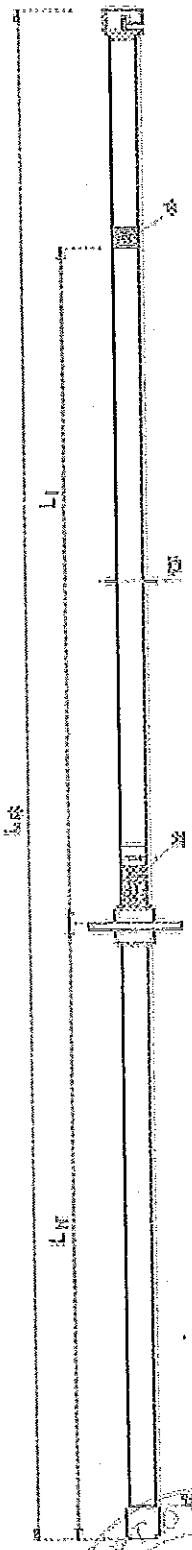
VDE standards:

DIN VDE 0681 part 1: 1986-10	Operating, testing and safe-guarding devices for work on electrically energised systems with rated voltages exceeding 1 kV - Part 1: General requirements for the part 2 to 4
DIN 57681 part 2/ **VDE 0681 part 2:** 1977-03	VDE-specification for operating, testing and safe-guarding devices used when carrying out live-line-work on equipment with rated voltages exceeding 1 kV - Part 2: Operating rods
DIN 57681 part 3/ **VDE 0681 part 3:** 1977-03	- Part 3: Fuse tongs
DIN VDE 0681 part 4: 1986-10	Operating, testing and safe-guarding devices for work on electrically energised systems with rated voltages exceeding 1 kV - Part 4: AC voltage detectors

The operating rods shown on the following pages are according to part 1 to 3 of the afore mentioned standards.
High voltage live line testers to VDE 0682 part 411 are described in a separate brochure.

ВЯРНО С ОРИГИНАЛА

Operating rods for nominal voltages above 1 kV "not to be used with precipitation"



Construction and material:

Operating rods comply with DIN VDE 0681 part 1 / 10.86.
They are equipped with a normal bayonet head as described on page 61.
The rods are manufactured from fibre glass reinforced and smooth epoxy resin tubes.
The surface is protected by a yellow UV-resistant varnish.
The hand protection disk is made of black rubber material.
The rod end is sealed with a non-slip rubber cap.
Labels are made of PVC-material, colour yellow, with abrasion resistant printing.

Single section operating rods						
Nominal voltage	up to 30	up to 60	up to 110	up to 150[4]	up to 220[4]	up to 380[4]
L_G [mm]	1000	1500	2000	2700	3500	4500
L_H [mm]	350	450	550	800	900	1000
L_1 [mm]	525	900	1300	1750	2400	3200
D [mm]	30	30	30	40	40	40
Weight [kg/each]	0,60	0,70	0,90	1,80	2,30	3,0
Type no.	510 183	510 184	510 185	510 186	510 187	510 188

1) "Red Ring"
2) Label
3) Rod end cap
4) Only for networks with effectively earthed star point.

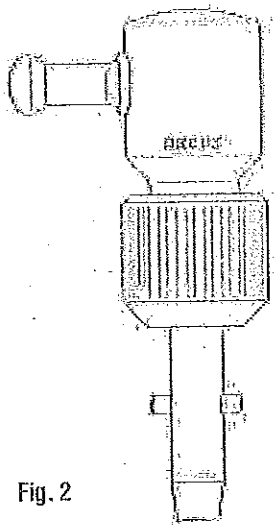


Fig. 2

Switching rod head

To DIN 57 681 part 2 / 3.77, can be quickly screwed onto the operating rod.

Material: Fibre glass reinforced polyamide, operating bolt made of solid glass polyester.

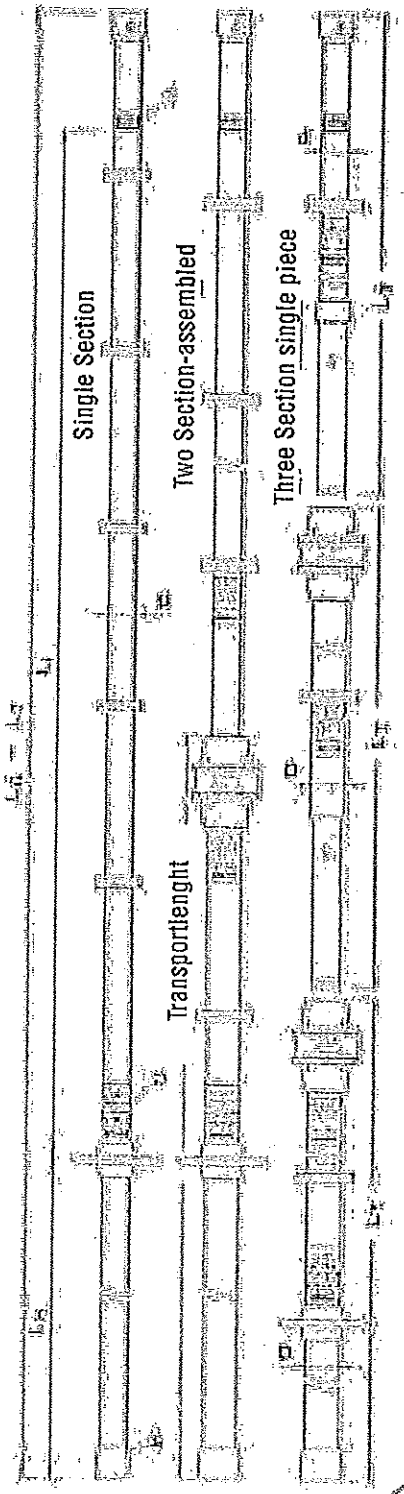
Type no.: 509 053

For further details about operating rods please see pages 61, 62 and 67.

The -test marks on this page were granted by the VDE Test Office.

SINGLE- AND MULTI-SECTION OPERATING RODS, PLUG-IN TYPE

for nominal voltages above 1 kV
"Can also be used with precipitation"



Construction and material:

Operating rods comply with DIN VDE 0681 part 1 / 10.86.and are equipped with a normal bayonet head as described on page 61. The rods are manufactured from fibre glass reinforced and smoothened epoxy resin tubes.
The surface is protected by a yellow UV-resistant varnish.
The inner tube is foamed with dense pores.
The hand protection disk is made of black rubber material.
The rod end is sealed with a non-slip rubber cap.
Labels are made of PVC-material, colour yellow, with abrasion resistant printing.
The rain insulators are made of impact-resistant plastic material, colour blue, and are glued to the tube unmovably.
For further details about operating rods please see pages 61, 62 and 67.

Operating rods						
Construction	one-sectional			two-section plugged-in type		three-section plugged-in type
Nominal voltage [kV]	up to 30	up to 60	up to 110	up to 110	up to 150[4]	up to 220[4]
L_G [mm]	1800	2300	2800	2700	3500	4100
L_H [mm]	500	600	700	700	800	980
L_T [mm]		-	-	1455	1855	1500
L_I [mm]	1200	1600	2000	1900	2600	3000
D/D/d [mm]	30	30	30	40/30	40/30	40/40/30
Weight [kg/each]	2,0	2,4	2,8	3,0	3,5	4,0
Type-no.	510 250	510 251	510 252	510 288	510 289	510 290

1) "Red Ring"
2) Label
3) Rod end cap
4) Only for networks with effectively earthed star point.

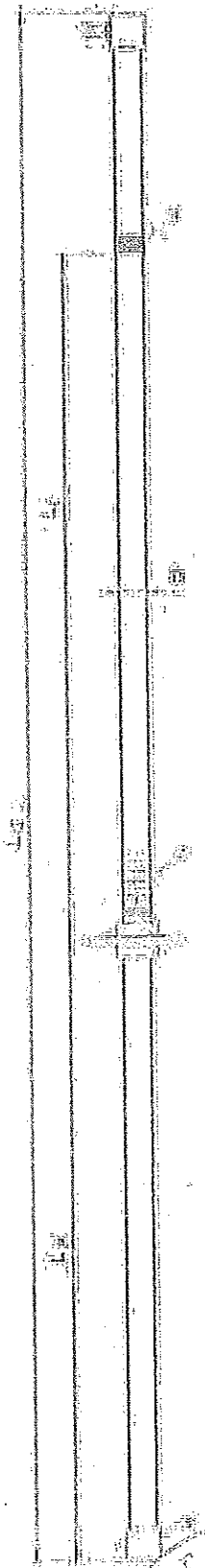


Fig. 1

Construction and material:

Switching rods comply with DIN VDE 0681 part 2 / 3.77.
Operating bolt and switching rod heads are made of high-quality plastic material.
The rods are manufactured from fibre glass reinforced and smoothened epoxy resin tubes. The surface is protected by a yellow UV-resistant varnish.
The hand protection disk is made of black rubber material.
The rod end is sealed with a non-slip rubber cap.
Labels are made of PVC-material, colour yellow, with special printing.

Switching rods							
Nominal voltage [kV]	up to 30	up to 30	up to 30	up to 30	up to 30	up to 30	up to 30
L_G [mm]	1000	1500	2000	2500	3000	3500	4000
L_H [mm]	350	450	550	700	850	900	950
L_I [mm]	525	525	525	525	525	525	525
D [mm]	30	30	30	30	30	30	40
Weight [kg/each]	0,60	0,70	0,90	1,10	1,30	1,50	1,90
Type no.	**510 227**	**510 264**	**510 265**	**510 266**	**510 267**	**510 268**	**510 269**

Switching rods		
Nominal voltage [kV]	up to 60	up to 110
L_G [mm]	1500	2000
L_H [mm]	450	550
L_I [mm]	900	1300
D [mm]	30	30
Weight [kg/each]	0,70	0,90
Type no.	**510 228**	**510 229**

1) "Red Ring"
2) Label
3) Rod end cap

For further details about switching rods and operating rods please see page 67.

The -test marks on this page were granted by the VDE Test Office.

FUSE TONGS

for nominal voltages 10 kV to 30 kV
"not to be used with precipitation"

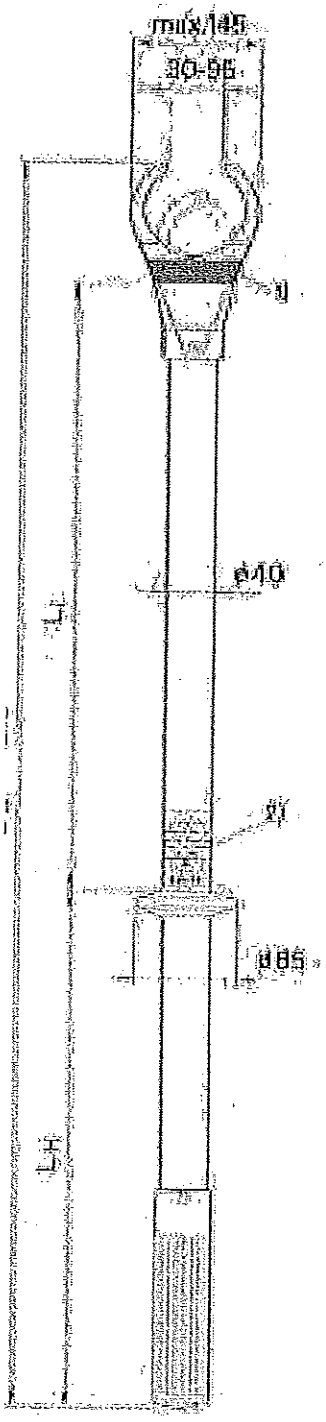


Fig. 1

The fuse tong is used to grip an HRC-fuse from the front. By rotating the handle the HRC-fuse is held tightly by the clamping part.
Little space is required by the fuse tong on each side. It is highly suitable for use in switching stations where space is limited.

Type no	UN [kV]	LH [mm]	LI [mm]	Safety standard
514 007	10 - 20	425	500	GS
514 008	10 - 30	400	525	GS

Clamping range: 30 - 95 mm
Weight each: appr. 2 kgs

Material: Clamping head made of fibre glass reinforced plastic material, colour black.
Insulating tube fibre glass reinforced polyester, colour yellow.
Hand protection disk made of hardened rubber, colour black.
Label made of plastic material, with abrasion resistant printing, colour yellow.

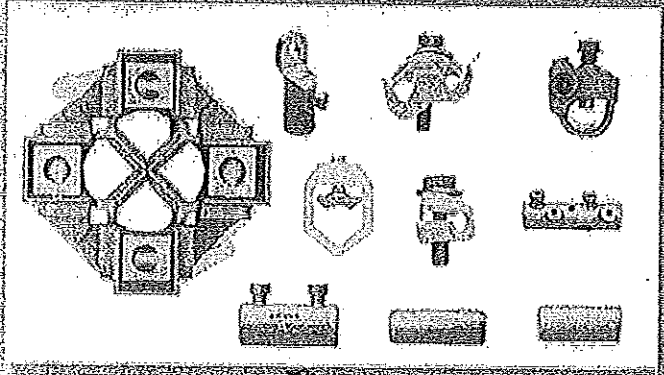
The GS-test signs on this page were granted by the Technical Supervision Association (TÜV) Bavaria.

1) Red Ring

2) Label

ВЯРНО С ОРИГИНАЛА

Production programme

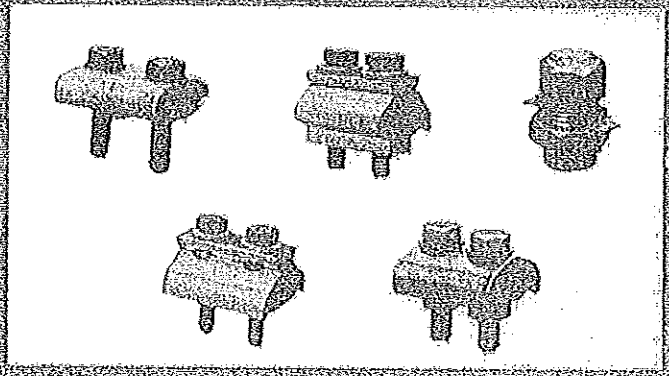


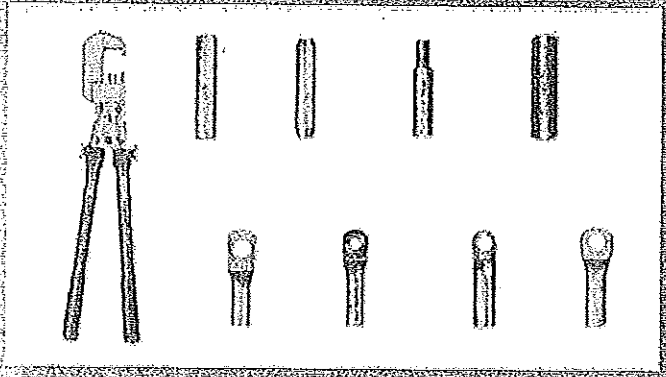
Cable Connection Technique

- Cable branching and ring connectors
- Cable connectors
- Connection terminals
- Transformer connection terminals
- Installation accessories

Overhead Line Clamps

- Tap off and dead end clamps
- Earth wire and strip clamps
- Surge arresters
- Accessories



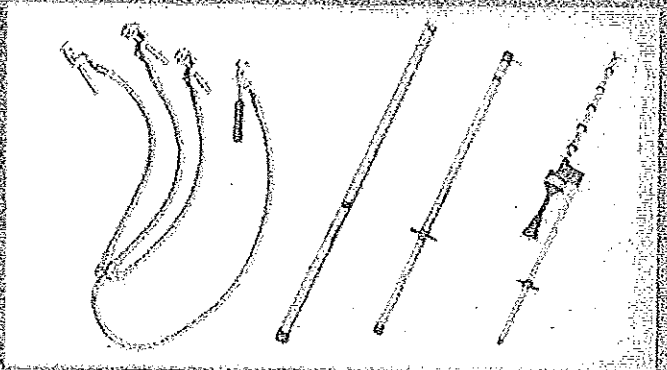


Compression Programme

- Compression cable lugs Al and Cu
- Compression links Al and Cu
- Compression material Al and Cu
- Compression tools

Safety Equipment

- High voltage live line testers 3-400 kV
- Earthing and short circulting devices for low, medium and high voltage
- Earthing and switching rods
- Earth and phase fixed points
- Insulated tools



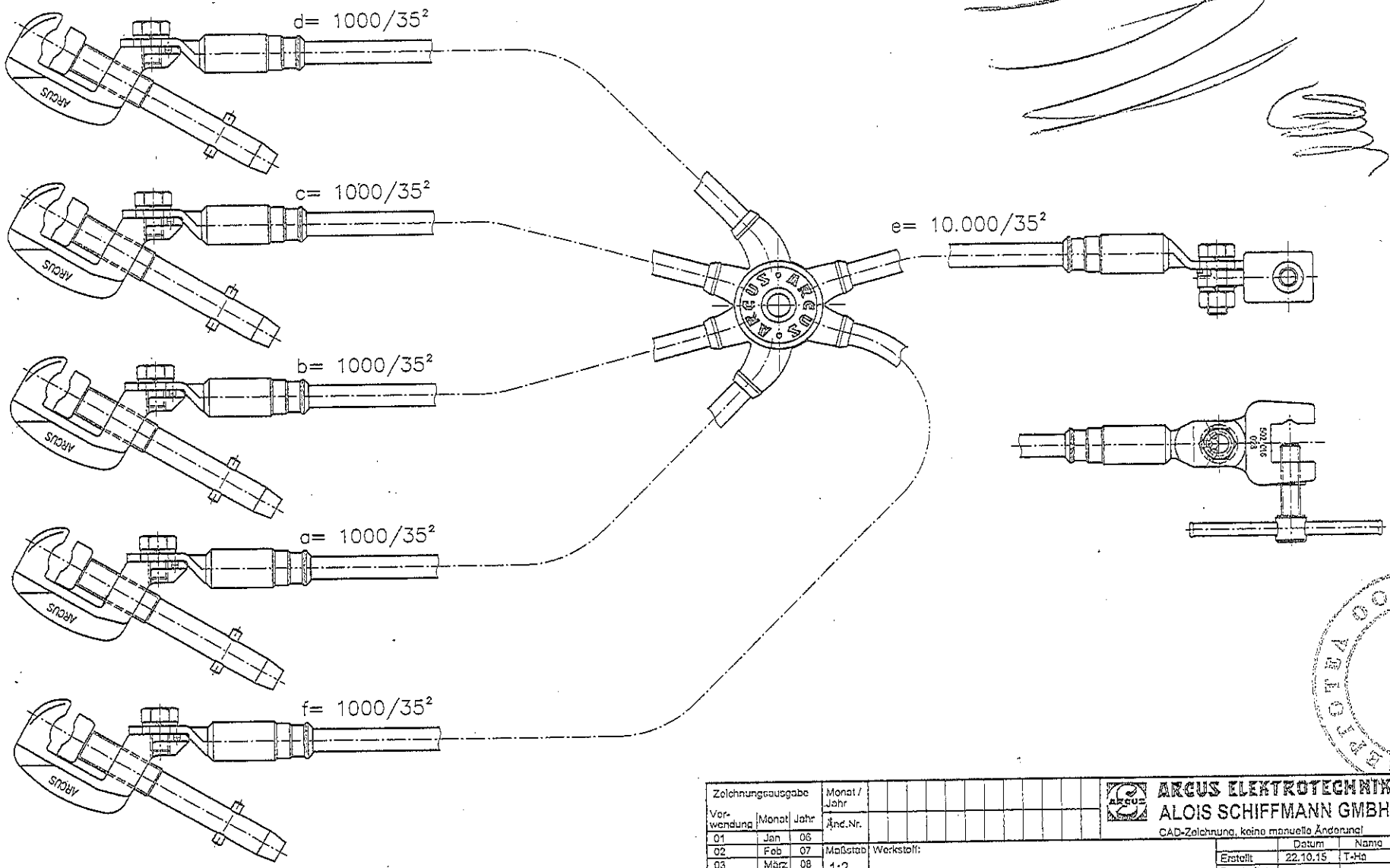
N 05.01

ARGUS Elektrotechnik Alois Schiffmann GmbH
P.O. Box 80 10 40 · D-81610 München · info@ARGUS-Schiffmann.de
Phone +49 (0) 89 43 60 40 · Fax sales dept. +49 (0) 89 43 60 47 75 · www.ARGUS-Schiffmann.de

ВЕРНО - ОРИГИНАЛА

~~Gewaschen / Gefeilt~~
Oberfläche sauber und gratfrei
Kanten entschärft

Abweichungen für Maße ohne Toleranzangabe
a) Für Rohteilmaße:
b) Für Bearbeitungsmaße: ISO 2768-m



Zeichnungsausgabe		
Vorwendung	Monat	Jahr
01	Jan	06
02	Feb	07
03	März	08
04	April	09
05	Mai	10
06	Juni	11
Kalk.	Juli	12
Muster	Aug	13
Anfrage	Sep	14
Kunde	Okt	15
Lieferant	Nov	16
	Dez	17

Monat / Jahr
Änd.-Nr.

Maßstab 1:2

Werkstoff:
Sach-Nr. Material
Einsatzlänge [mm]: Rohteilgewicht [kg]: (Richtwerte)

Bezeichnung:
KUNDENZEICHNUNG
EuK-Vorrichtung 35 mm², 5-polig
Ir=10 kA/0,5 s, 5x 1000/E10.000 mm lang
5x 507042D, 1x 502016

ARCUS ELEKTROTECHNIK
ALOIS SCHIFFMANN GMBH
CAD-Zeichnung, keine manuelle Änderung!

	Datum	Name
Erstellt	22.10.15	T-Ha
Bearbeitet		
Geprüft		
Ersatz für		

Sachnummer:
530 001 459

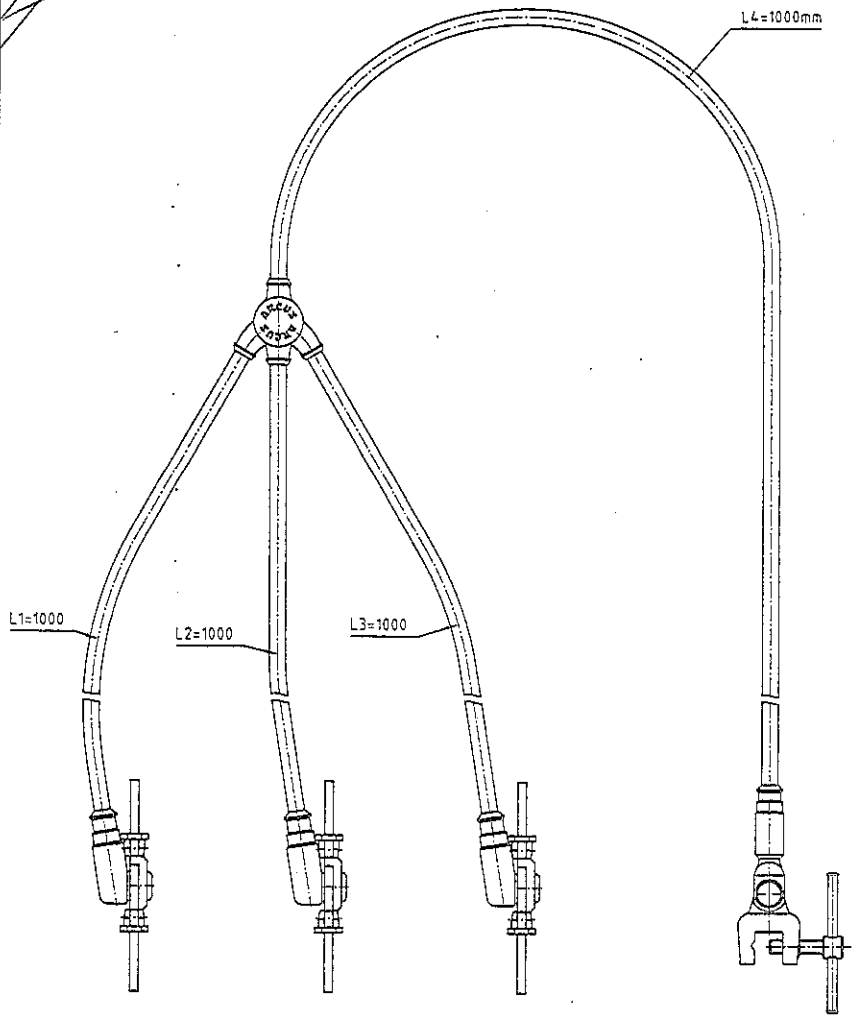
Dateiname: ENG-012648.dwg

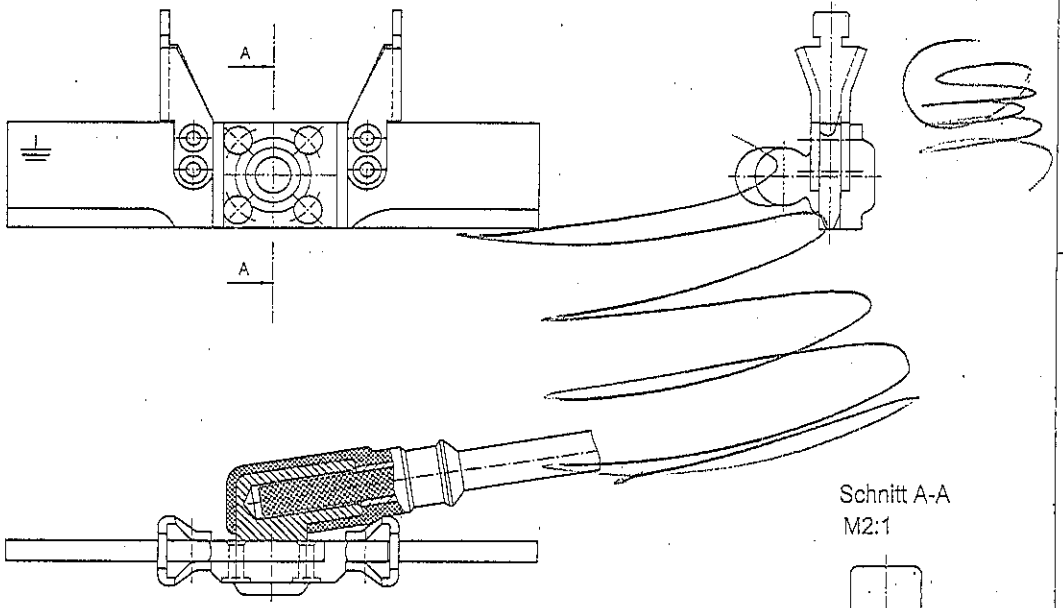
ВЕРНО С ОРИГИНАЛА

Gewindekern Gebeizt
Oberfläche sauber und gratfrei
Kanten entgratet

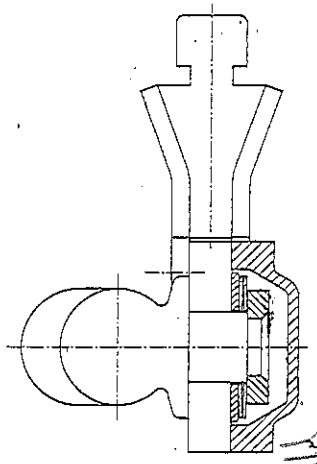
Abweichungen für Maße ohne Toleranzangabe
a) Für Rohteilmaße:
b) Für Bearbeitungsmaße: ISO 2768-m

M1:2,5





Schnitt A-A
M2:1



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Zeichnungsausgabe Verwendung	Monat	Jahr
01	Jan.	05
02	Feb.	07
03	März	08
04	April	09
05	Mai	10
06	Juni	11
Kalk.	Juli	12
Muster	Aug.	13
Anfrage	Sep.	14
Kunde	Okt.	15
Lieferung	Nov.	16
	Dez.	17

Monat / Jahr
And.Nr.

Maßstab: 1:1, 2:1, 1:2,5

Werkstoff:
Sach-Nr. Material
Linearlänge [mm]: Rohteilgewicht [kg]: (Richtwerte)

Bezeichnung:
Kundenzeichnung
EuK-Vorrichtung für Niederspannungsverteilung
mit NH-Sicherungsunterteil Größe 0-3

ARGUS ELEKTROTECHNIK
ALOIS SCHIFFMANN GMBH
CAD-Zeichnung, keine manuelle Änderung!

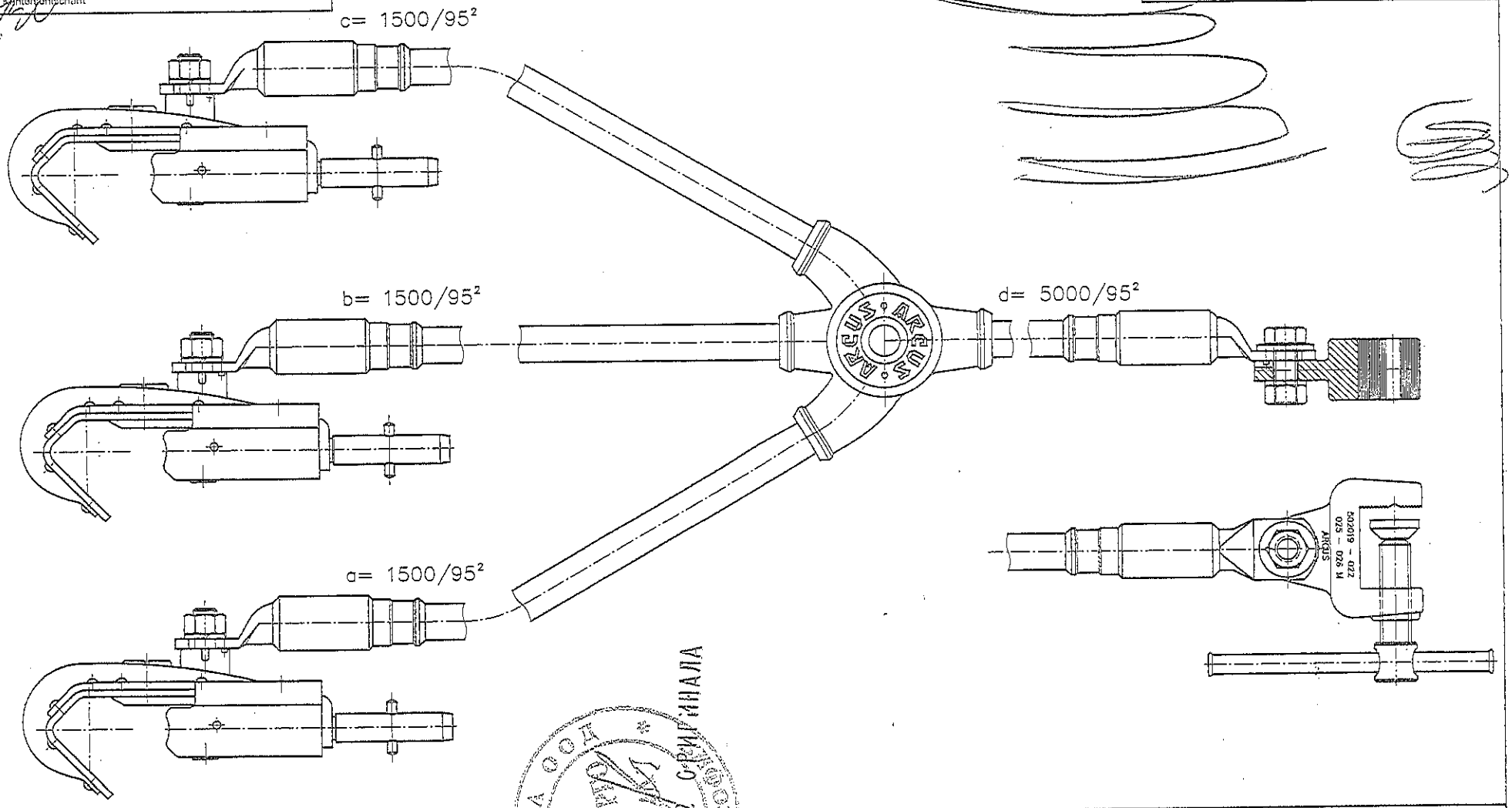
	Datum	Name
Erstellt	21.10.15	T-N
Bearbeitet		
Geprüft		
Ersatz für		

Sachnummer:
530001460

Dateiname: ENC-M1244R.dwg

~~Gewölbt~~ ~~Gebeizt~~
Oberflächte sauber und gratfrei
Kanten entschärft

Abweichungen für Maße ohne Toleranzangabe
a) Für Rohteilmaße:
b) Für Bearbeitungsmaße: ISO 2768-m



Zeichnungsausgabe		
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03	März	08
04	April	09
05	Mai	10
06	Juni	11
Kalk.	Juli	12
Muster	Aug	13
Anfrage	Sep	14
Kundo	Okt	15
Lieferant	Nov	16
	Dez	17

Monat / Jahr
Änd.Nr.

Maßstab 1:2

Werkstoff:
Sach-Nr. Material
Einsatzlänge [mm]: Rohteilgewicht [kg]: (Richtwerte)

Bezeichnung:
KUNDENZEICHNUNG
EuK-Vorrichtung 95/95 mm², 3-polig
Ir=26,5 kA/0,5 s, 3x 1500/E5000 mm lang
3x 507006D , 1x 502022

ARCUS ELEKTROTECHNIK
ALOIS SCHIFFMANN GMBH
CAD-Zeichnung, keine manuelle Änderung!

	Datum	Name
Erstellt	21.10.15	T-Ha
Bearbeitet		
Geprüft		
Ersatz für		

Sachnummer:
530 001 462

Dateiname: ENG-012650.dwg

~~Gewaschen / Gebeizt~~
Oberfläche sauber und gratfrei
Kanten entschärft

Abweichungen für Maße ohne Toleranzangabe
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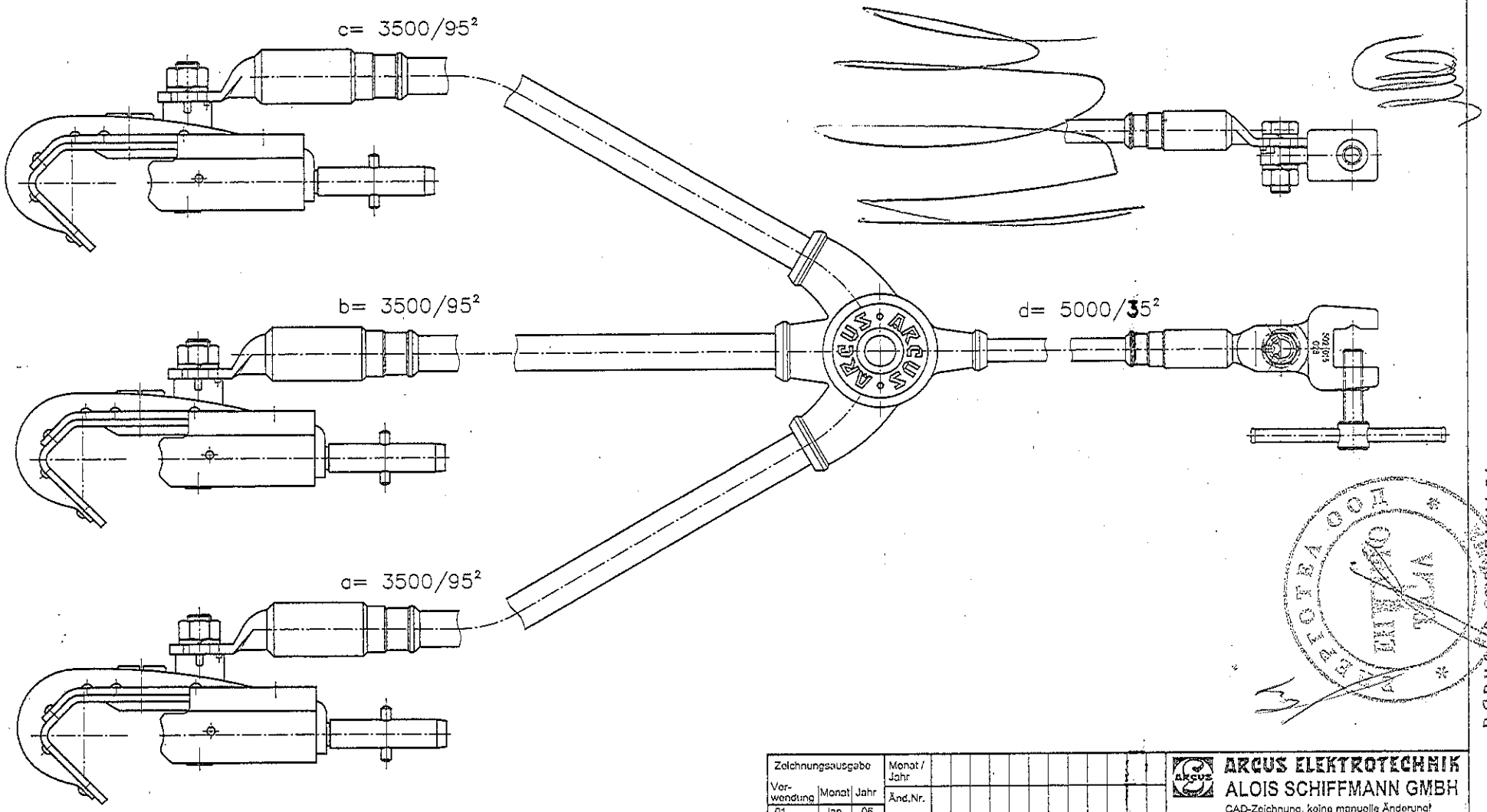
b) Für Bearbeitungsmaße: ISO 2768-m



Zeichnungsausgabe		
Verwendung	Monat	Jahr
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02	Feb	07
03	März	08
04	April	09
05	Mai	10
06	Juni	11
Kalk.	Juli	12
Muster	Aug	13
Anfrage	Sep	14
Kunde	Okt	15
Lieferant	Nov	16
	Dez	17

Monat / Jahr
Änd.Nr.

Maßstab 1:2

Werkstoff:
Sach-Nr. Material
Einsatzlänge [mm]: Rohteilgewicht [kg]: (Richtwerte)

Bezeichnung:
KUNDENZEICHNUNG
EuK-Vorrichtung 95/35 mm², 3-polig
Ir=26,5 kA/0,5s, 3x 3500/E5000 mm
3x 507 006D, 1x 502 016

ARGUS ELEKTROTECHNIK
ALOIS SCHIFFMANN GMBH
CAD-Zeichnung, keine manuelle Änderung!

	Datum	Name
Erstellt	21.10.15	T-Ka
Bearbeitet		
Geprüft		
Ersatz für		

Sachnummer:
530 001 463

Dateiname: ENG-012651.dwn

~~GEWASCHEN GEBEIZT~~ .....

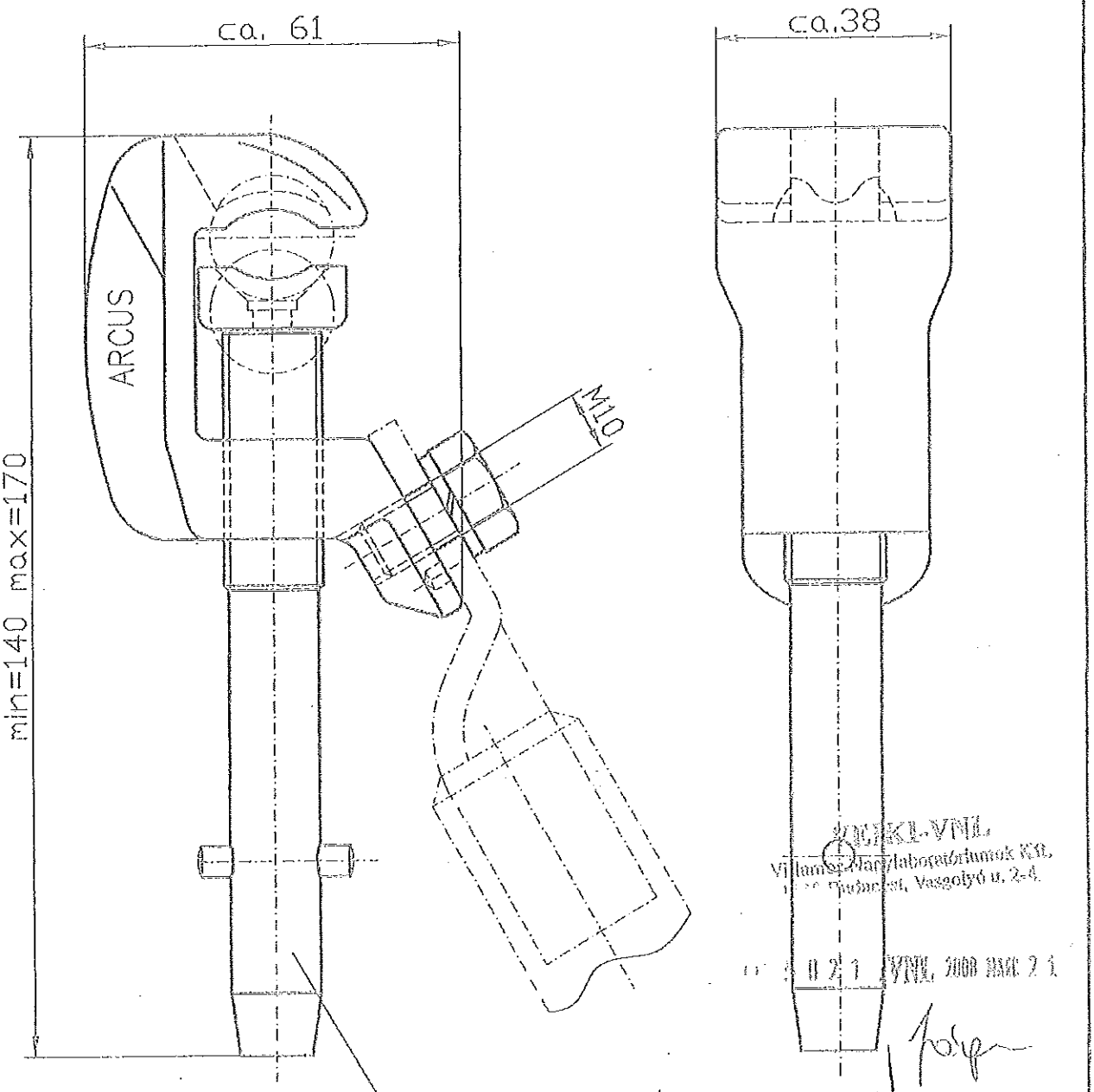
OBERFLÄCHE SAUBER UND GRATFREI

KANTEN ENTSCHÄRFT

Abweichungen für Maße ohne Toleranzangabe

a) Für Rohteilmaße:

b) Für Maße der Bearbeitung: ISO 2768-m



Ausgabevermerk:		
Kurzzeichen	Datum Monat	Jahr
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05	Mai	07
07	Jun	08
08	Jul	09
Kalk.	Aug	10
Must.	Sep.	11
	Okt	12
	Nov	13
	Dez	14

Datum

Änd.Nr.

Maßstab: 1:1

Werkstoff:

Einsatzlänge: Gew. in kg Roh: Fertig:

Bezeichnung:

Universal-Phasenanschlussklemme
für Flachleiter bis 20,
Kugel ø 20, Rd. ø 9-22

ARCUS
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CAD- Zeichnung, keine manuelle Änderung!

Erstellt	Dat. 16.08.01	Name	T-Re
Bearbeitet	Dat. 24.09.07	Name	T-N
Geprüft	Dat.	Name	

Ersatz für:

Ersetzt durch:

Dateiname: 507042k.dwg

Sach-Nr. 507 042

~~GEWASCHEN GEBEIZT~~

OBERFLÄCHE SAUBER UND GRATFREI

KANTEN ENTSCHÄRFT

Abweichungen für Maße ohne Toleranzangabe

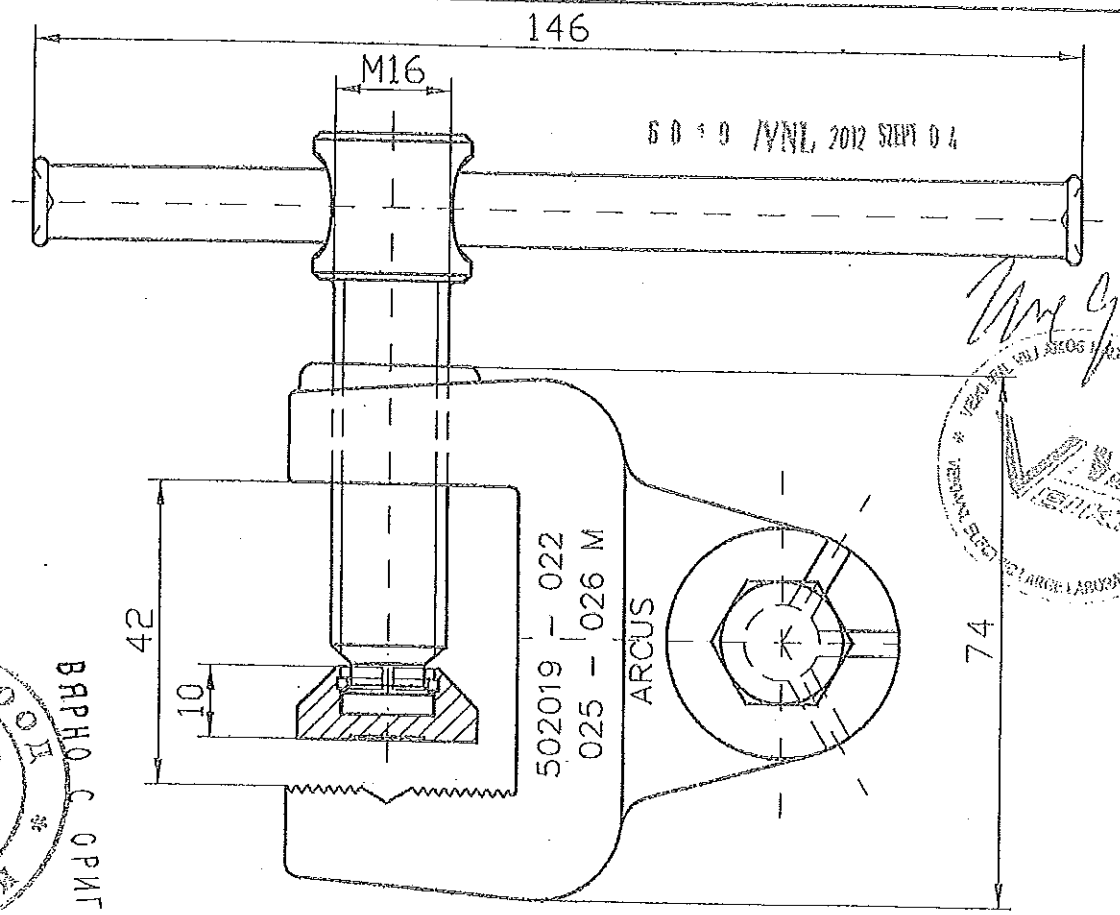
a) Für Rohteilmaße:

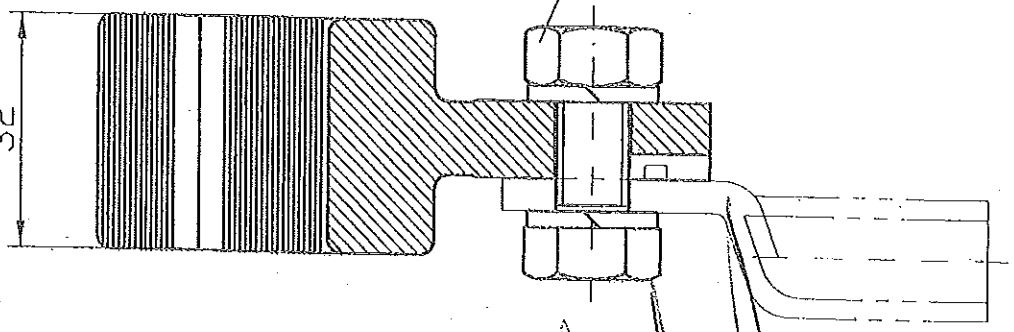
b) Für Maße der Bearbeitung: ISO 2768-m

muß unterliegen nicht der Stichprobenkontrolle durch QW:

[ ]....Konstruktionsmaße

[ ]....Vorrichtungsmaße





Ausgabevermerk:

Kurzzeichen	Datum Monat	Jahr
01	Jan	02
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04	Apr	05
05	Mai	06
07	Jun	07
08	Jul	08
Kalk.	Aug	09
Must.	Sep	10
	Okt	11
	Nov	12
	Dez	13

Datum

Änd.Nr.

Maßstab: 1:1

Werkstoff:

Einsatzlänge: Gew. in kg Roh: Fertig:

Bezeichnung:

Kundenzeichnung
Erdanschlussklemme mit Knebelschraube und Druckstück, Klemmhöhe 31

ARCUS

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CAD-Zeichnung, keine manuelle Änderung!

Erstellt	Dat.	15.05.12	Name	T-N
Bearbeitet	Dat.	.	Name	.
Geprüft	Dat.		Name	

Ersatz für:

Ersetzt durch:

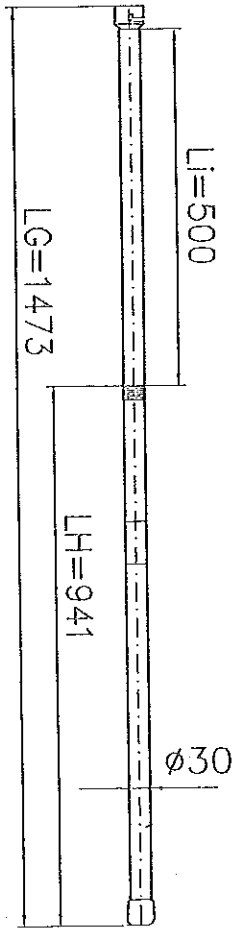
Dateiname: ENG-005886.dwg

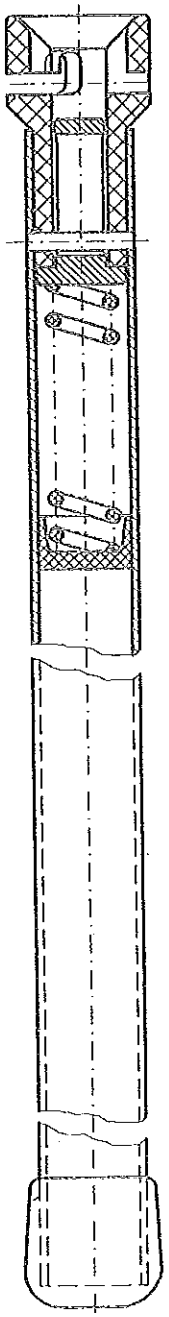
Sach-Nr. 502 021

GEWASCHEN GEBEIZT .....
OBERFLÄCHE SAUBER UND GRATFREI
KANTEN ENTSCHÄRFT

Abweichungen für Maße ohne Toleranzangabe
a) Für Rohteilmaße:
b) Für Maße der Bearbeitung: ISO 2768–m

...e unterliegen nicht der Stichprobenkontrolle durch QW:
...Vorrichtungsmaße [ ]...Konstruktionsmaße





Ausgabevermerk:

Kurzzeichen	Datum Monat	Jahr
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03	Mär	95
04	Apr	96
05	Mai	97
07	Jun	98
08	Jul	99
Kalk.	Aug	00
Must.	Sep	01
	Okt	02
	Nov	03
	Dez	04

Datum
Änd.Nr.
Maßstab: 1:2 1:10
Werkstoff:
Einsatzlänge: Gew. in kg Roh: Fertig:

Bezeichnung: Einteilige Erdungsstange mit Federbajonett für Nennspannung über 1kV

ARCUS
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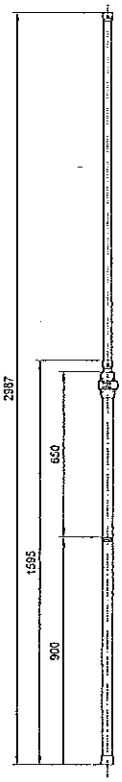
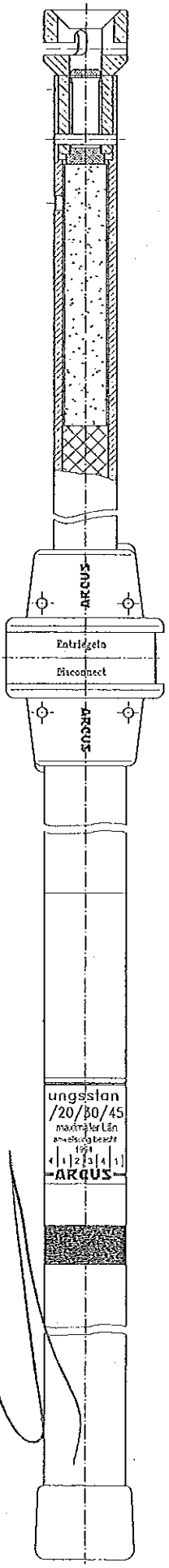
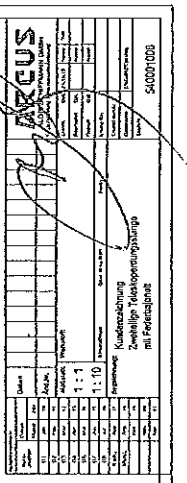
CAD–Zeichnung, keine manuelle Änderung!

Erstellt	Dat.	27.08.09	Name	T--Me
Bearbeitet	Dat.		Name	
Geprüft	Dat.		Name	
Ersatz für:				
Ersetzt durch:				
Dateiname:	510206ku.dwg			
Sach–Nr.	510 206			

ВЯРНО С ОРИГИНАЛА

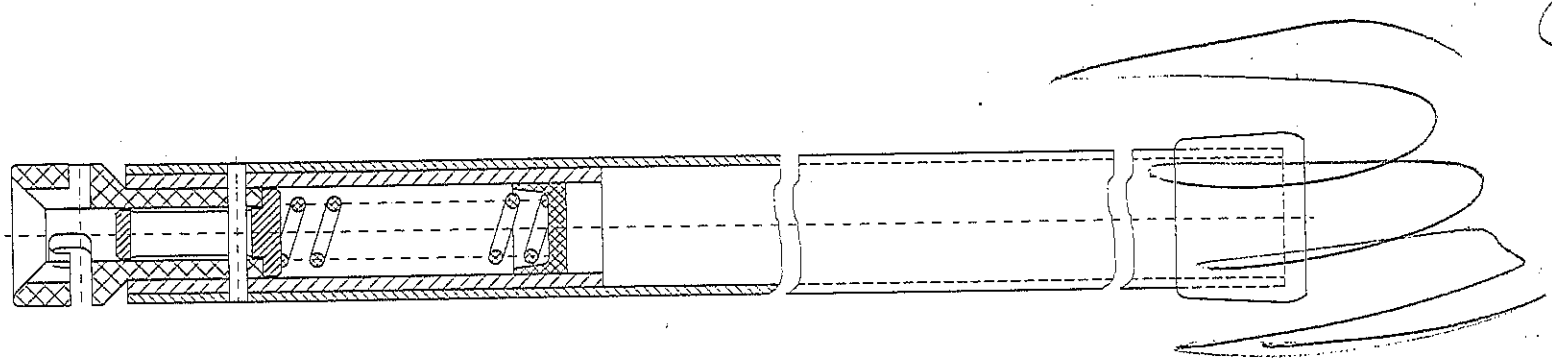




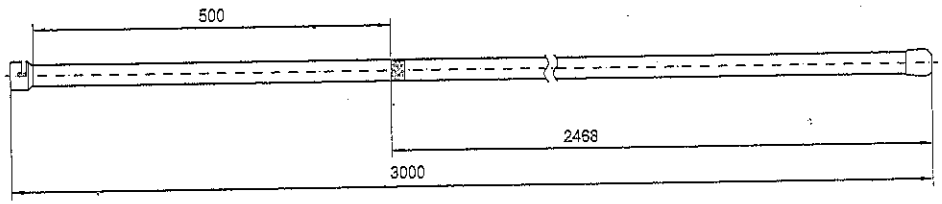


~~GEWASCHEN GEBEIZT~~
OBERFLÄCHE SAUBER UND GRATFREI
KANTEN ENTSCHÄRFT

Abweichungen für Maße ohne Toleranzangabe
a) Für Rohteilmaße:
b) Für Maße der Bearbeitung: ISO 2768-m



M 1:5



Änderungsvermerk			
Kurz-zeichen	Datum		
	Monat	Jahr	
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02	Feb	15	
03	Mär	17	
04	Apr	18	
05	Mai	19	
07	Jun	20	
08	Jul	21	
Kalk.	Aug	22	
Mustr.	Sep	23	
	Okt	24	
	Nov	25	
	Dez	26	

Datum
Änd.Nr.
Maßstab: 1:1 / 1:5
Werkstoff:
Einzellänge: Gew. in kg /Stk: Fertigt:

Bezeichnung: Kundenzeichnung
Einteilige Erdungsstange
mit Federbajonett

AKCUS
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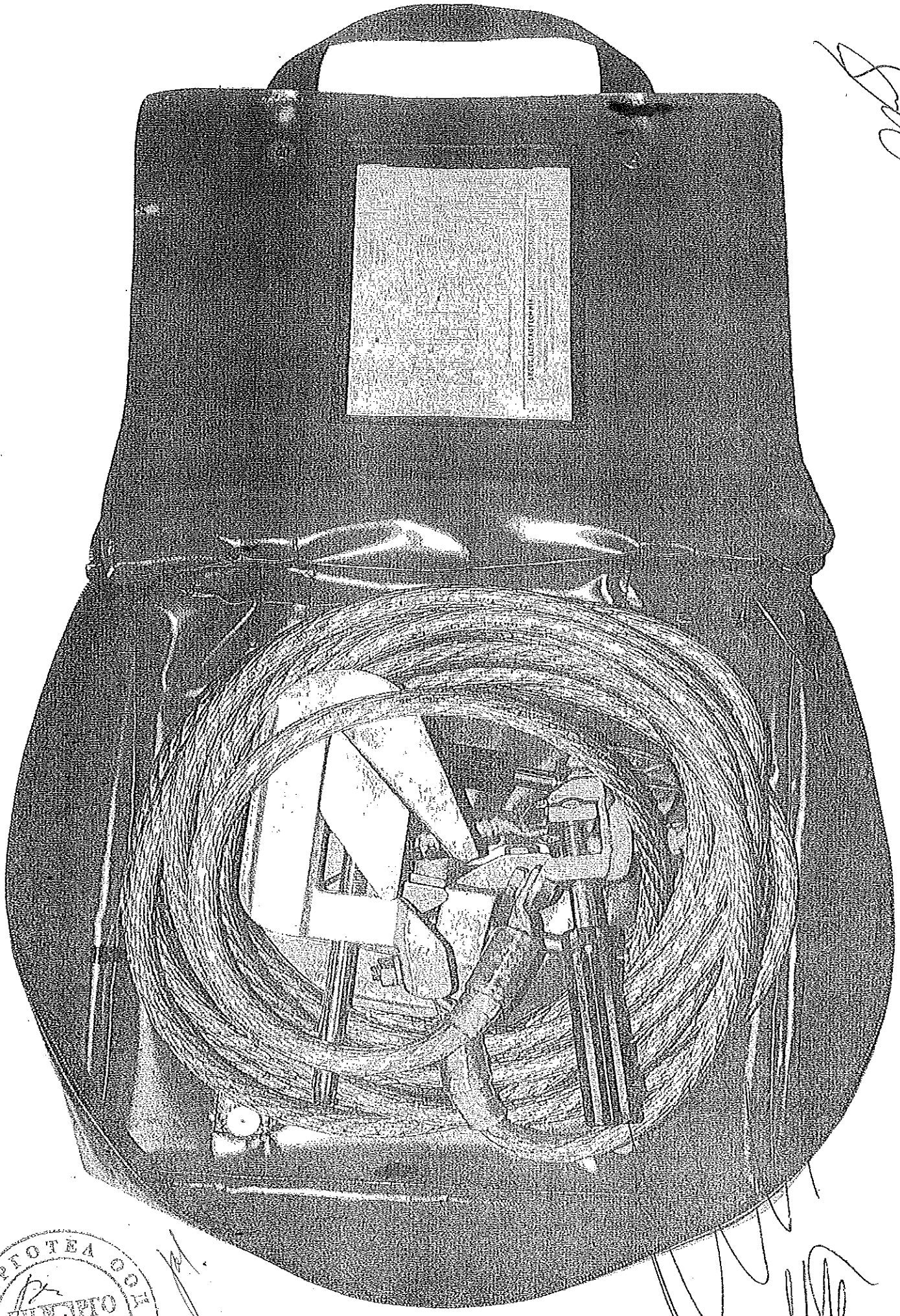
CAD-Zeichnung, keine manuelle Änderung

Erstellt	Dat. 21.10.15	Name	T-N
Geprüft	Dat.	Name	
Freigab	Dat.	Name	
Ersatz für:			
Ersetzt durch:			
Dateiname:	DAC-012547.dwg		
Ausführung:	597 569		

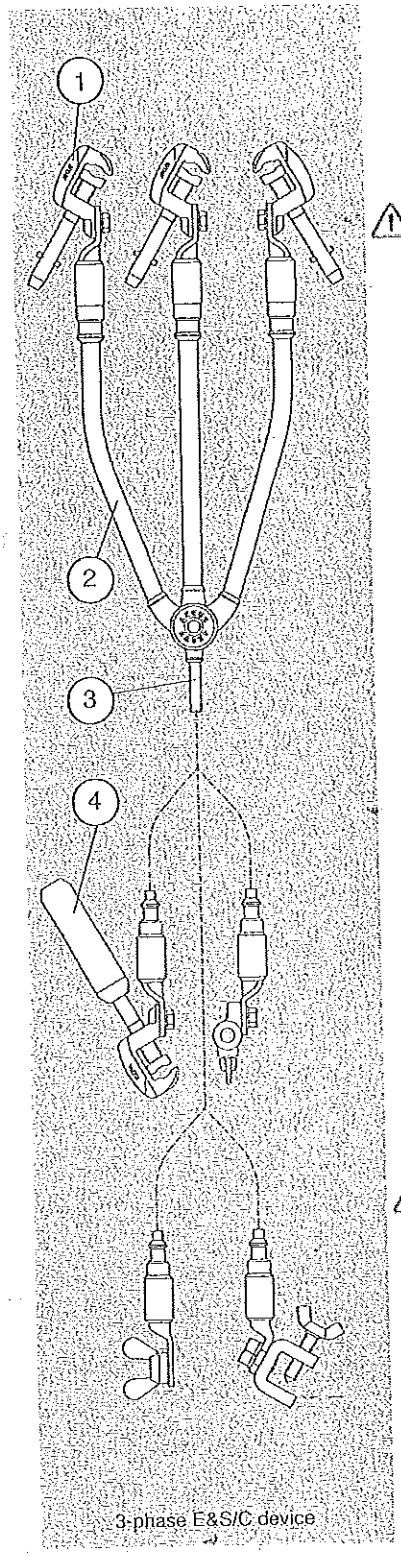
ВЫПИСКА ВЕРНА ОРИГИНАЛА



Instructions for use

Portable earthing and short circuiting devices in accordance with DIN VDE 0683 Part 1

GA66GB-05.10



3-phase E&S/C device

1. Earthing and short circuiting devices

1.1 General information

Earthing and short circuiting (E&S/C) devices are used to earth and short circuit de-energised parts of electrical installations that have been tested for absence of voltage.

⚠ 1.2 Safety information

- In order to avoid risks, both EN 50110-1 and local accident prevention regulations must be observed when using E&S/C devices!
- E&S/C devices may only be used within the framework of the 5 safety rules!
- E&S/C devices may only be used on de-energised parts of electrical installations that have been tested for absence of voltage!
- E&S/C devices may not be used to transmit current!
- De-energised parts of systems may still carry considerable residual voltage. Phase connecting parts (1) may therefore only be directed and attached to the phase conductor using earthing rods or other suitable insulating means.
- E&S/C devices and their fixed points may not be re-used if they have already been subjected to a short circuit current!

1.3 Storage, maintenance and inspection

The purpose of E&S/C devices is to provide protection and safety; they must therefore be treated with care.
E&S/C devices must be stored in dry and clean premises.
Examine the E&S/C devices regularly to make sure they are in faultless condition. The frequency and nature of these inspections depends on the specific conditions of application and storage.
A guideline for such insprections can also be found in Section 1.4 "*Prior to each use*".
We recommend conducting these inspections at annual intervals until you have gained sufficient knowledge to permit an extension of the intervals.
If you decide to replace individual components, e.g. connecting parts (1,4), we recommend that you contact us.

⚠ 1.4 Prior to each use

Before using the E&S/C devices, examine them each time to make sure they are in faultless condition. Particular attention should be paid to the following:

Visual inspection: Check

- that the device is complete
- the connecting parts (1,4) for any damages
- that the contact surfaces of the connecting parts (1,4) are clean
- the short circuiting (2) and earthing (3) leads for corrosion or broken wires
- the lead insulation for cracks or discolouration caused by overheating
- the labels, especially the cross section details

ARCUS-ELEKTROTECHNIK ALOIS SCHIFFMANN GMBH

Phone General +49 (0) 89 / 436 04-0
Fax General +49 (0) 89 / 431 68 88
Fax Sales Department +49 (0) 89 / 436 04 73
Seat of the Company Truderinger Str. 199 D-81673 Munich
Internet www.ARCUS-Schiffmann.com info@ARCUS-Schiffmann.com

ВЯРНО С ОРИГИНАЛА

Instructions for use

Portable earthing and short circuiting devices in accordance with DIN VDE 0683 Part 1

GA66GB-05.10

Manual examination: Check
- to make sure all moving parts are smooth running
- to make sure all detachable connections are firmly tightened

Caution: If you detect any faults during one or more of these checks, take the device out of circulation.

1.5 Assembly

Our E&S/C devices are delivered ready for use. There is no need for on-site assembly.

1.6 Intended usage

- E&S/C devices must always be connected to the earthing system first. When removing the devices, they must be disconnected from the earthing system as the last step.
- E&S/C devices may only be used in electrical installations with the short circuit currents and times for which they have been designed.
- Connecting parts and points may only be joined to conductors with the shape and dimensions for which they have been designed. The same applies when joining connecting parts to connecting points.
- The full short circuit strength of the E&S/C device is only assured if the contact surfaces between the connecting parts and the connecting points are metallic blank and the connecting parts have been screwed hand-tight (using both hands if an earthing rod is used).
- The length of the leads of E&S/C devices between two connecting points may not be less than 1.2 times the distance between the connecting points.
- The leads should not, however, be too long as they will bang if a short circuit occurs.
- In the case of using E&S/C devices for parallel earthing, each lead may only be exposed to 75% of the load for which the full cross section is designed.
- Furthermore, the length and cross section of the leads, the connecting parts and the connecting points must be the same for all the E&S/C devices. The devices must be installed in close consecutive sequence, make sure the leads are parallel.

1.7 Rated values

Our E&S/C devices are suitable for temperatures ranging between -25°C and +55°C and maximum relative humidity of 60%. The short circuit strength of our E&S/C devices is determined by the short circuit strength of the copper leads that are used. Based on the cross section information on the short circuit cables, the maximum permissible short circuit current for the E&S/C device can be derived from the following table.
The values in the table apply to:
- Single and three phase alternating current systems
- A max. cable end temperature of 250°C in the event of a short circuit
- And a short circuit that occurs far from the generator.

If current and time values are explicitly indicated on the E&S/C device (e.g. on an additional label), these values are applicable.

Table – *Rated currents in [kA] for copper leads, depending on the duration of current flow*

Cross section [mm²]	Highest admissible short circuit current in kA at a duration of				
	10 s	5 s	2 s	1 s	< 0.5 s
16	1.0	1.4	2.2	3.2	4.5
25	1.6	2.2	3.5	4.9	7.0
35	2.2	3.1	4.9	6.9	10.0
50	3.1	4.4	7.0	9.9	14.0
70	4.4	6.2	9.8	13.8	19.5
95	5.9	8.4	13.2	18.7	26.5
120	7.5	10.6	16.7	23.7	33.5
150	9.4	13.2	20.9	29.6	42.0

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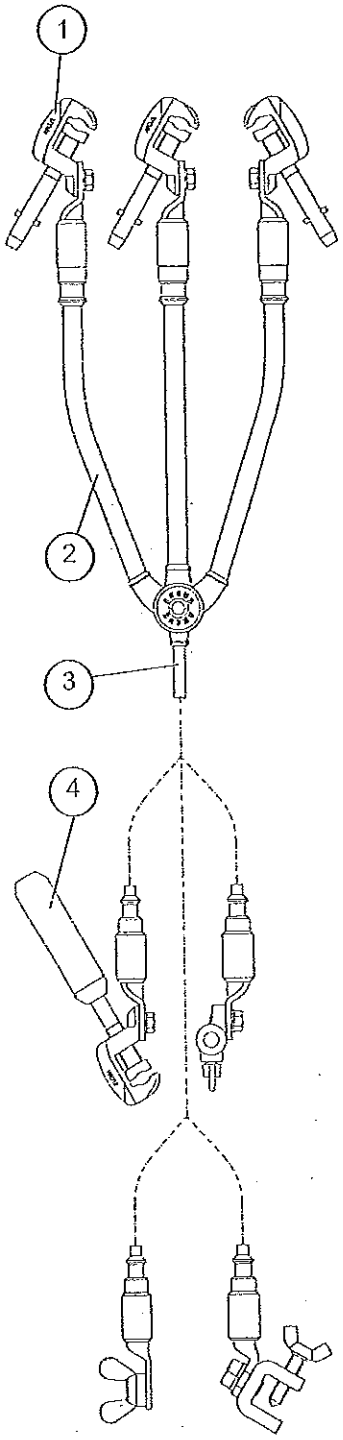
Ръководство за употреба

Преносима апаратура за заземяване и свързване на късо съгласно DIN VDE 0683 част 1

GA66BG-05.10



3-полюсно З и СК-устройство

1. Устройства за заземяване и свързване на късо

1.1 Общо

Устройствата за заземяване и свързване на късо (З и СК-устройство) са устройства за заземяване и свързване на късо на отделени от електрозахранването, проверени за липса на напрежение части на електрически съоръжения.

⚠ 1.2 Указания за безопасност

- При употреба на З и СК-устройства, за предпазване от опасности, трябва да се вземат под внимание EN 50110-1, както и местните предписания за предпазване от злополуки!
- З и СК-устройствата се допуска да се използват само в рамките на 5-те правила за безопасност!
- Използването на З и СК-устройство се допуска да се извършва само на отделени от електрозахранването, проверени за липса на напрежение електрически части на съоръжения!
- Не се допуска използването на З и СК-устройства за пренасяне на ток!
- Отделените от електрозахранването части на съоръжението могат да имат значителни остатъчни напрежения. Поради това, елементите за присъединяване към фазите (1) се допуска да се подвеждат и закрепват към фазовите проводници само чрез заземителни пръти или други подходящи изолиращи помощни средства !
- З и СК-устройствата и техните фиксирани точки, които веднъж вече са били натоварени с ток от късо съединение, не се допуска да се използват отново!

1.3 Складиране, поддръжка и проверка

З и СК-устройствата служат за Вашата защита и Вашата безопасност и поради това с тях трябва да се работи грижливо. Съхранявайте З и СК-устройствата в сухи и чисти помещения. Проверявайте З и СК-устройствата на редовни интервали за безупречното им състояние. Честотата и видът на проверките зависят от специфичните условия на приложение и складиране. Като насока за такива проверки, виж също раздел 1.4 *„Преди всяка употреба"*. Препоръчваме, тези проверки да се извършват на годишни интервали, до тогава, докато събраният опит позволи увеличаване на интервалите. В случай, че желаете да смените отделни компоненти, напр. елементи за свързване (1,4), ние Ви препоръчваме, да се свържете с нас.

⚠ 1.4 Преди всяка употреба

Проверявайте З и СК-устройствата преди всяко използване за безупречното им състояние. Особено внимание при това трябва да се обърне на следните точки:

Визуална проверка: Проверете

- окомплектоваността на заземителния прът
- свързващите елементи (1,4) за повреди
- контактните повърхности на свързващите елементи (1,4) за чистота
- елементите за свързване на късо (2) и заземяване (3) за корозия, респ. за прекъсване на проводник
- обвивката на въжето за пукнатини или оцветяване в следствие на прегряване
- надписите, специално указанията за приложение

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Ръчна проба: Проверете
- всички подвижни елементи за лек ход
- всички разглобяеми съединения за здравото им закрепване

Внимание: Ако при една или няколко от тези проверки бъде установен дефект, то устройството трябва да се изключи от по-нататъшно използване.

1.5 Сглобяване

Нашите З и СК-устройства се доставят в готово за употреба състояние. Не е необходимо сглобяване на място.

1.6 Употреба по предназначение

- З и СК-устройствата винаги трябва първо да се свързват със заземителната инсталация. При отстраняването на устройствата, връзката със заземителната инсталация трябва да се откачи последна.
- З и СК-устройствата да се използват само в електрически съоръжения, за чиито токове и времена на късо съединение са оразмерени.
- Елементите и местата за присъединяване да се монтират само към проводници, за чиято форма и размери те са оразмерени. Същото важи и за свързване на елементите за присъединяване към местата на присъединяване.
- Пълната устойчивост на късо съединение на З и СК-устройството е гарантирана само когато контактните повърхности между елементите за присъединяване и местата на присъединяване са почистени до метал и елементите за присъединяване са стегнати на ръка (при използване на заземителен прът с двете ръце).
- Дължината на въжетата на З и СК-устройствата между всеки две места на присъединяване, не трябва да е по-къса от 1,2 кратното на разстоянието между местата на присъединяване. С оглед на биенето на въжето в случай на късо съединение, дължината не трябва да бъде избрана прекалено голяма.
- При паралелно свързани З и СК-устройства, всяко въже трябва да бъде натоварвано само със 75% от натоварването, което съответства на пълното напречно сечение на въжето. Освен това З и СК-устройствата трябва да имат еднакви дължини на въжетата, напречни сечения на въжетата, елементи и места за присъединяване. Монтажът на устройствата трябва да е плътно едно до друго, при което трябва да се обърне внимание за паралелното водене на въжетата.

1.7 Оразмерителни стойности

Нашите З и СК-устройства са подходящи за температурен диапазон от -25 °C до +55 °C, както и за максимална относителна влажност на въздуха от 60%. Устойчивостта на късо съединение на нашите З и СК-устройства се определя от устойчивостта на късо съединение на използваните медни въжета. Въз основа на данните за напречните сечения върху въжетата за свързване на късо, от следващата таблица може да се установи най-големият допустим ток на късо съединение за З и СК-устройството.
Табличните стойности важат за:
- променливотокови и трифазни съоръжения
- максимална крайна температура на въжето в случай на късо съединение от 250 °C
- както и отдалечено от генератора късо съединение.

Ако върху З и СК-устройството отделно са посочени стойности за ток и време (напр. върху допълнителна табела, то тези стойности са определящи).

Таблица – *Оразмерителни токове в [kA] за медни въжета, в зависимост от продължителността на протичането на тока*

Напречно сечение	Максимално разрешен ток при късо съединение Ik Продължителност tk в секунди				
[mm²]	10 s	5 s	2 s	1 s	≤ 0,5 s
16	1,0	1,4	2,2	3,2	4,5
25	1,6	2,2	3,5	4,9	7,0
35	2,2	3,1	4,9	6,9	10,0
50	3,1	4,4	7,0	9,9	14,0
70	4,4	6,2	9,8	13,8	19,5
95	5,9	8,4	13,2	18,7	26,5
120	7,5	10,6	16,7	23,7	33,5
150	9,4	13,2	20,9	29,6	42,0

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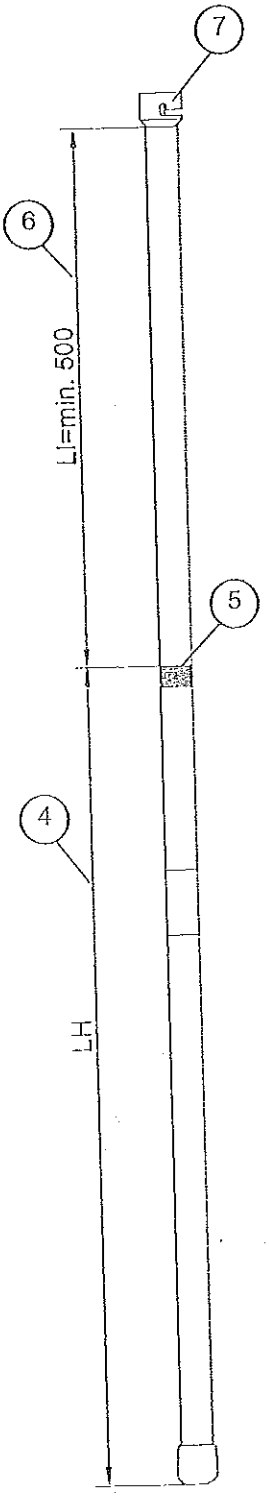

Заземителен прът от една част

2. Заземителни пръти

2.1 Общо

Заземителните пръти са изолиращи пръти за подвеждане на елементите за присъединяване на устройствата за заземяване и свързване на късо към отделени от електрозахранването, предварително проверени за липса на напрежение елементи на електрически съоръжения, с цел заземяване и свързване на късо съгласно EN 50110-1.
Заземителният прът се състои от ръкохватка LH (4), черен пръстен (5), изолираща част LI (6), както и съединител (7) за захващане на елемента за присъединяване към фазата. Ръкохватката LH (4) е областта, в която заземителният прът може да бъде държан по време на използването. Изолиращата част LI (6) има дължина от минимум 500 mm. Тя дава на потребителя необходимото защитно разстояние и достатъчна изолация за безопасно боравене. Заземителни пръти за използване при ниско напрежение, може да се отклоняват от тази конструкция.

2.2 Складиране, поддръжка и проверка

Със заземителните пръти трябва да се работи грижливо. Съхранението трябва да се извършва в сухи и чисти помещения.
На редовни интервали, заземителните пръти трябва да се проверяват за безупречното им състояние. Честотата и видът на проверките зависи от специфичните условия на приложение и складиране.
По отношение на изолационната характеристика, един заземителен прът може да се поддържа в почти ново състояние, ако ежегодно бъде натриван леко с ARCUS-силиконова грес (№ за поръчка 625 004).

⚠ 2.3 Преди всяка употреба

Проверявайте заземителния прът преди всяко използване за безупречното му състояние. Особено внимание при това трябва да се обърне на следните точки:

Визуална проверка: Проверете
- окомплектоваността на заземителния прът
- съединителя и елементите за присъединяване за повреди
- изолиращите тръби за счупвания, пукнатини и други тежки повреди
- за наличието на черния пръстен или на шайбата за защита на ръцете
- надписите, специално указанията за приложение

Ръчна проба:
- проверете съединителя и елементите за присъединяване за надеждно функциониране

Внимание: Ако при една или няколко от тези проверки бъде установен дефект, то заземителният прът трябва да се изключи от по-нататъшно използване.

2.4 Сглобяване

Нашите заземителни пръти се доставят в готово за употреба състояние. Сглобяване на място е необходимо само при наставяеми пръти от няколко части. При това трябва да се вземат под внимание надписите върху отделните части на пръта, както и данните в ръководството за употреба на заземителния прът.

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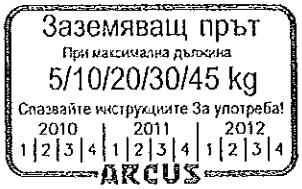
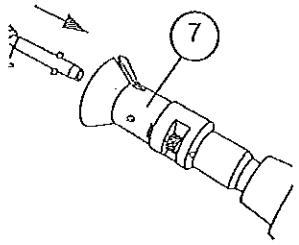
2.5 Употреба по предназначение

- не се допуска използването на заземителни пръти за установяване на липса на напрежение!
- при свързване на късо, заземителният прът да се хваща само в областта на ръкохватката LH (4)!
- изолиращата част LI (6) на заземителния прът, защитава потребителя достатъчно от остатъчни напрежения, когато той води пръта така, че изолиращата част LI (6) в същото време представлява защитно разстояние между неговото тяло и провеждащите остатъчно напрежение части на съоръжението.
- върху всеки заземителен прът се намира залепена табелка с надпис „Заземителен прът". на пръти със съединители (7) за захващане на различни елементи за присъединяване, допълнително се намира числена стойност в kg, която посочва максималното тегло на З и СК-устройството, което може сигурно да бъде повдигнато и подведено със заземителния прът (виж фиг. 1).
- елементът за присъединяване, преди присъединяването към проводника, трябва да се фиксира с шпиндела си в съединителя (7) на заземителния прът и при необходимост да се осигури срещу неволно разхлабване (виж фиг. 2). Непосредствено преди употреба, още веднъж трябва да се провери, дали всички съединителни елементи са надеждно застопорени или фиксирани по друг начин!

Фиг. 1



Фиг. 2



3. Изхвърляне на отпадъци

Изхвърляйте Вашето З и СК устройство, респ. заземителен прът съответно на местните валидни предписания. За некомпетентно изхвърляне на отпадъци ARCUS Schiffmann не носи отговорност.
При неясноти относно използваните материали, ARCUS Schiffmann с удоволствие ще Ви даде информация.

4. Отговорност за продукта и гаранция

Това ръководство за употреба е създадено с голяма грижливост и е проверено преди издаването:
Предпоставка за гаранция е доказаното спазване на ръководството за употреба при складиране, сглобяване, обслужване, поддръжка и грижи.
Валидни са общите условия за продажба и доставка на изделия и услуги от електроиндустрията.

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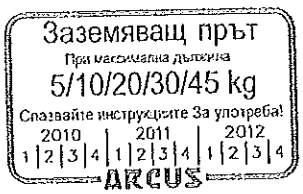
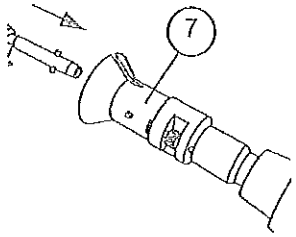
2.5 Употреба по предназначение

- не се допуска използването на заземителни пръти за установяване на липса на напрежение!
- при свързване на късо, заземителният прът да се хваща само в областта на ръкохватката LH (4)!
- изолиращата част LI (6) на заземителния прът, защитава потребителя достатъчно от остатъчни напрежения, когато той води пръта така, че изолиращата част LI (6) в същото време представлява защитно разстояние между неговото тяло и провеждащите остатъчно напрежение части на съоръжението.
- върху всеки заземителен прът се намира залепена табелка с надпис „Заземителен прът". на прътите със съединители (7) за захващане на различни елементи за присъединяване, допълнително се намира числена стойност в kg, която посочва максималното тегло на 3 и СК-устройството, което може сигурно да бъде повдигнато и подведено със заземителния прът (виж фиг. 1).
- елементът за присъединяване, преди присъединяването към проводника, трябва да се фиксира с шпиндела си в съединителя (7) на заземителния прът и при необходимост да се осигури срещу неволно разхлабване (виж фиг. 2). Непосредствено преди употреба, още веднъж трябва да се провери, дали всички съединителни елементи са надеждно застопорени или фиксирани по друг начин!

Фиг. 1



Фиг. 2



3. Изхвърляне на отпадъци

Изхвърляйте Вашето З и СК устройство, респ. заземителен прът съответно на местните валидни предписания. За некомпетентно изхвърляне на отпадъци ARCUS Schiffmann не носи отговорност. При неясноти относно използваните материали, ARCUS Schiffmann с удоволствие ще Ви даде информация.

4. Отговорност за продукта и гаранция

Това ръководство за употреба е създадено с голяма грижливост и е проверено преди издаването: Предпоставка за гаранция е доказаното спазване на ръководството за употреба при складиране, сглобяване, обслужване, поддръжка и грижи.
Валидни са общите условия за продажба и доставка на изделия и услуги от електроиндустрията.

ARCUS ELEKTROTECHNIK ALOIS SCHIFFMANN GMBH

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Седалище на дружеството
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D-81673 Muenchen

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www.ARCUS-Schiffmann.com
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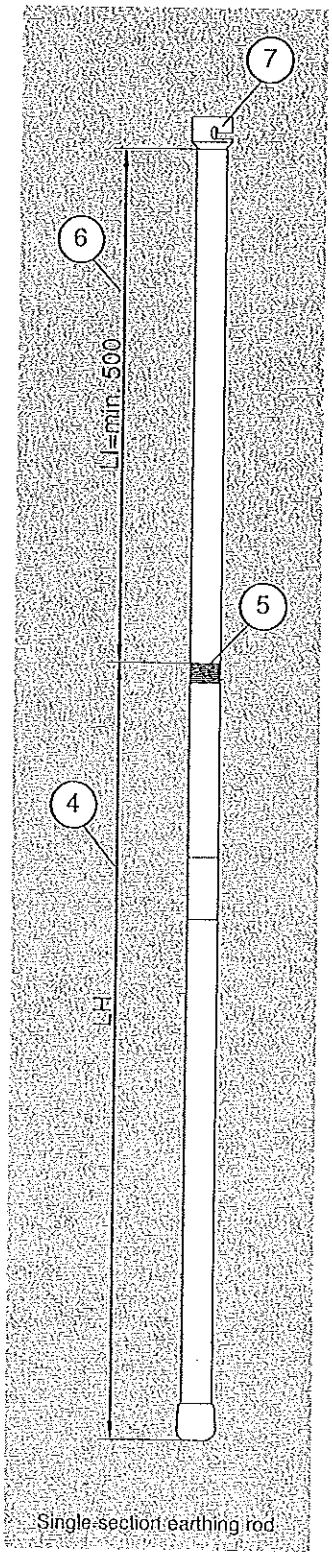
Instructions for use

Portable earthing and short circuiting devices in accordance with DIN VDE 0683 Part 1

GA66GB-05.10



Single-section earthing rod

2. Earthing rods

2.1 General information

Earthing rods are insulating rods for joining the connecting parts of earthing and short circuiting devices to de-energised parts of electrical insatallations that have been tested for absence of voltage; their purpose is to earth and short circuit in accordance with EN 50110-1.
Earthing rods consist of a handle LH (4), a black ring (5), the insulation section LI (6), and a coupling (7) for connecting the phase connection clamp. The handle LH (4) is the part of the earthing rod that may be held during use. The insulating section LI (6) is at least 500 mm long. It keeps the user at the necessary safe distance and provides sufficient insulation for safe usage. Earthing rods for low-voltage use may have a different design.

2.2 Storage, maintenance and inspection

Earthing rods must be treated with care. They should be stored in dry and clean premises.
Earthing rods must be examined regularly to ensure they are in faultless condition. The frequency and nature of these checks depends on the specific conditions of application and storage.
As far as their insulating properties are concerned, earthing rods can be kept virtually as good as new by lightly greasing them with ARCUS silicone grease (order no. 625 004) approximately once a year.

⚠ 2.3 Prior to each use

Check the earthing rod before each use to make sure it is in impeccable condition. Particular attention should be paid to the following:
Visual inspection: Check

- that the earthing rod is complete
- the coupling and connecting parts for damages
- the insulating tube for fractures, cracks and other severe damages
- the presence of the black ring or hand protection disc
- the labels, particularly the instructions for use

Manual examination:

- Check that the coupling and connecting parts are working properly

Attention: If you detect any faults during one or more of these checks, take the earthing rod out of circulation.

2.4 Assembly

Our earthing rods are delivered ready for use.
On-site assembly is only necessary for multi-section pluggable rods. In this case, the labels on the individual rod sections and the information in the instructions for the use of the earthing rods must be observed.

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⚠ 2.5 Intended usage

- Earthing rods must not be used to verify the absence of voltage!
- When short circuiting, only the handle LH (4) of the earthing rod may be touched!
- The insulating section LI (6) on the earthing rod provides sufficient protection against residual voltage if users guide the rod in such a way that the insulating section LI (6) is between the user's body and any part of the installation that is still carrying residual voltage; this ensures the necessary safety clearance.
- An adhesive label marked "Earthing rod" is affixed to each rod. Rods with couplings (7) for joining various connectors also indicate a figure in kg, which is the maximum weight of an E&S/C device that can be safely lifted and directed with the earthing rod (see Fig. 1).
- Prior to connection with the conductor, the spindle of the connecting part must be locked into the coupling (7) on the earthing rod and, if necessary, secured against unintentional disconnection (see Fig. 2). Verify again that all connecting parts are locked in securely or otherwise fixed immediately prior to use!

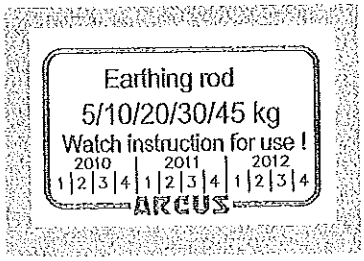

Fig. 1

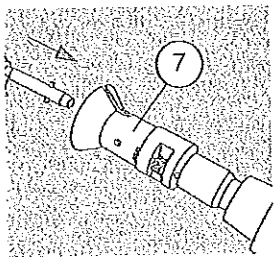

Fig. 2

3. Disposal

Disposal of the E&S/C device and/or earthing rod must comply with local regulations. ARCUS Schiffmann accepts no liability for incorrect disposal.
Please do not hesitate to contact ARCUS Schiffmann if you require clarification about any of the materials used.

4. Product liability and warranty

These instructions for use have been prepared with the greatest possible care and were reviewed prior to publication.
Warranty liability will only be accepted upon proof of compliance with the instructions for use in terms of storage, assembly, operation, maintenance and care.
The General Terms and Conditions of Sale and Delivery for Electrical Products and Services apply.

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ВЯРНО С ОРИГИНАЛА

Инструкции за употреба

Оперативни щанги за приложение над 1KV

При използването на оперативни щанги трябва да се спазват правилата по EN50110-1.

1.Указание за ползване,надписи и поддръжка

1.1 Оперативната щанга трябва да се използва само за номинално нарежение или в диапазона на напрежение,отбелязано на етикета.

1.2 Оперативната щанга може да бъде използвана за временна работа на работеща инсталация.

1.3 Оперативната щанга да не се използва за конструкции вътрешен и външен монтаж, които не са влагозащитени.Влагата причинява пукнатини и деформации на повърхността на щангата, същото действие оказва и наличието на мъгла.Оперативната щанга при конструкции с наличие на влага не трябва да се използва повече от 1 минута върху работещи части без прекъсване.

1.4 Оперативната щанга се състои от:

-Глава на оперативната щанга(1) за включване на оперативен елемент,например превключвател

-Изолирана част(L), между ръчната защитна част (4) и червения пръстен(2).Това ще осигури на потребитяля необходимото защитно разстояние и достатъчна изолация за да оперира.

-Допълнителна част(Lvl) между главата на оперативната щанга (1) и червения пръстен (2).Тя може да бъде поставена в заземени или работещи инсталации.

-Ръчна секция (LH).Оперативната щанга трябва да бъде вмъкната само в ръчната част (LH) при използване.Забранено е оперативната щанга да се държи над ръчната защитна част(4).

-Ниво(3) с информация за номинално напрежение и диапазон на напрежение.

1.5 Оперативната щанга може да се използва във всяка позиция.

1.6 Преди използване оперативната щанга трябва да бъде тествана от квалифицирано лице за евентуално наличие на проблеми.В случай на повредени части или неясно указание за употреба, не използвайте оперативната щанга.

1.7 За по-голяма безопастност се препоръчва тестването на безупречното състояние на щангата чрез рутинни тестове(изолиращи свойства,безопастност). При такива случаи, ако не са спазени изискванията на VDE 0681 оперативната щанга трябва да бъде спряна от употреба.

2. Указание за употреба

Допълнение от главните стандарти EN 50110-1:

a)Работата с оперативната щанга трябва да се изпълнява само от квалифициран персонал.

b)Оперативните щанги трябва да се изпозват само от безопастна позиция,когато работника е на достатъчно безопасно разстояние от работещите под напреение части.

c)Оперативни щанги трябва да се съхраняват на сухо място.

d)Етикетите,указанията и инструкциите трябва да бъдат поставени на видно място.

e)Главите на оперативните щанги,например превключващите глави, които са конструирани само за монтиране на оперативни щанги трябва да бъдат използвани само с подходящата щанга.

f)Съответните правила на Институцията за злополука,застраховане,профилактика и превенция трябва да бъдат спазени!

3. Експлоатация

3.1 Оперативната щанга трябва да се изполва внимателно и да бъде защитена от повреди и замърсявания(например лак металическа абразия и др.)

3.2 Влажна оперативна щанга се изсушава с мека,гладка и чиста памучна кърпа.

3.3 Оперативна щанга, която е предназначена за използване без наличие на влага се подсушава внимателно в случай, че е мокра.

3.4 За да се поддържат изолационните качества може да се прави провилактика на повърхността на оперативната щанга чрез третиране със силиконова паста ARCUS(тип номер: 625 004) веднъж годишно.

4. Инструкции за монтаж.

4.1 За да има синхрон между отделните елементи при оперативни щанги с байонетна глава(11) е необходимо те да се плъзгат плавно.

Например: Закрепване на елемент като например превключваща глава(10,12,13) към байонетна глава (11) на оперативна щанга:

-Завъртете назъбената гайка(12)на превкл. глава докато се законтри

-Вкарайте превкл. Глава(10,12,13) във вдлъбнатините на байонетната глава (11) и завъртете на 90градуса докато се законтри.

-Завъртете назъбената гайка надолу и я стегнете.Байонетния щифт на шпиндела(13) трябва да бъде заключен във врязката(14)на байонетната глава(11).

4.2 Многосекционни оперативни щанги със система plug-in се монтират според инструкциите.

Пример: 4-секционна оперативна щанга

Главна част Горна част Висока част Долна част

4.3 Телескопичните оперативни щанги трябва да се използват само в напълно удължено състояние.

5. Оперативни щанги могат да бъдат използвани в специално проектирани заводски инсталации за тестване при ограничени условия, като те са били проектирани в съответствие с минималните разстояния от HD 637 S1, и неговите разрешения **на ниво** освобождаване от отговорност. Потребителите на оперативните щанги или операторите на съответните инсталации, трябва да се обърнат към производителя, дали оперативните щанги може да се използват и къде.

6. Допълнителни части и аксесоари:

Превключваща глава по стандарт DIN 57681 част 2

Силиконова паста Arcus 100гр.

Информация за други аксесоари се получава след запитване

CERTIFICATE OF CONFORMITY

Customer: Energo-Tel for CEZ Bulgaria

Product: Earthing device 35 mm², 5-polar, 5x 1000 mm long, 1x E10000 mm long, 5x phase clamp 507042D, 1x earthing clamp 502016

Type No.: 530001459BG

Characteristics	Result of Examination
Measurements according to order (100%)	Yes
Measurements according to drawing (100%)	Yes
Visual inspection (100%)	Yes

All items detailed above which we will supply will be inspected, tested and will be in conformity in all respect with the requirements of the order, unless otherwise stated.

Date:

21.10.2015

ARCUS ELEKTROTECHNIK
Alois Schiffmann GmbH

i.V. Dipl.-Ing.Johannes Distler
Head of Sales Department

i.A. Regina Krumm
Export Sales Manager

ЕНЕРГОТЕЛ ООД
гр. СОФИЯ

ВЯРНО С ОРИГИНАЛА

CERTIFICATE OF CONFORMITY

Customer: Energo-Tel for CEZ Bulgaria

Product: Earthing rod, 1-part, up to 1kV use, spring bayonet head, 650 mm long

Type No.: 540001105BG

Characteristics	Result of Examination
Measurements according to drawing (100%)	Yes
Function test (100%)	Yes
Labels according to drawing (100%)	Yes
Visual inspection (100%)	Yes

All items detailed above which we will supply will be inspected, tested and will be in conformity in all respect with the requirements of the order, unless otherwise stated.

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Export Sales Manager

ВЯРНО С ОРИГИНАЛА

CERTIFICATE OF CONFORMITY

Customer: Energo-Tel for CEZ Bulgaria

Product: Carrying bag for earthing devices, with zipper and shoulder strap, dimensions 420 x 420 x 120 mm

Type No.: 615099

Characteristics	Result of Examination
Measurements according to drawing (100%)	Yes
Function test (100%)	Yes
Visual inspection (100%)	Yes

All items detailed above which we will supply will be inspected, tested and will be in conformity in all respect with the requirements of the order, unless otherwise stated.

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гр. СОФИЯ

ВЯРНО С ОРИГИНАЛА

CERTIFICATE OF CONFORMITY

Customer: Energo-Tel for CEZ Bulgaria

Product: Earthing device 50 mm², 3-polar, 3x 1000 mm long, 1x E1000 mm long, 3x cartridge NH0-3 firmly connected, 1x earthing clamp 502016

Type No.: 530001460BG

Characteristics	Result of Examination
Measurements according to order (100%)	Yes
Measurements according to drawing (100%)	Yes
Visual inspection (100%)	Yes

All items detailed above which we will supply will be inspected, tested and will be in conformity in all respect with the requirements of the order, unless otherwise stated.

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ВЯРНО С ОРИГИНАЛА

CERTIFICATE OF CONFORMITY

Customer: Energo-Tel for CEZ Bulgaria

Product: Earthing device 35 mm², 3-polar, 3x 2000 mm long, 1x E12000 mm long, 3x phase clamp 507042D, 1x earthing clamp 502016

Type No.: 530001461BG

Characteristics	Result of Examination
Measurements according to order (100%)	Yes
Measurements according to drawing (100%)	Yes
Visual inspection (100%)	Yes

All items detailed above which we will supply will be inspected, tested and will be in conformity in all respect with the requirements of the order, unless otherwise stated.

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ЕНЕРГОТЕЛ ООД
ЕНЕРГО ТЕЛА
гр. СОФИЯ

ВЯРНО С ОРИГИНАЛА

CERTIFICATE OF CONFORMITY

Customer: Energo-Tel for CEZ Bulgaria

Product: Earthing rod, 1-part, spring bayonet head, 1500 mm long

Type No.: 510206BG

Characteristics	Result of Examination
Measurements according to drawing (100%)	Yes
Function test (100%)	Yes
Labels according to drawing (100%)	Yes
Visual inspection (100%)	Yes

All items detailed above which we will supply will be inspected, tested and will be in conformity in all respect with the requirements of the order, unless otherwise stated.

Date:

21.10.2015

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Dipl.-Ing. Johannes Distler
Head of Sales Department

Regina Krumm
Export Sales Manager

ВЯРНО С ОРИГИНАЛА

CERTIFICATE OF CONFORMITY

Customer: Energo-Tel for CEZ Bulgaria

Product: Earthing device 95 mm², 3-polar, 3x 1500 mm long, 1x E5000 mm long, 3x phase clamp 507006D, 1x earthing clamp 502022

Type No.: 530001462BG

Characteristics	Result of Examination
Measurements according to order (100%)	Yes
Measurements according to drawing (100%)	Yes
Visual inspection (100%)	Yes

All items detailed above which we will supply will be inspected, tested and will be in conformity in all respect with the requirements of the order, unless otherwise stated.

Date:

21.10.2015

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гр. СОФИЯ

ВЯРНО С ОРИГИНАЛА

CERTIFICATE OF CONFORMITY

Customer: Energo-Tel for CEZ Bulgaria

Product: Earthing device 95/35 mm², 3-polar, 3x 3500 mm long, 1x E5000 mm long, 3x phase clamp 507006D, 1x earthing clamp 502016

Type No.: 530001463BG

Characteristics	Result of Examination
Measurements according to order (100%)	Yes
Measurements according to drawing (100%)	Yes
Visual inspection (100%)	Yes

All items detailed above which we will supply will be inspected, tested and will be in conformity in all respect with the requirements of the order, unless otherwise stated.

Date:

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Export Sales Manager

ВЯРНО С ОРИГИНАЛА

CERTIFICATE OF CONFORMITY

Customer: Energo-Tel for CEZ Bulgaria

Product: Earthing rod, 1-part, spring bayonet head, 3000 mm long

Type No.: 597569

Characteristics	Result of Examination
Measurements according to drawing (100%)	Yes
Function test (100%)	Yes
Labels according to drawing (100%)	Yes
Visual inspection (100%)	Yes

All items detailed above which we will supply will be inspected, tested and will be in conformity in all respect with the requirements of the order, unless otherwise stated.

Date:

21.10.2015

ARCUS ELEKTROTECHNIK
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гр. СОФИЯ

ВЯРНО С ОРИГИНАЛА

CERTIFICATE OF CONFORMITY

Customer: Energo-Tel for CEZ Bulgaria

Product: Earthing rod, 2-section, telescopic, spring bayonet head, extended length 3000 mm,

transport length 1595 mm

Type No.: 540001008

Characteristics	Result of Examination
Measurements according to drawing (100%)	Yes
Function test (100%)	Yes
Labels according to drawing (100%)	Yes
Visual inspection (100%)	Yes

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Date:

21.10.2015

ARCUS ELEKTROTECHNIK
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ЕНЕРГО ТЕЛ
гр. СОФИЯ
ВЯРНО С ОРИГИНАЛА

Превод от английски

Фирмена бланка

Енерго-Тел ООД
Ул.„Тинтява“ 122
1172 София
България

Дата
21.10.2015

СЕРТИФИКАТ ЗА СЪОТВЕТСТВИЕ

Клиент: ЧЕЗ България

Продукт: Преносимо заземтелно устройство със сечение 35mm2, 5 полюсно с дължина 5x1000mm с 5 фазови скоби 507042D и заземителен кабел с дължина 1000mm и заземителна скоба 502016

Продуктов No.: 530001459BG

Продукт: Заземяване щанга с приложение до 1kV ,байонетен захват, дължина 650 mm

Продуктов No.: 540001105BG

Продукт: Чанта за заземителни устройства, с цип и презрамка, размери 420 x 420 x 120 mm

Продуктов No.: 615099

Продукт: Заземяване устройство със сечение 50 mm2, 3 полюсно с дължина 3x1000 mm и 3бр. касети NH0-3 здраво свързани и заземителна скоба 502016

Продуктов No.: 615099

Продукт: Преносимо заземтелно устройство със сечение 35mm2, 3 полюсно с дължина 5x2000mm с 3 фазови скоби 5070420 и заземителен кабел с дължина 12000mm и заземителна скоба 502016

ЕНЕРГО ТЕЛ ООД гр. СОФИЯ

ВЯРНО С ОРИГИНАЛА

Продуктов No.: 530001461 BG

Продукт: Заземяване щанга байонетен захват, дължина 1500 mm

Продуктов No.: 510206BG

Продукт: Преносимо заземтелно устройство със сечение 95mm2, 3 полюсно с дължина 3x1500mm с 5 фазови скоби 507006Dи заземителен кабел с дължина 5000mm и заземителна скоба 502022

Продуктов No.: 530001462BG

Продукт: Преносимо заземтелно устройство със сечение 95/35mm2, 3 полюсно с дължина 3x3500mm с 5 фазови скоби 507006D и заземителен кабел с дължина 5000mm и заземителна скоба 502016

Продуктов No.: 53000146388

Продукт: Заземяване щанга байонетен захват, дължина 3000 mm

Продуктов No.: 597569

Продукт: Заземяване щанга, 2-секции, телескопична,байонетен захват, разтеглива дължина 3000 mm, транспортна дължина 1595mm

Продуктов No.: 540001008

Потвърждаваме, че всички елементи, подробно описани по-горе, които ще доставим ще бъдат инспектирани, тествани и ще бъдат в съответствие с изискванията на заповедта, освен ако не е посочено друго.

С уважение

Йоханес Дистлер
Директор Продажби

Реджина Крумм
Мениджър Експорт

ВЯРНО С ОРИГИНАЛА

TEST REPORT

Apparatus:	Line clamps for earthing and short-circuiting device
Designation:	Line clamps for earthing and short-circuiting device 502 021
Manufacturer:	ARCUS ELEKTROTECHNIK ALOIS SCHIFFMANN GMBH Truderinger Strasse 199.; D-81673 Munich;GERMANY
Tested for:	ARCUS ELEKTROTECHNIK ALOIS SCHIFFMANN GMBH Truderinger Strasse 199.; D-81673 Munich;GERMANY
Date of test:	10th July 2012
Tested by:	VEIKI-VNL Ltd. – Budapest – HUNGARY
Project ID:	NTL-33 / 2012
Order/Contract:	66486, 23th April 2012
Test Specification:	IEC 61230:2008
Tests Performed:	Short-circuit current test on line clamps type 502 021 for earthing and short-circuiting device.
Test Results:	The tested clamps withstood the mechanical and thermal effects of the applied short-circuit current without any damages or visible deformation.

This Test Report has been issued by VEIKI-VNL Ltd. in accordance with above mentioned Specifications.

The Report applies only to the apparatus tested. The responsibility for conformity of any apparatus having the same designations with that tested rests with the Manufacturer.

This Report comprises 14 sheets in total (11 numbered pages, 1 drawing, 2 oscillograms). Only integral reproduction of this document is permitted without written permission from VEIKI-VNL Ltd.

VEIKI-VNL Ltd. is independent test laboratory accredited acc. to MSZ EN ISO/IEC 17025 by the Hungarian Accreditation Board (NAT).

Budapest, 4th September, 2012	Gabor Huszl responsible for the test	László Tóth supervised by	Dr. László Varga managing director

1158 Budapest, Vasgolyó u. 2-4., HUNGARY
E-mail: vnl@vnl.hu
www. vnl.hu
Phone: +36-1-417 3157
Fax: +36-1-417 3163

STL applicant

ВЯРНО С ОРИГИНАЛА

TEST CERTIFICATES OR REPORTS ISSUED BY VEIKI-VNL LTD.

Type Test Certificate of Complete Type Test
This certificate provides the verification of all the rated characteristics of the equipment as assigned by the manufacturer, by means of the performance of all type tests specified by the standards.

Type Test Certificate of Dielectric Performance
This certificate provides the verification of all dielectric ratings, by means of the performance of the appropriate type tests specified by the standards.

Type Test Certificate of Temperature-Rise Performance
This certificate provides the verification of temperature-rise limits together with measurement of the main circuit resistance, by means of the performance of the appropriate type tests specified by the standards.

Type Test Certificate of Short-Circuit / Making and Breaking Performance
This certificate provides the verification of rated characteristics with respect short-circuit and/or making and breaking performance, by means of the performance of the appropriate type tests specified by the standards.

Type Test Certificate of Switching Performance
This certificate provides the verification of the switching ratings (e.g. capacitive current), by means of the performance of the appropriate type tests specified by the standards.

Type Test Report
This report provides the verification of the rated characteristics of the equipment as assigned by the manufacturer, by means of the performance of the appropriate type tests specified by the standards, for type tests not indicated above.

Development Test Report
This report is issued when the test is intended only to provide the Client with information about the performance of the equipment. The tests are performed in accordance with relevant standards, but are not intended to verify compliance of the equipment.

Control Test Report
This report is issued for tests performed on equipment in service, or removed from service. Tests are performed, and compliance is evaluated in accordance with relevant standards.

Test Report
Test report is issued in all cases not listed above.

ЕНЕРГОТЕА ООД
ЕНЕРГО ТЕСТ
гр. СОФИЯ

ВЯРНО С ОРИГИНАЛА

Ratings/characteristics assigned by the manufacturer and proved by tests:

Designation:	Line clamps for short-circuiting device
Type:	502 021
Rated voltage:	> 1kV
Rated frequency:	50 Hz
Rated short-time withstand current:	33.5 kA
Rated peak factor:	2.5
Rated duration of short-circuit:	0.5 s
Diameter of the installation conductor:	First test : 30x31 mm; copper flat conductor
	Second test: 50x3 mm; copper flat conductor

The first test arrangement consisted of the following elements:

- Copper flat conductor with cross-section of 30x31 mm
- Line clamp (Drawing number: 502 021)
- Flexible, insulated, 120 mm^2 Cu short-circuiting cable (1m)
- Line clamp (Drawing number: 502 021)
- Copper flat conductor with cross-section of 30x40 mm

The second test arrangement consisted of the following elements:

- Copper flat conductor with cross-section of 50x3 mm
- Line clamp (Drawing number: 502 021)
- Flexible, insulated, 120 mm^2 Cu short-circuiting cable (1m)
- Line clamp (Drawing number: 502 021)
- Copper flat conductor with cross-section of 50x3 mm

The tests were carried out in accordance with the following standards:

IEC 61230:2008	Live working - Portable equipment for earthing or earthing and short-circuiting.

Requirements of manufacturer or purchaser:

-

List of manufacturer's drawings for identification of the test object:

502 021

Present at the test in charge of manufacturer or purchaser:

Mr. Christian Niklis	ARCUS GMBH
Mr. Andreas Hanusch	ARCUS GMBH

ВЯРНО С ОРИГИНАЛА

TESTS PERFORMED ON THE APPARATUS

No.	Description	Relevant clauses of the standard
1	Short-circuit current tests	5.7

DESCRIPTION OF THE TESTS

1. The test object

Short-circuit current tests were carried out on line clamps type 502 021 for short-circuiting device. For the tests flat installation conductors were used in test arrangement according to Figure 6a of the standard (See: Figure 3). The drawing of the tested clamps given by the manufacturer is enclosed to the test report. Before the commencement of the tests the identification of the test samples was made. The applied flexible copper short-circuiting cable was not part of the test objects. The preconditioning of clamps was performed before the short-circuit current tests.

2. The tests carried out

Short-circuit current tests were carried out on four new line clamps for short-circuiting device. The test arrangement consisted of installation conductors, line clamps and short-circuiting cable. The tests were carried out in accordance with the referred standard. The scheme of the test circuit is shown in Figure 1. The applied test arrangement can be seen on Photos 1, 3 and in Figure 3.

First test:

Two line clamps were clamped onto copper flat conductor with cross-section of 30x31 mm and connected to each other by flexible copper short-circuiting cable with cross section of 120 mm^2. The test was carried out with the maximum conductor size at the rated current of the clamps.

Second test:

Two line clamps were clamped onto copper flat conductor with cross-section of 50x3 mm and connected to each other by flexible copper short-circuiting cable with cross section of 120 mm^2. This test was carried out with the minimum conductor size at the rated current of the applied conductor.

3. Results of the test

During the short-circuit tests, during the visual inspection damages could not be observed. The tested clamps withstood the mechanical and thermal effects of the applied short-circuit current without any damages or visible deformations. The condition of the tested elements is shown on Photos 2 and 4. The test parameters and results are collected in Table 1.

ВЯРНО С ОРИГИНАЛА

4. The recorded quantities taken during the short-circuit current tests

During all tests oscillograms were taken. The quantities were recorded by transient recorder with sampling rate of 50 μs. The meaning of the symbols on the enclosed oscillograms are the next:

U - voltage measured at the test arrangement;
I - short-circuit current flowing through the tested line clamp.

Same notations are applied in Figures. The test parameters evaluated from the oscillograms are collected in Table 1. The measuring circuit with the applied elements are shown in Figure 2.

5. Measurement uncertainty

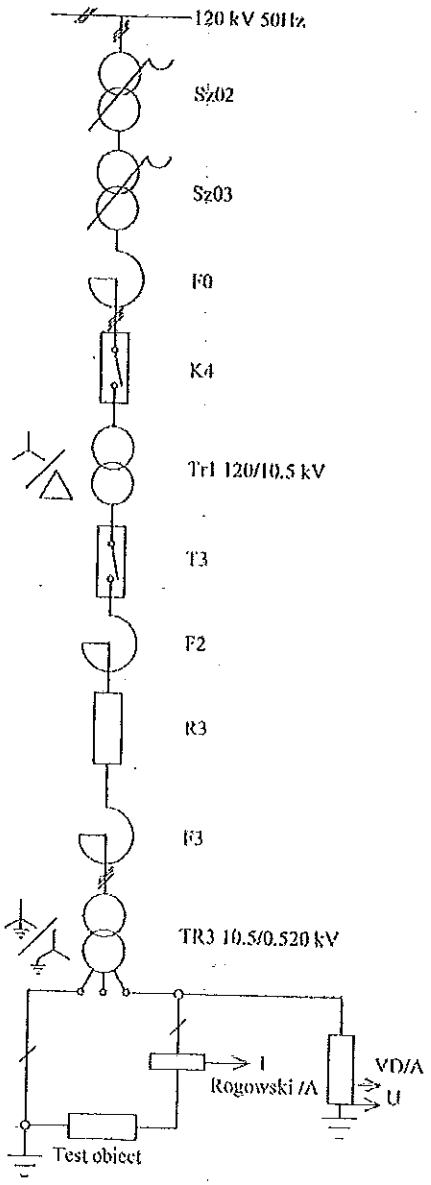
Measured parameter	Uncertainty
Voltage measurement:	0.26 %
Current measurement:	0.59 %

The uncertainty values given in this report are standard deviation values multiplied by k=2. Measurement uncertainty was estimated according to the method described in the EAL-R2 document.

6. Measuring devices used for the tests:

No.	Designation	Manufacturer	Type	Serial number
[1]	Rogowski/A	3D-Motion Control Mérnökiroda Kft.	DCM-R1 Rogowski Coil / DCM R1 Secondary Converter	2010-RC-001/2010-IU-001/1
[2]	VD/A 1kV/100V	VEIKI	R-C-R	21
[3]	PSO 9001	ECKELMANN	PSO 9001	1294-3015

ВЯРНО С ОРИГИНАЛА

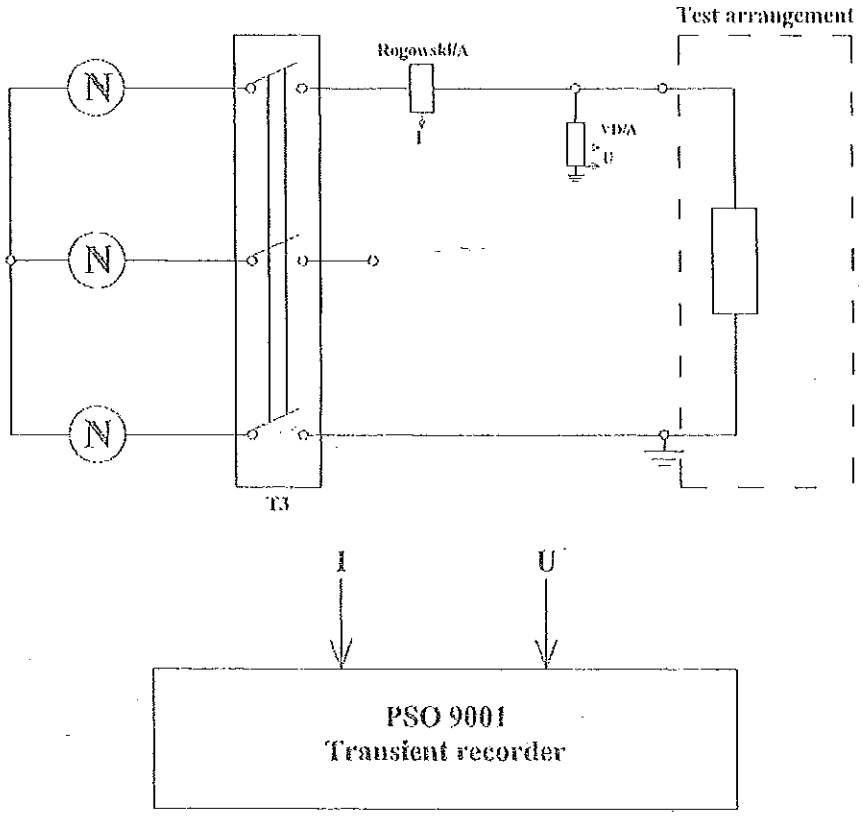


Sz02; Sz03	-	regulating transformers
F0, F2, F3	-	reactors
R3	-	resistor
K4	-	protective circuit-breaker
Tr1, Tr3	-	short-circuit transformers
T3	-	making switch
Rogowski /A (I)	-	Rogowski current measuring system [1]
VD/A (U)	-	voltage divider [2]

Figure 1
The test circuit of the short-circuit current test

ЕНЕРГОТЕА ООД

ВЯРНО С ОРИГИНАЛА



N	-	50 Hz power network	
T3	-	making switch	
Rogowski/A	-	Rogowski current measuring system (I)	[1]
VD/A	-	voltage divider (U)	[2]
PSO 9001	-	transient recorder	[3]

Figure 2
The measuring circuit of the short-circuit current test

ВЯРНО С ОРИГИНАЛА

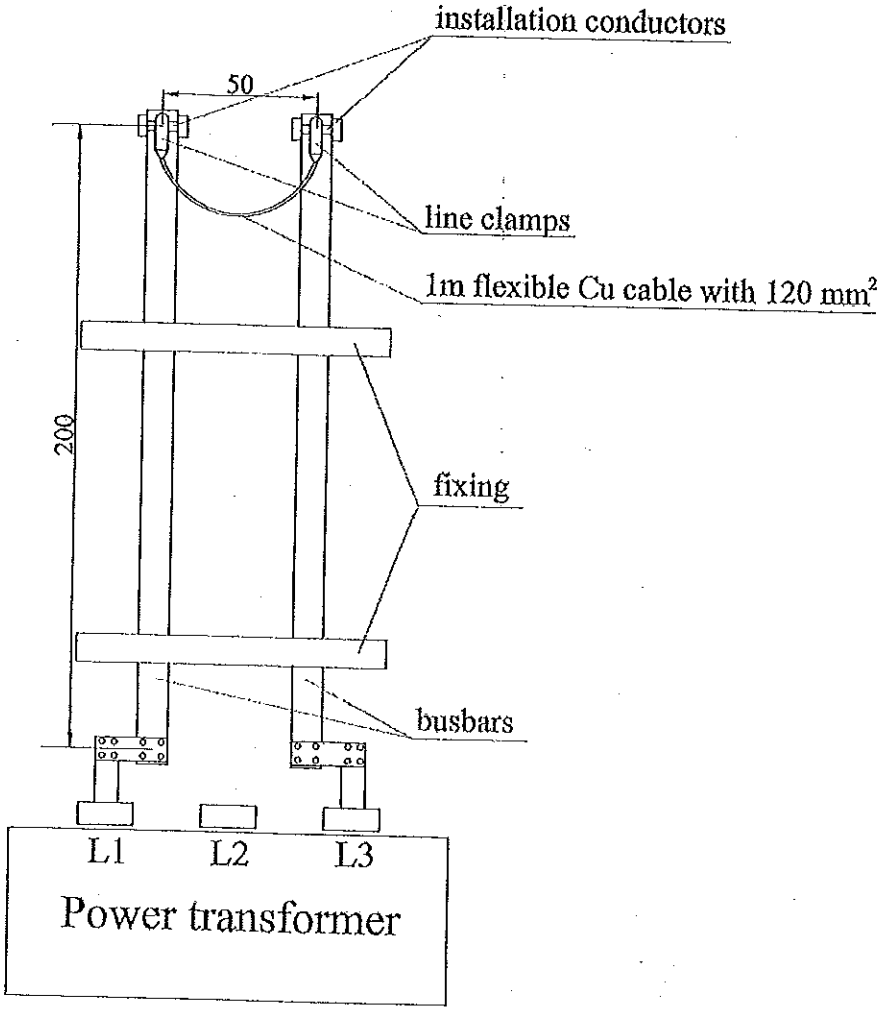


Figure 3
Test arrangement

ВЯРНО С ОРИГИНАЛА

ЕНЕРГОТЕХ ЕООД
ЕНЕРГОТЕХ
ЕЛДА
ГР. СОФИЯ

Short-circuit current test on line clamps for short-circuiting device

First test:	Second test:
- 2 pcs copper flat conductor with 30x31 mm - 2 pcs line clamp - Flexible, insulated 120 mm^2 Cu cable (1m)	- 2 pcs copper flat conductor with 50x3 mm - 2 pcs line clamp - Flexible, insulated 120 mm^2 Cu cable (1m)

Test circumstances:
- Test arrangement : Figure 3, Photos 1, 3
- Test circuit: Figure 1
- Measuring circuit: Figure 2

Test No.	Oscillogram No.	Parameters of short-circuit current				
		Highest current peak	RMS value of the A.C. component	Joule-integral		Duration of short-circuit
				Prescribed	Achieved	
		[kA]	[kA]	$[(kA)^2s]$		[ms]
1	BDG 1015	99.9	43.8	741	801	403
2	BDG 1026	99.0	43.3	741	799	403

Comments, remarks:
No damages or breakages were found after the tests. The Photos 2 and 4 show the condition of the samples after the test.

Table 1
Summary of test circumstances and results of the short-circuit test

ВЯРНО С ОРИГИНАЛА

PHOTOS

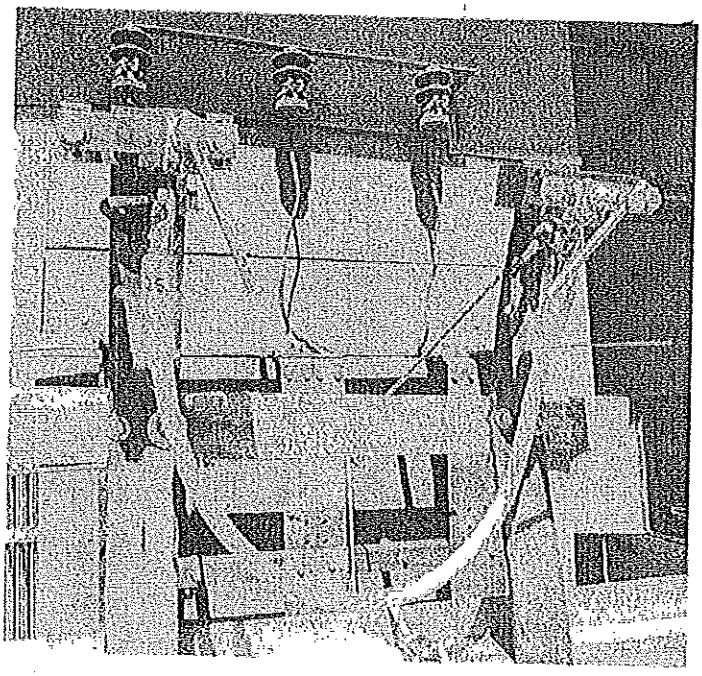


Photo 1
The first test object prepared for the test

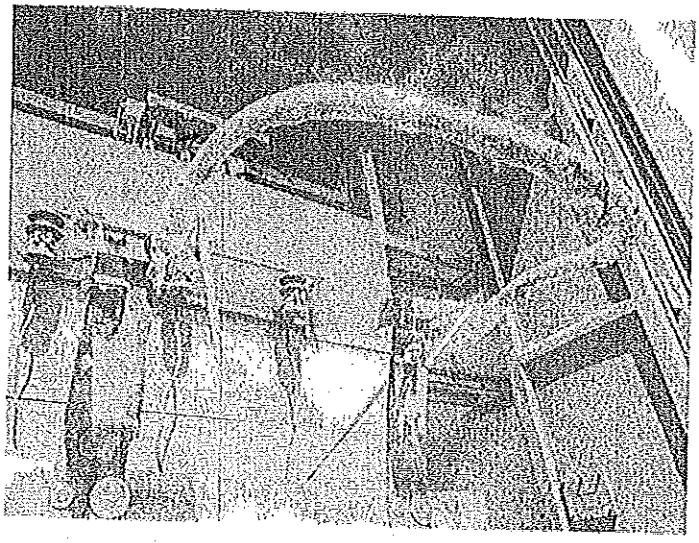


Photo 2
The condition of the first test object after the test

ВЯРНО С ОРИГИНАЛА

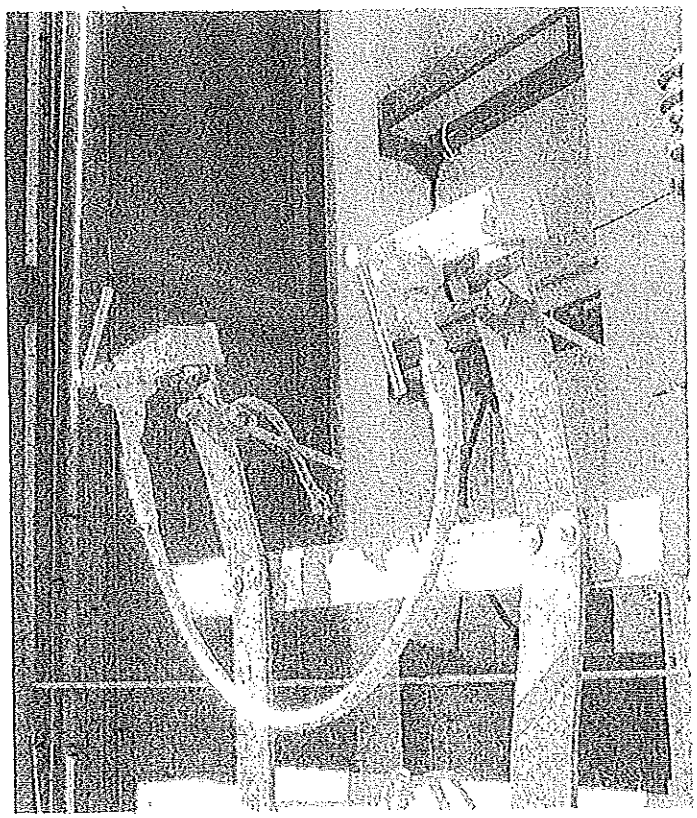


Photo 3
The second test object prepared for the test

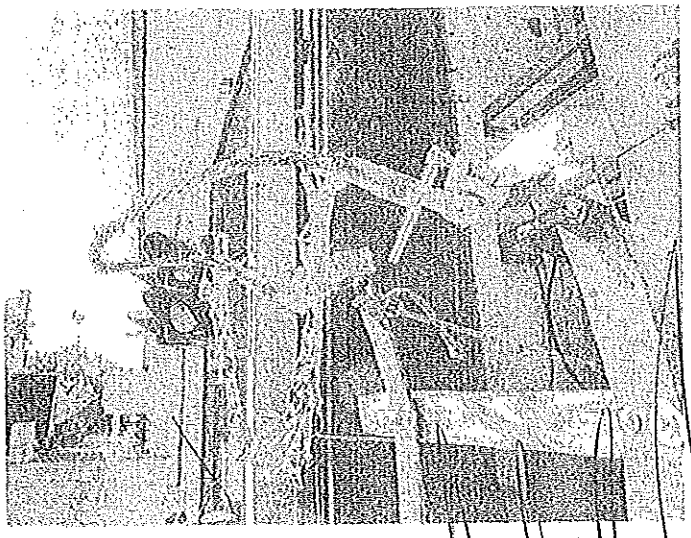
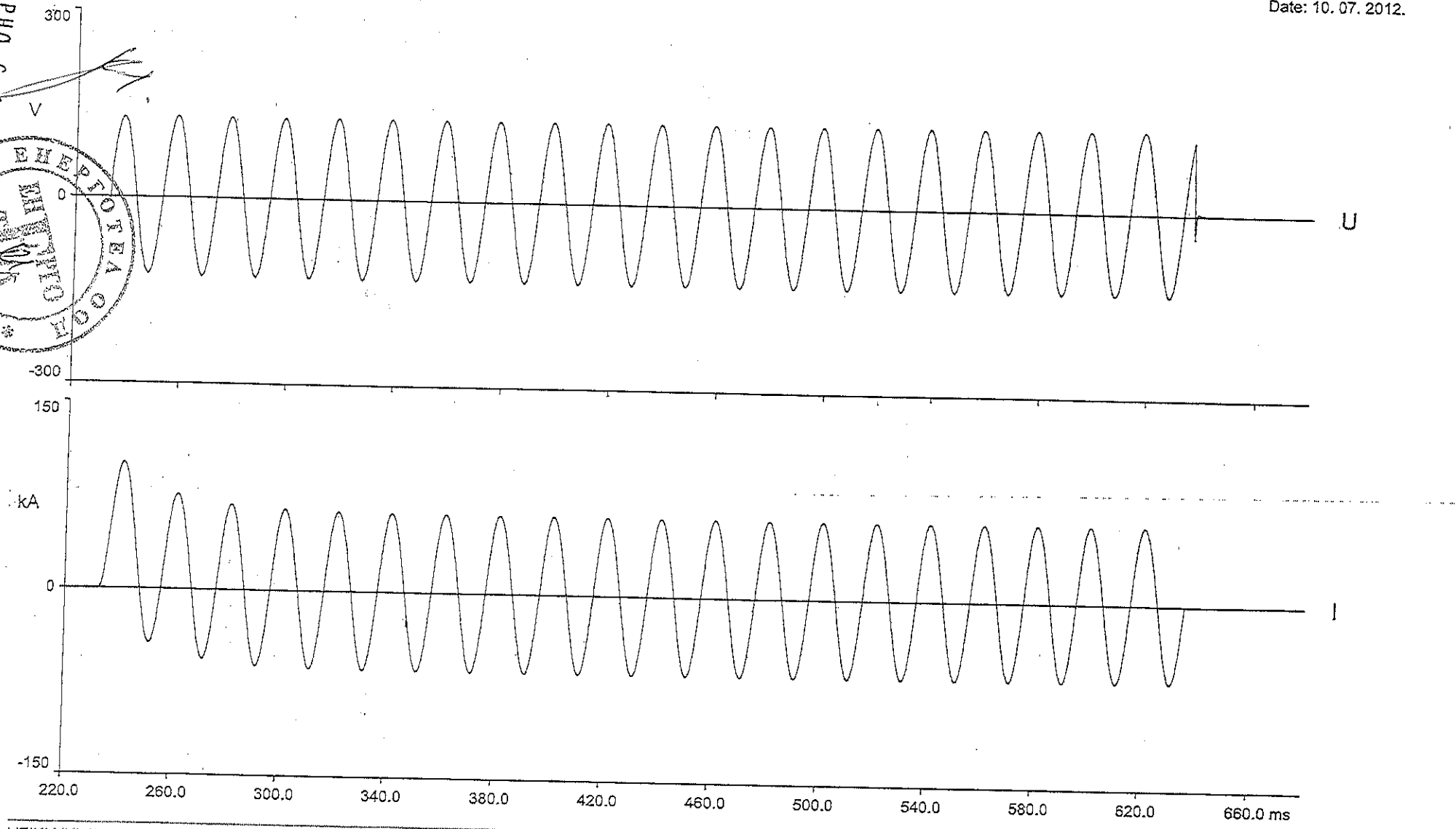


Photo 4
The condition of the second test object after the test

ВЯРНО С ОРИГИНАЛА

Arcus Elektrotechnik Alois Schiffmann GmbH
Short-circuit current test on line clamps for short-circuiting device

Sample rate: 50 us
Date: 10. 07. 2012.

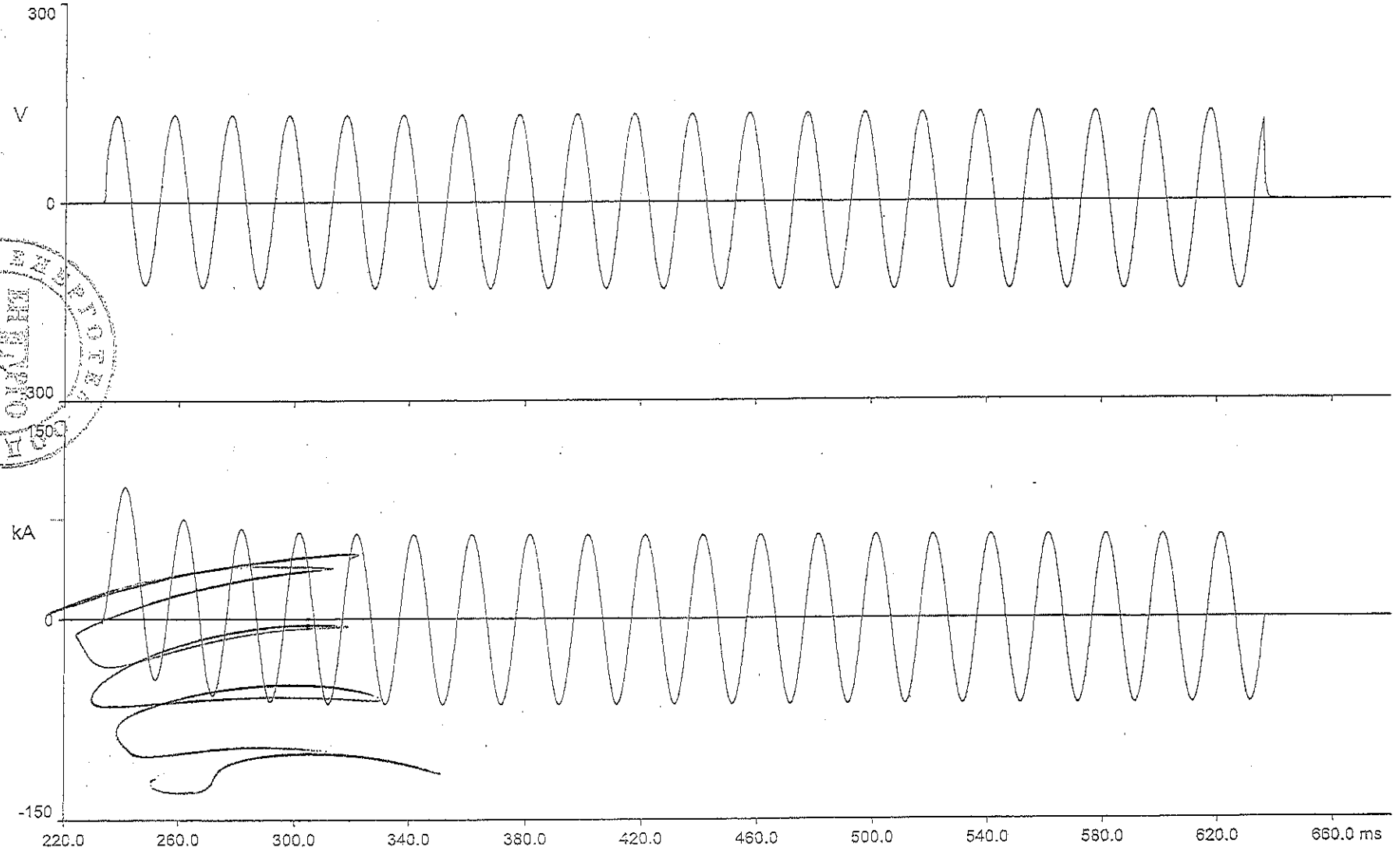


VEIKI-VNL Ltd.
HUNGARY - Budapest
www.vnl.hu

Osc.No.: BDG 1015
6819 / VNL

Arcus Elektrotechnik Alois Schiffmann GmbH
Short-circuit current test on line clamps for short-circulting device

Sample rate: 50 us
Date: 10. 07. 2012.



VEIKI VNL Ltd.
HUNGARY - Budapest
www.vnl.hu

Osc.No.: BDG 1026
6819 / VNL

~~GEWASCHEN GEBEIZT~~

OBERFLÄCHE SAUBER UND GRATFREI

KANTEN ENTSCHÄRFT

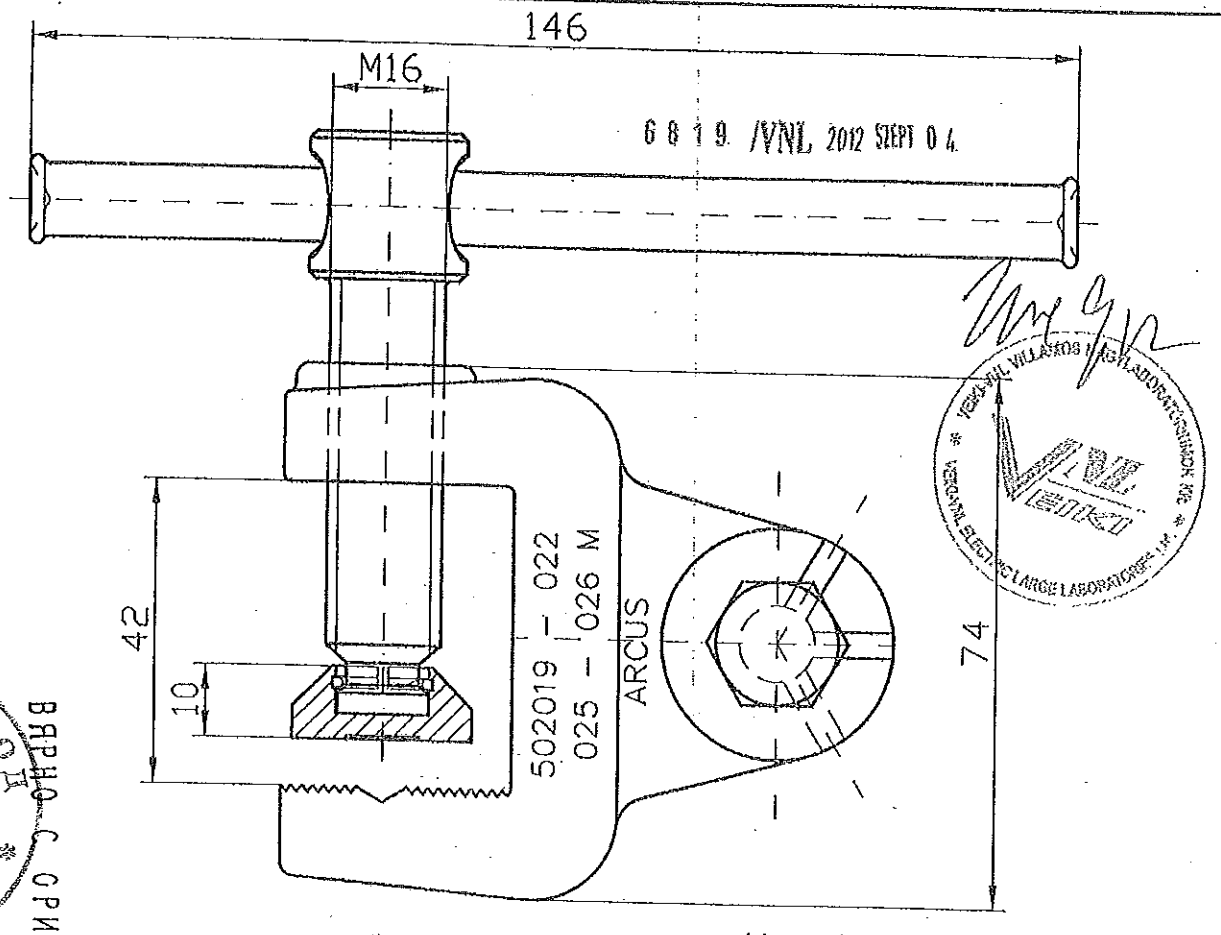
Abweichungen für Maße ohne Toleranzangabe

a) Für Rohteilmaße:

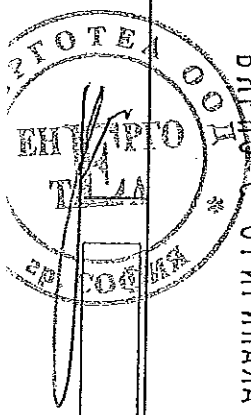
b) Für Maße der Bearbeitung: ISO 2768-m

Maße unterliegen nicht der Stichprobenkontrolle durch QW:

[ ]....Vorrichtungsmaße [ ]....Konstruktionsmaße

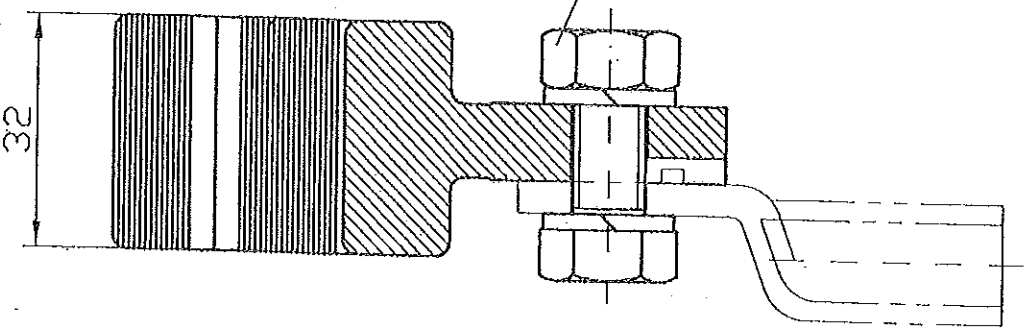


6 8 1 9 /VNL 2012 SEPT 04



ВЯРНО С ОРИГИНАЛА

Verschraubung M10 / SW17



Ausgabevermerk:		
Kurzzeichen	Datum	
	Monat	Jahr
01	Jan	02
02	Feb	03
03	Mär	04
04	Apr	05
05	Mai	06
07	Jun	07
08	Jul	08
Kalk.	Aug	09
Must.	Sep	10
	Okt	11
	Nov	12
	Dez	13

Datum

Änd.Nr.

Maßstab: 1:1

Werkstoff:

Einsatzlänge: Gew. in kg Roh: Fertig:

Bezeichnung:

Kundenzeichnung
Erdanschlussklemme mit Knebelschraube
und Druckstück, Klemmhöhe 31

ARCUS

ALOIS SCHIFFMANN GMBH

CAD- Zeichnung, keine manuelle Änderung!

Erstellt	Dat.	15.05.12	Name	T-N
Bearbeitet	Dat.		Name	
Geprüft	Dat.		Name	
Ersatz für:				
Ersetzt durch:				
Dateiname:		ENG-005886.dwg		
Sach-Nr.		502 021		

TEST REPORT

Apparatus:	Line clamps for earthing and short-circuiting device
Designation:	Line clamps for earthing and short-circuiting device type 507 042
Manufacturer:	ARCUS ELEKTROTECHNIK ALOIS SCHIFFMANN GMBH Truderinger Strasse 199.; D-81673 Munich;GERMANY
Tested for:	ARCUS ELEKTROTECHNIK ALOIS SCHIFFMANN GMBH Truderinger Strasse 199.; D-81673 Munich; GERMANY
Date of test:	10th-11th July 2012
Tested by:	VEIKI-VNL Ltd. – Budapest – HUNGARY
Project ID:	NTL-33 / 2012
Order/Contract:	66486, 23th April 2012
Test Specification:	IEC 61230:2008
Tests Performed:	Short-circuit current test on line clamps type 507 042 for earthing and short-circuiting device
Test Results:	The tested clamps withstood the mechanical and thermal effects of the applied short-circuit current without any damages or visible deformation.

This Test Report has been issued by VEIKI-VNL Ltd. in accordance with above mentioned Specifications.

The Report applies only to the apparatus tested. The responsibility for conformity of any apparatus having the same designations with that tested rests with the Manufacturer.

This Report comprises 23 sheets in total (15 numbered pages, 2 drawings, 6 oscillograms). Only integral reproduction of this document is permitted without written permission from VEIKI-VNL Ltd.

VEIKI-VNL Ltd. is independent test laboratory accredited acc. to MSZ EN ISO/IEC 17025 by the Hungarian Accreditation Board (NAT).

VEIKI-VNL VILLAMOS NAGYLABORATÓRIUMOK Kft. * VEIKI-VNL ELECTRIC LARGE LABORATORIES Ltd.

Budapest, 4th September, 2012	Gabor Huszl responsible for the test	László Tóth supervised by	Dr. László Varga managing director

1158 Budapest, Vasgolyó u. 2-4., HUNGARY
E-mail: vnl@vnl.hu
www. vnl.hu
Phone: +36-1-417 3157
Fax: +36-1-417 3163

ЕНЕРГОЕКСПОРТ ТЕЦ ЕАД

STL
applicant

ВЯРНО С ОРИГИНАЛА

TEST CERTIFICATES OR REPORTS ISSUED BY VEIKI-VNL LTD.

Type Test Certificate of Complete Type Test
This certificate provides the verification of all the rated characteristics of the equipment as assigned by the manufacturer, by means of the performance of all type tests specified by the standards.

Type Test Certificate of Dielectric Performance
This certificate provides the verification of all dielectric ratings, by means of the performance of the appropriate type tests specified by the standards.

Type Test Certificate of Temperature-Rise Performance
This certificate provides the verification of temperature-rise limits together with measurement of the main circuit resistance, by means of the performance of the appropriate type tests specified by the standards.

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This certificate provides the verification of the switching ratings (e.g. capacitive current), by means of the performance of the appropriate type tests specified by the standards.

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Development Test Report
This report is issued when the test is intended only to provide the Client with information about the performance of the equipment. The tests are performed in accordance with relevant standards, but are not intended to verify compliance of the equipment.

Control Test Report
This report is issued for tests performed on equipment in service, or removed from service. Tests are performed, and compliance is evaluated in accordance with relevant standards.

Test Report
Test report is issued in all cases not listed above.

ВЯРНО С ОРИГИНАЛА

ЕНЕРГОТЕА ООД
ЕНЕРГО
ГР. СОФИЯ

Ratings/characteristics assigned by the manufacturer and proved by tests:

Designation:	Line clamps for earthing and short-circuiting device
Type:	507 042
Rated voltage:	> 1kV
Rated frequency:	50 Hz
Rated short-time withstand current:	33.5 kA
Rated peak factor:	2.5
Rated duration of short-circuit:	0.5 s
Diameter of the installation conductor:	
1st arrangement:	Ø22 mm Cu circular conductor
2nd arrangement:	Ø9 mm Cu circular conductor
3rd arrangement:	30x20 mm Cu flat bar
4th arrangement:	50x3 mm Cu flat bar
5th arrangement:	Ø20 mm Cu alloy ball-bolt
6th arrangement:	Ø15 mm CuZn T-bolt

The tests were carried out in accordance with the following standards:

IEC 61230:2008	Live working - Portable equipment for earthing or earthing and short-circuiting.

List of manufacturer's drawings for identification of the test object:

507 042
515 107 D

Present at the test in charge of manufacturer or purchaser:

Mr. Christian Niklis	ARCUS GMBH
Mr. Andreas Hanusch	ARCUS GMBH

ВЯРНО С ОРИГИНАЛА

TESTS PERFORMED ON THE APPARATUS

No.	Description	Relevant clauses of the standard
1	Short-circuit current tests	5.7

DESCRIPTION OF THE TESTS

1. The test object

Line clamps type 507 042 for earthing and short circuiting devices were subjected to short-circuit current test The tested clamps were preconditioned before the test. The test objects were clamped on different installation conductors and short-circuited by flexible copper cables with cross-section of 120 mm^2, which cable was not subject to the tests. Figure 3 shows the test arrangement.

2. The tests carried out

Short-circuit current tests were carried out on twelve new line clamps in six test arrangement detailed below. One test arrangement consisted of installation conductors, two line clamps and short-circuiting cable. The scheme of the test circuit is shown in Figure 1.

1st arrangement:

Line clamps were clamped onto Cu circular conductors with diameter of 22 mm. The test was carried out with the maximum conductor size at the rated current of the clamps (See: Photo 1).

2nd arrangement:

Line clamps were clamped onto Cu circular conductors with diameter of 9 mm The test was carried out with the minimum conductor size at the rated current of the applied installation conductor (See: Photo 3).

3rd arrangement:

Line clamps were clamped onto Cu flat bars with size of 30x20 mm. This test was carried out with the maximum conductor size at the rated current of the clamps (See: Photo 5).

4th arrangement:

Line clamps were clamped onto Cu flat bars with size of 50x3 mm. This test was carried out with the minimum conductor size at the rated current of the applied installation conductor (See: Photo 7).

5th arrangement:

Line clamps were clamped onto Cu alloy ball-bolts with diameter of 20 mm (see drawing no. 515 107 D). This test was carried out with the rated current of the clamps. (See: Photo 9)

6th arrangement:

Line clamps were clamped onto CuZn T-bolts with diameter of 15 mm. This test was carried out with the rated current of the clamps. (See: Photo 11)

ВЯРНО С ОРИГИНАЛА

3. Results of the test

During the short-circuit tests, during the visual inspection breakage of the line clamps could not be observed. The tested clamps withstood the mechanical and thermal effects of the applied short-circuit current without any damages or visible deformations. The condition of the tested elements is shown on Photos 2, 4, 6, 8, 10, and 12, were taken after the tests. The test parameters and results are collected in Table 1.

4. The recorded quantities taken during the short-circuit current tests

During the tests oscillograms were taken. The quantities were recorded by transient recorder with sampling rate of 50 μs. The meaning of the symbols on the enclosed oscillograms are the next:

U - voltage measured at the test arrangement;
I - short-circuit current flowing through the tested line clamp.

Same notations are applied in Figures. The test parameters evaluated from the oscillograms are collected in Table 1. The measuring circuit with the applied elements are shown in Figure 2.

5. Measurement uncertainty

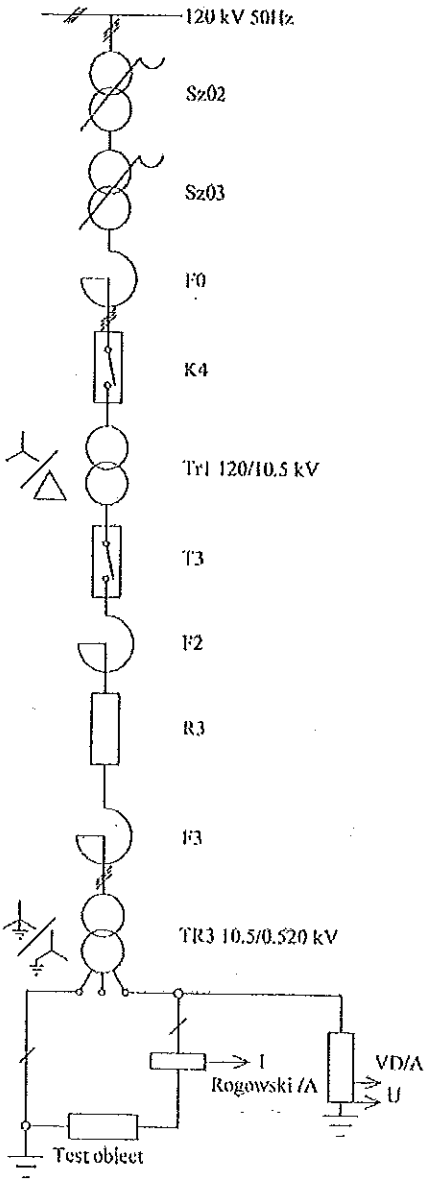
Measured parameter	Uncertainty
Voltage measurement:	0.26 %
Current measurement:	0.59 %

The uncertainty values given in this report are standard deviation values multiplied by k=2. Measurement uncertainty was estimated according to the method described in the EAL-R2 document.

6. Measuring devices used for the tests

No.	Designation	Manufacturer	Type	Serial number
[1]	Rogowski/A	3D-Motion Control Mérnökiroda Kft.	DCM-R1 Rogowski Coil / DCM R1 Secondary Converter	2010-RC-001/2010-IU-001/1
[2]	VD/A 1kV/100V	VEIKI	R-C-R	21
[3]	PSO 9001	ECKELMANN	PSO 9001	1294-3015

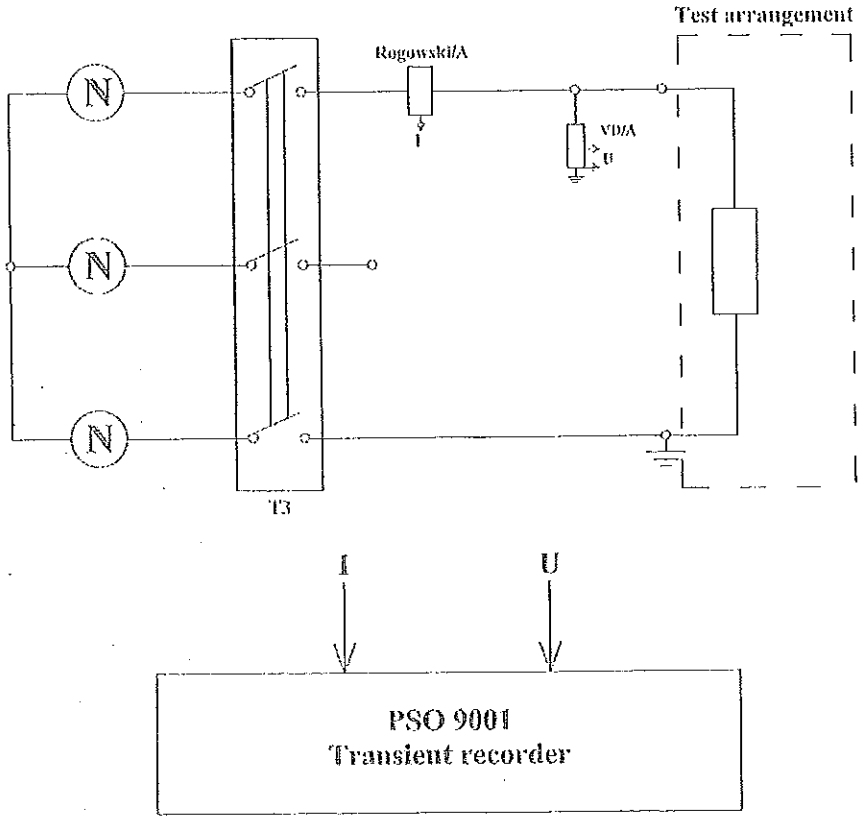
ВЯРНО С ОРИГИНАЛА



Sz02; Sz03	-	regulating transformers
F0, F2, F3	-	reactors
R3	-	resistor
K4	-	protective circuit-breaker
Tr1, Tr3	-	short-circuit transformers
T3	-	making switch
Rogowski /A (I)	-	Rogowski current measuring system [1]
VD/A (U)	-	voltage divider [2]

Figure 1
The test circuit of the short-circuit current test

ВЯРНО С ОРИГИНАЛА



N	-	50 Hz power network
T3	-	making switch
Rogowski/A	-	Rogowski current measuring system (I) [1]
VD/A	-	voltage divider (U) [2]
PSO 9001	-	transient recorder [3]

Figure 2
The measuring circuit of the short-circuit current test

ВЯРНО С ОРИГИНАЛА

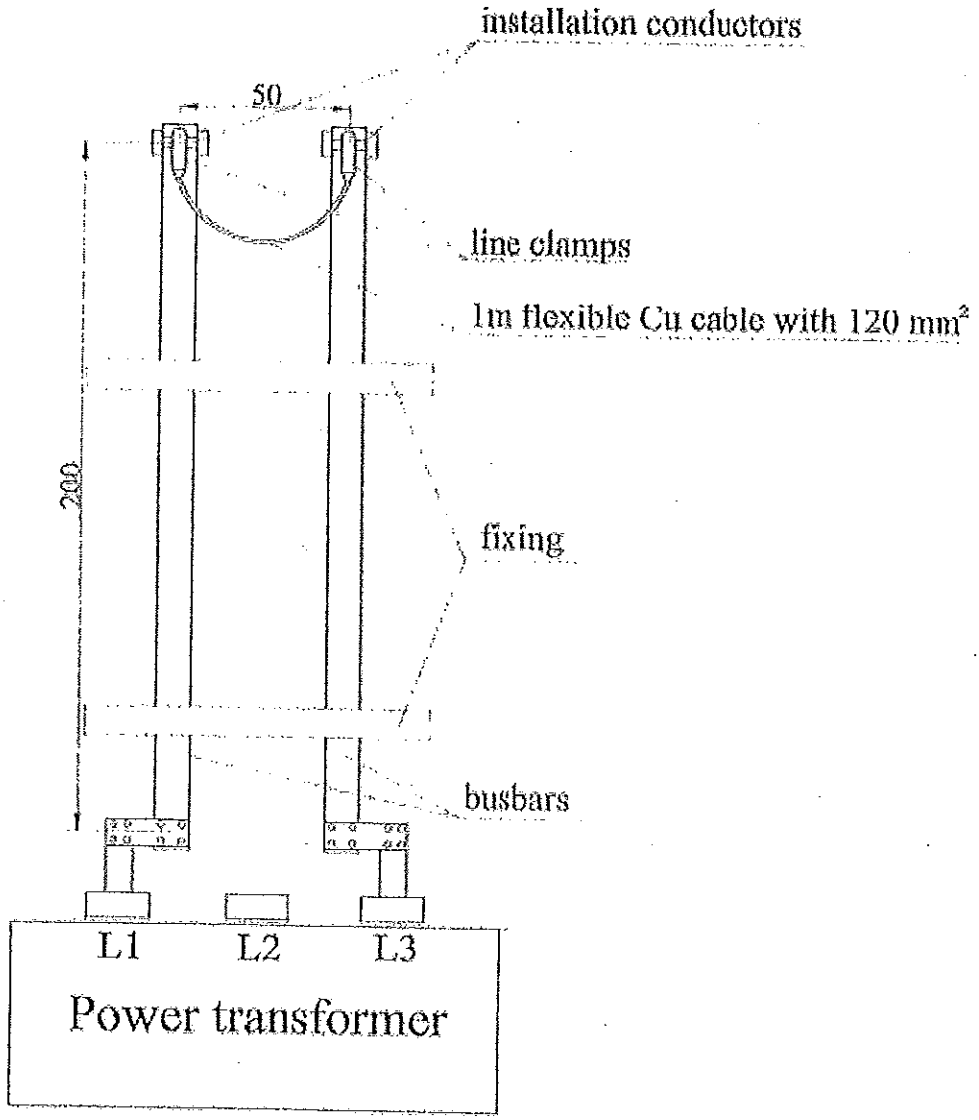


Figure 3
Test arrangement

ЕНЕРГОТЕА ООД
ЕНЕРГО ТЕСТ
ВЯРНО С ОРИГИНАЛА

Short-circuit current test on line clamps for earthing and short-circuiting device	
The components of the tested arrangements:	
1st arrangement: - 2 pcs Ø22 mm Cu circular conductor - 2 pcs line clamp - Flexible, insulated 120 mm^2 Cu cable (1m)	2nd arrangement: - 2 pcs Ø9 mm Cu circular conductor - 2 pcs line clamp - Flexible, insulated 120 mm^2 Cu cable (1m)
3rd arrangement: - 2 pcs 30x20 mm Cu flat bar - 2 pcs line clamp - Flexible, insulated 120 mm^2 Cu cable (1m)	4th arrangement:: - 2 pcs 50x3 mm Cu flat bar - 2 pcs line clamp - Flexible, insulated 120 mm^2 Cu cable (1m)
5th arrangement: - 2 pcs Ø 20 mm Cu alloy ball-bolt - 2 pcs line clamp - Flexible, insulated 120 mm^2 Cu cable (1m)	6th arrangement: - 2 pcs Ø 15 mm CuZn T-bolt - 2 pcs line clamp Flexible, insulated 120 mm^2 Cu cable (1m)
Test circumstances: - Test arrangement : Figure 3, Photos 1, 3, 5, 7, 9,11 - Test circuit: Figure 1 - Measuring circuit: Figure 2	

		Parameters of short-circuit current				
Test No.	Oscillogram No.	Highest current peak [kA]	RMS value of the A.C. component [kA]	Joule-integral Prescribed [(kA)^{2}s]	Joule-integral Achieved [(kA)^{2}s]	Duration of short-circuit [ms]
1st	BDG 1007	98.7	43.1	741	793	403.4
2nd	BDG 1112	43.8	17.6	150	156	503.2
3rd	BDG 1005	98.5	43.9	741	795	402.9
4th	BDG 1027	96.1	43.1	741	783	402.2
5th	BDG 1009	98.7	43.2	741	787	402.9
6th	BDG 1011	98.2	43.2	741	798	403.2

Comments, remarks:
No damages or breakages were found after the tests. Photos 2, 4, 6, 8, 10 and 12 show the condition of the samples after the test.

Table 1
Summary of test circumstances and results of the short-circuit test

ВЯРНО С ОРИГИНАЛА

PHOTOS

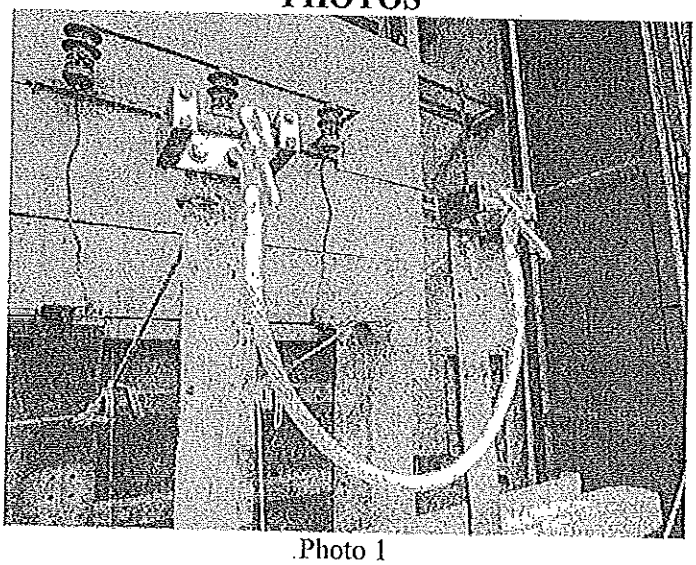


Photo 1
The first test arrangement with the maximum conductor size prepared for the test

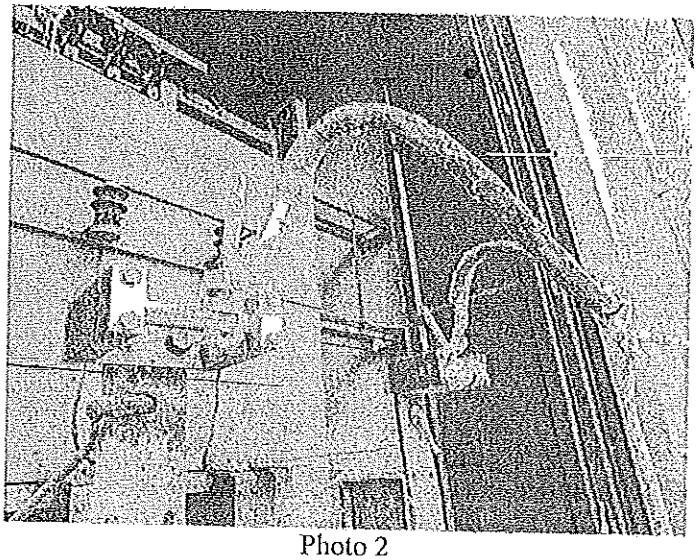


Photo 2
The condition of the samples after the test

ВЯРНО С ОРИГИНАЛА

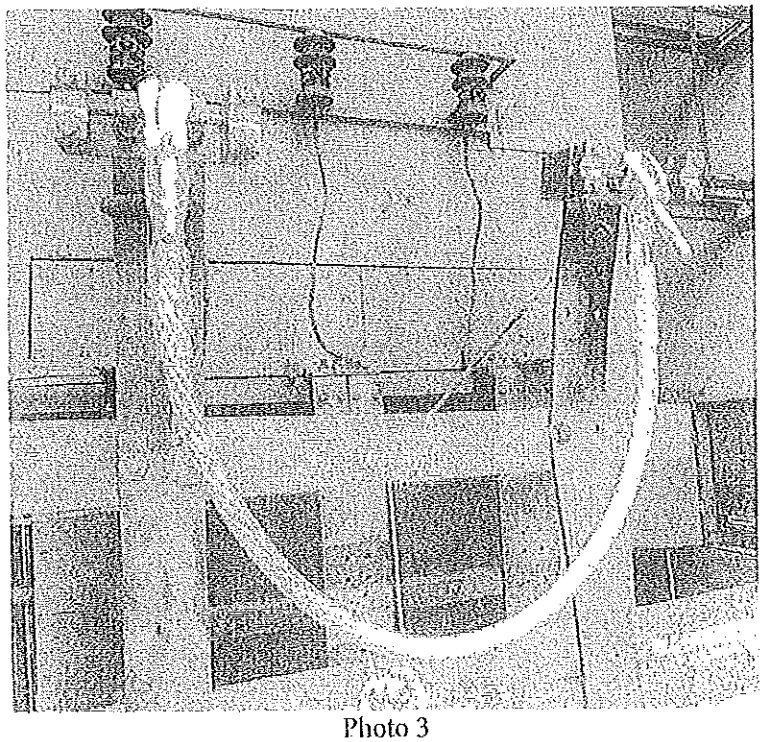


Photo 3
The second test arrangement with the minimum conductor size prepared for the test

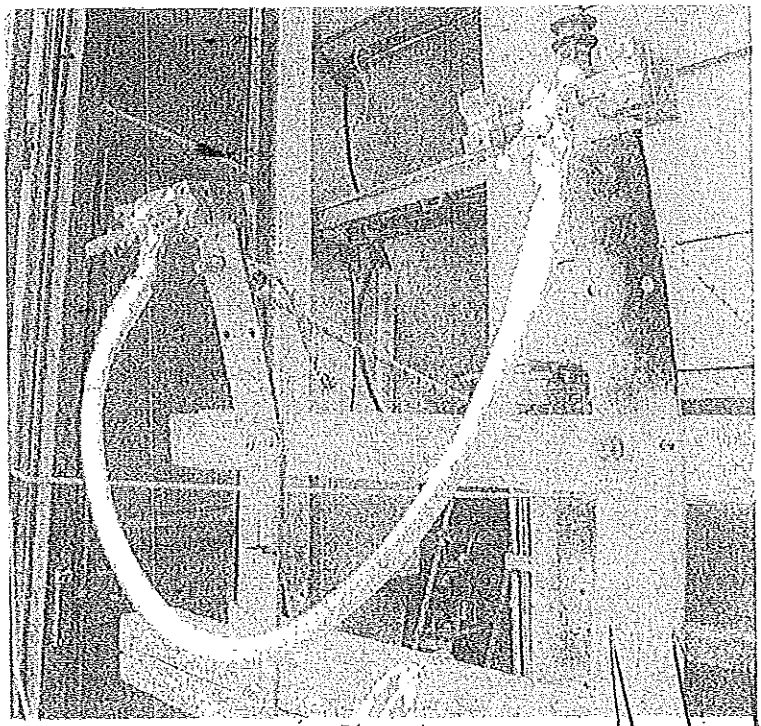


Photo 4
The condition of the samples after the test

ВЯРНО С ОРИГИНАЛА

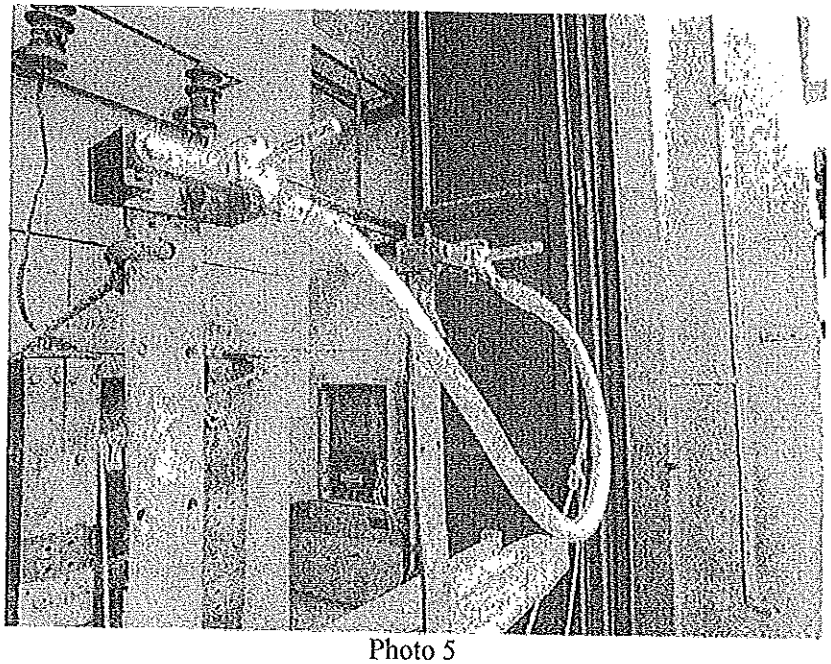


Photo 5
The third test arrangement with the maximum conductor size prepared for the test

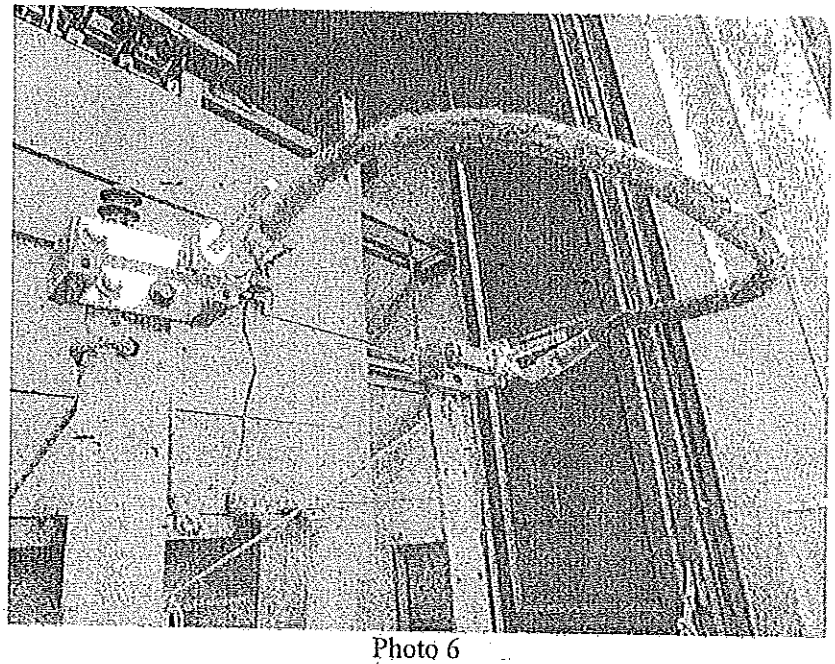


Photo 6
The condition of the samples after the test

ВЯРНО С ОРИГИНАЛА

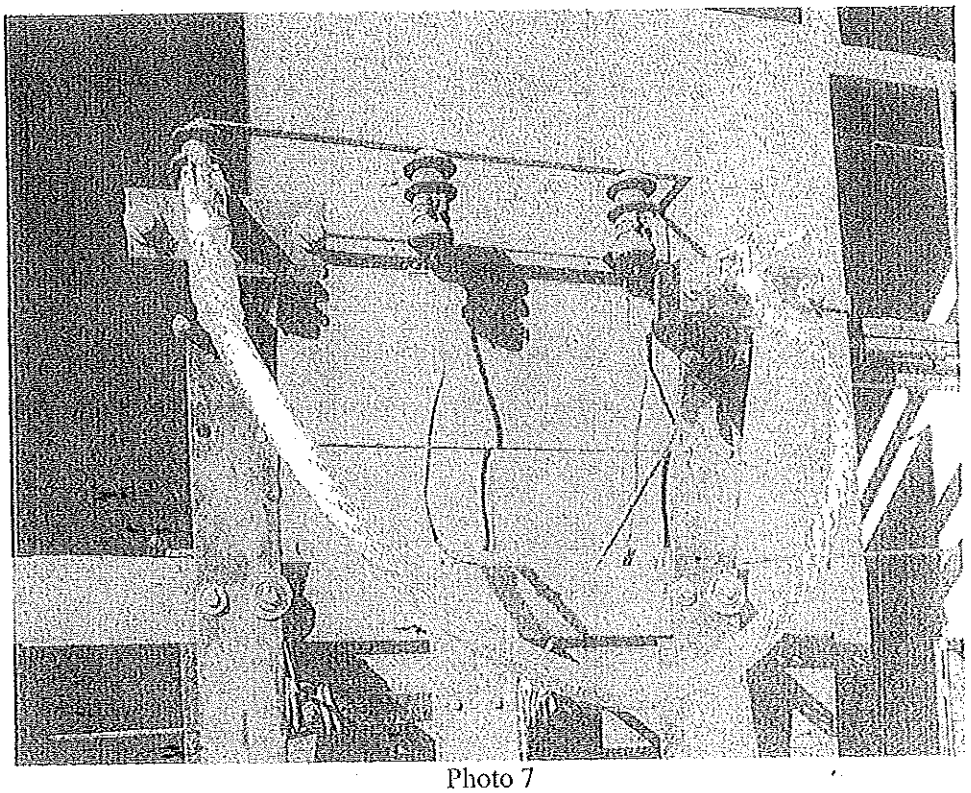


Photo 7
The fourth test arrangement with the minimum conductor size prepared for the test

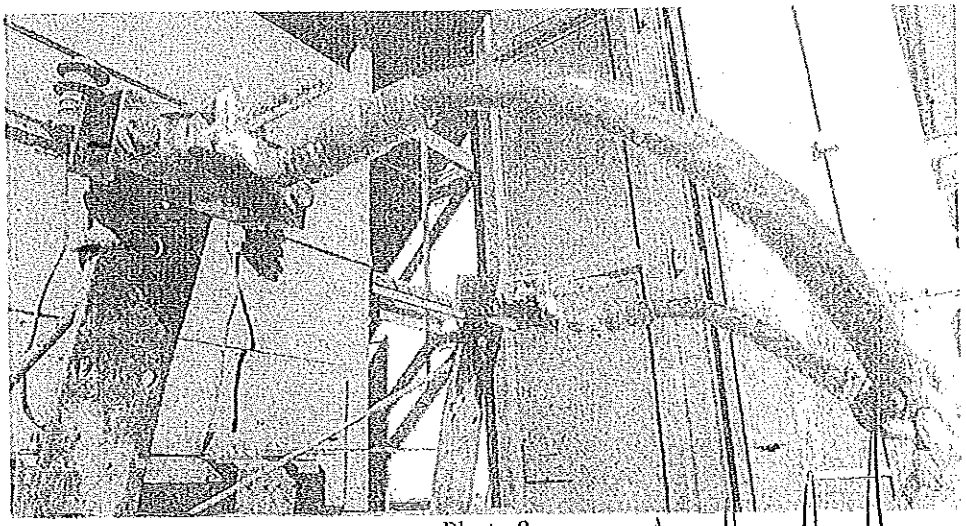


Photo 8
The condition of the samples after the test

ВЯРНО С ОРИГИНАЛА

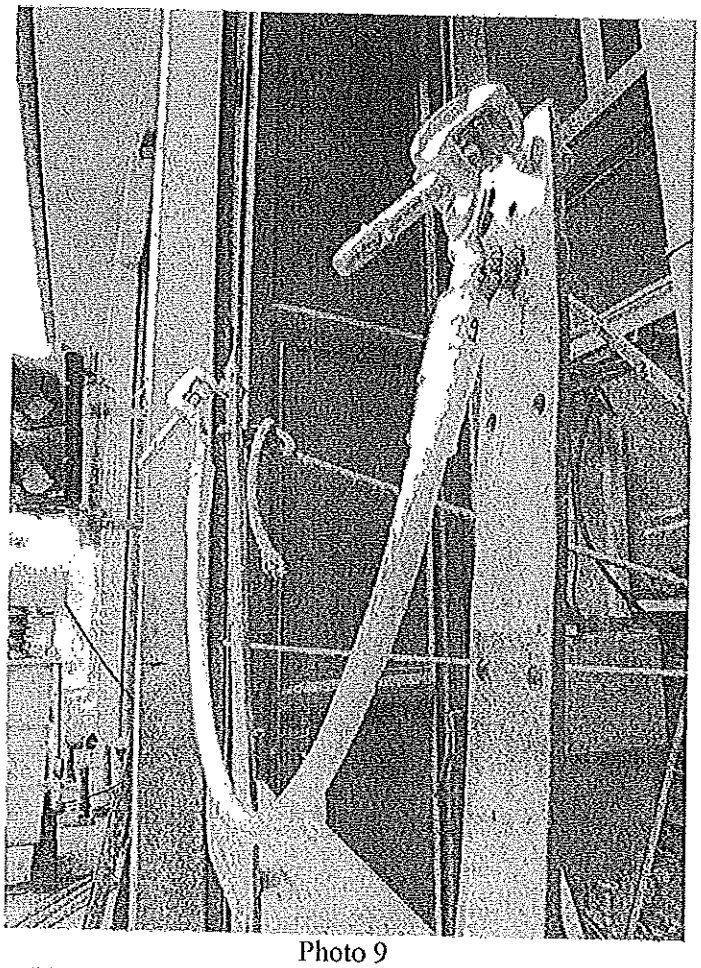


Photo 9
The fifth test arrangement with the ball-bolt prepared for the test

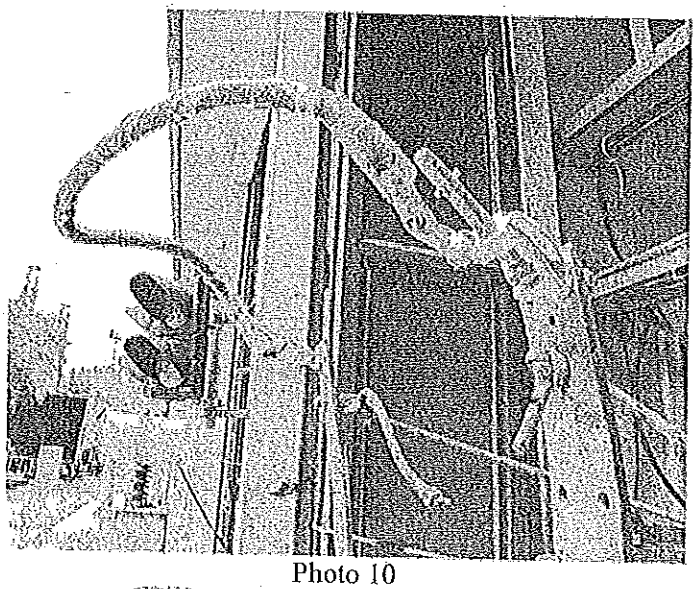


Photo 10
The condition of the samples after the test

ВЯРНО С ОРИГИНАЛА

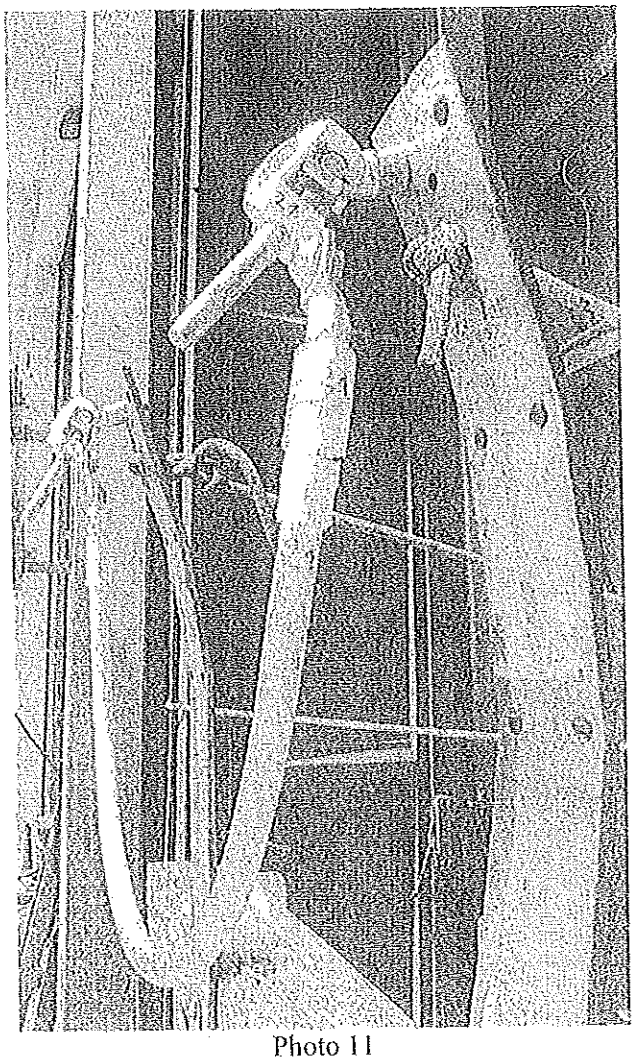


Photo 11
The sixth test arrangement with the the T-bolt prepared for the test

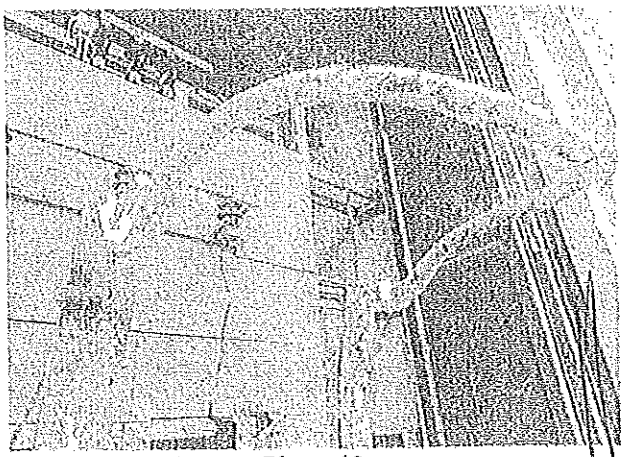
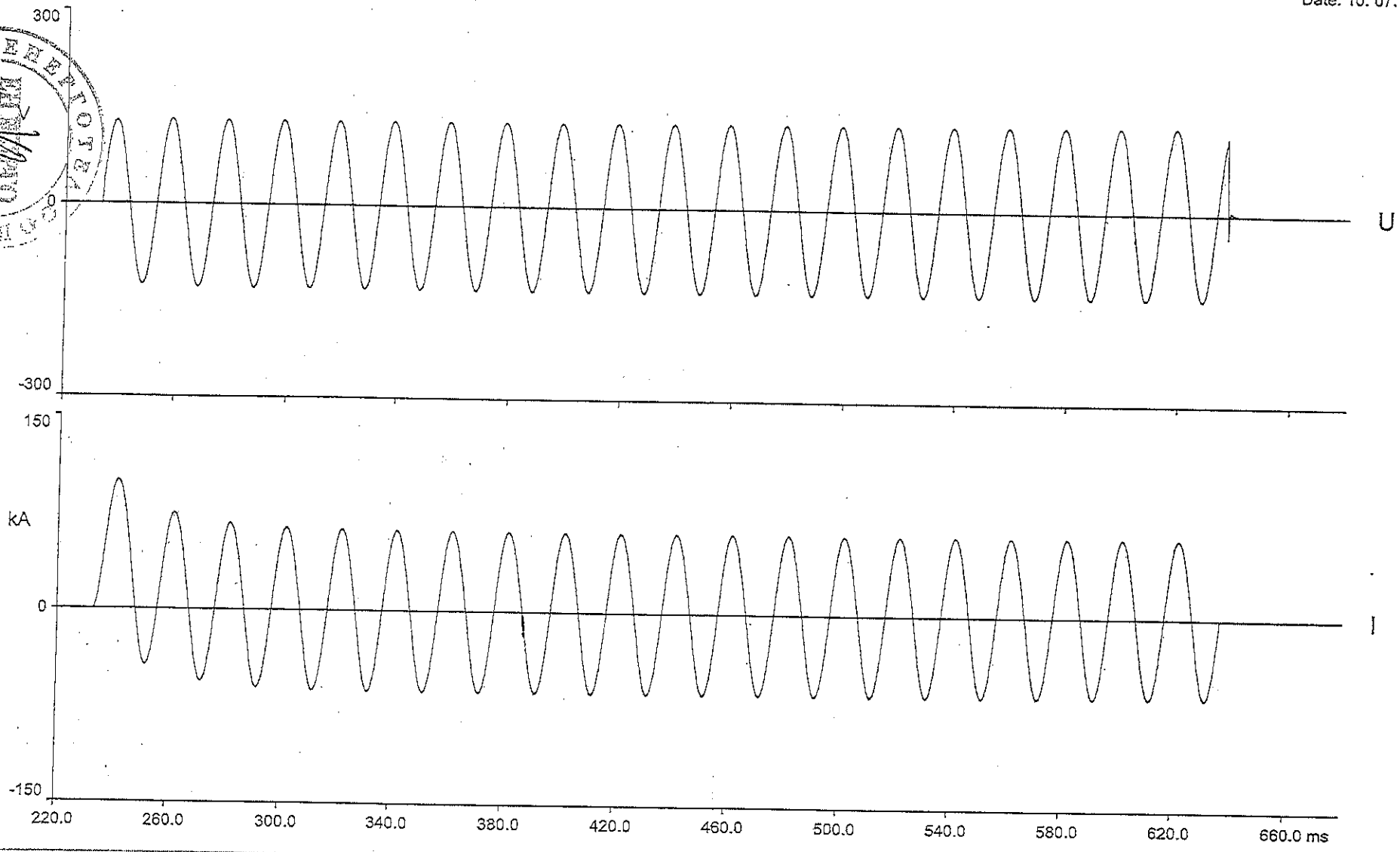


Photo 12
The condition of the samples after the test

ВЯРНО С ОРИГИНАЛА

Arctis Elektrotechnik Alois Schiffmann GmbH
Short-circuit current test on line clamps for short-circuiting device

Sample rate: 50 us
Date: 10. 07. 2012.



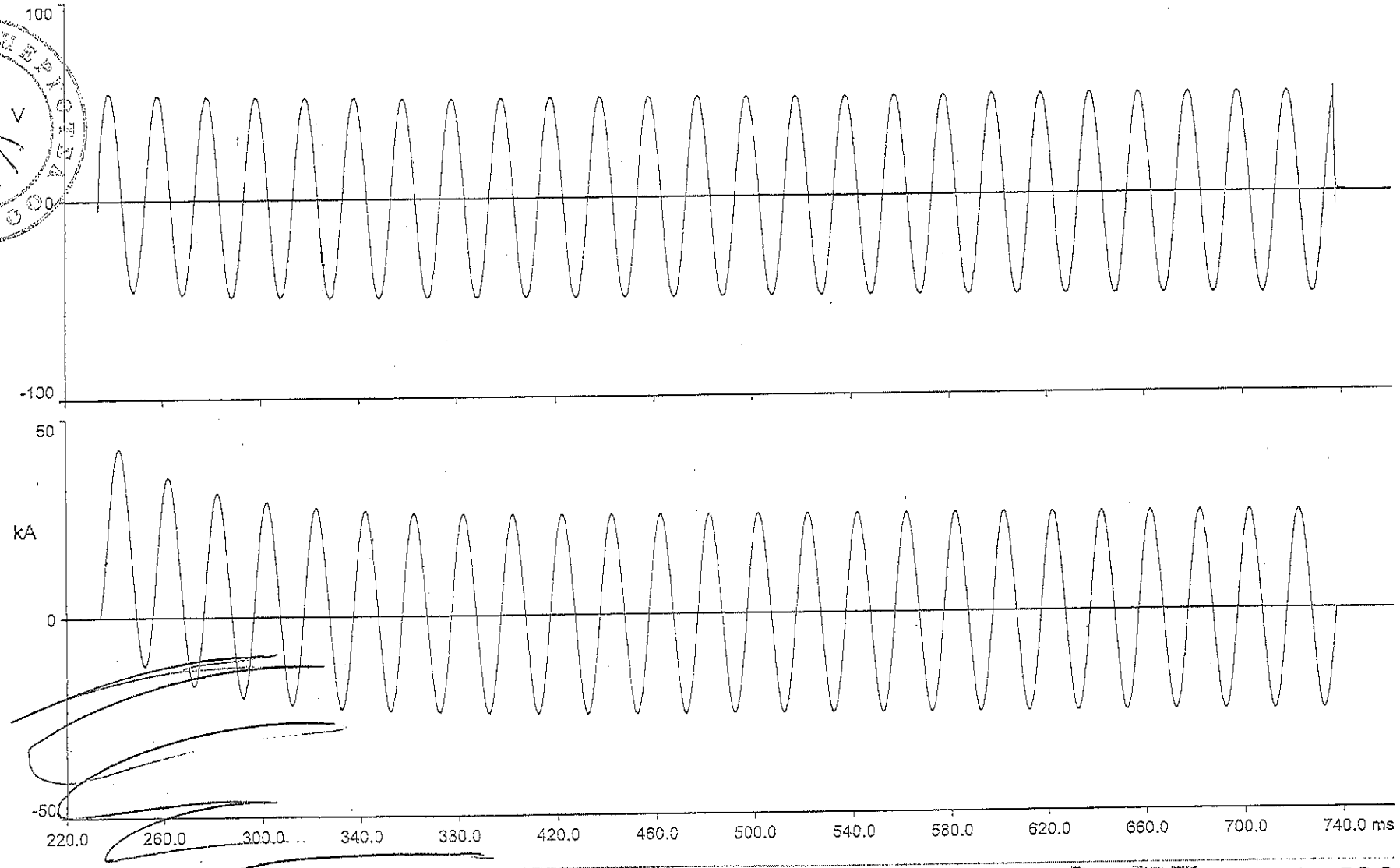
ВЯРНО С ОРИГИНАЛА

VEIKI-VNL Ltd.
HUNGARY - Budapest
www.vnl.hu

Osc.No.: BDG 1007
6822 / VNL

Arcus Elektrotechnik Alois Schiffmann GmbH
Short-circuit current test on line clamps for short-circuiting device

Sample rate: 50 us
Date: 11. 07. 2012.



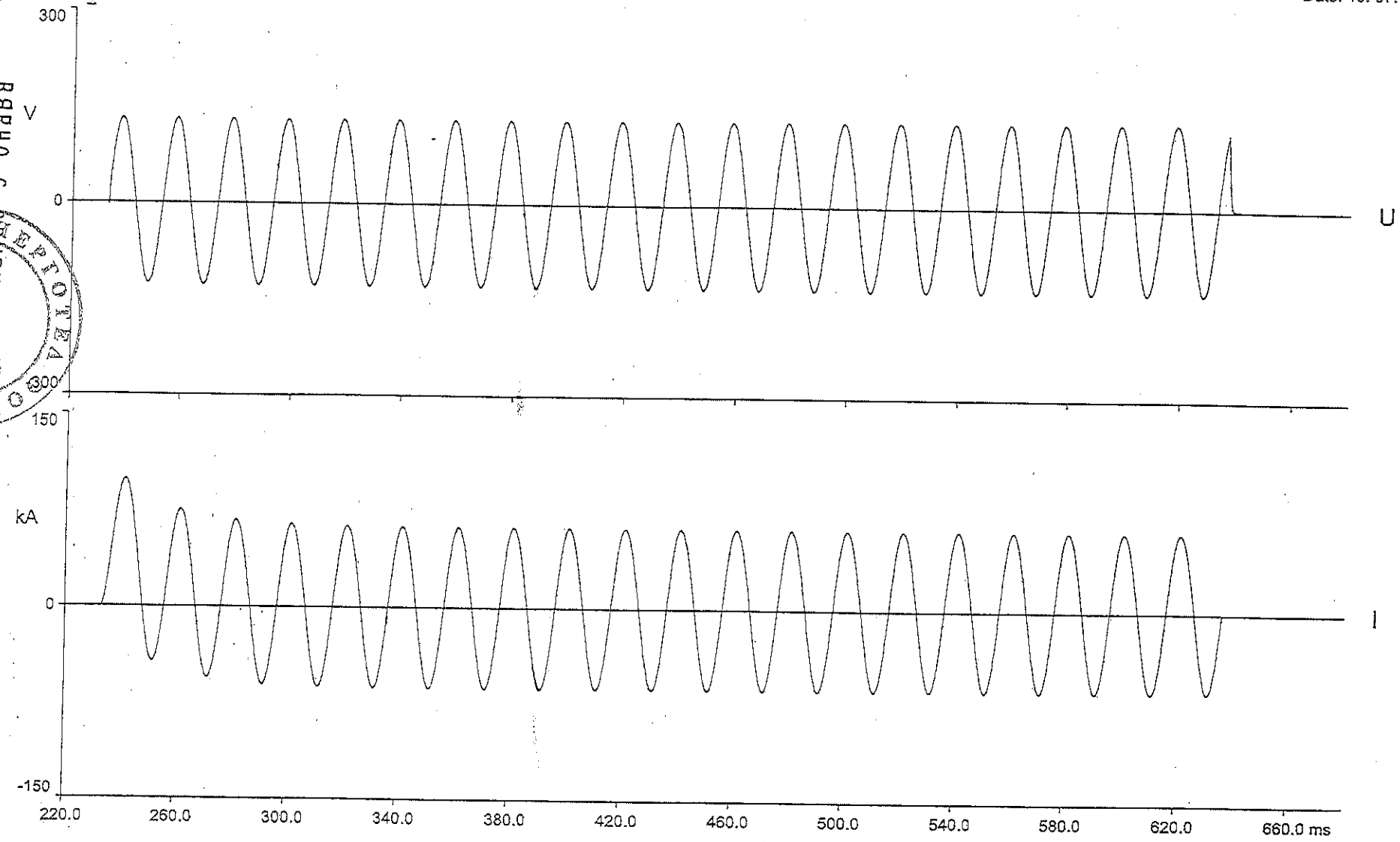
ВЯРНО С ОРИГИНАЛА

VEIKI-VNL Ltd.
HUNGARY - Budapest
www.vnl.hu

Osc.No.: BDG 1112
6822 / VNL

Arcus-Elektrotechnik Alois Schiffmann GmbH
Short-circuit current test on line clamps for short-circuiting device

Sample rate: 50 us
Date: 10. 07. 2012.



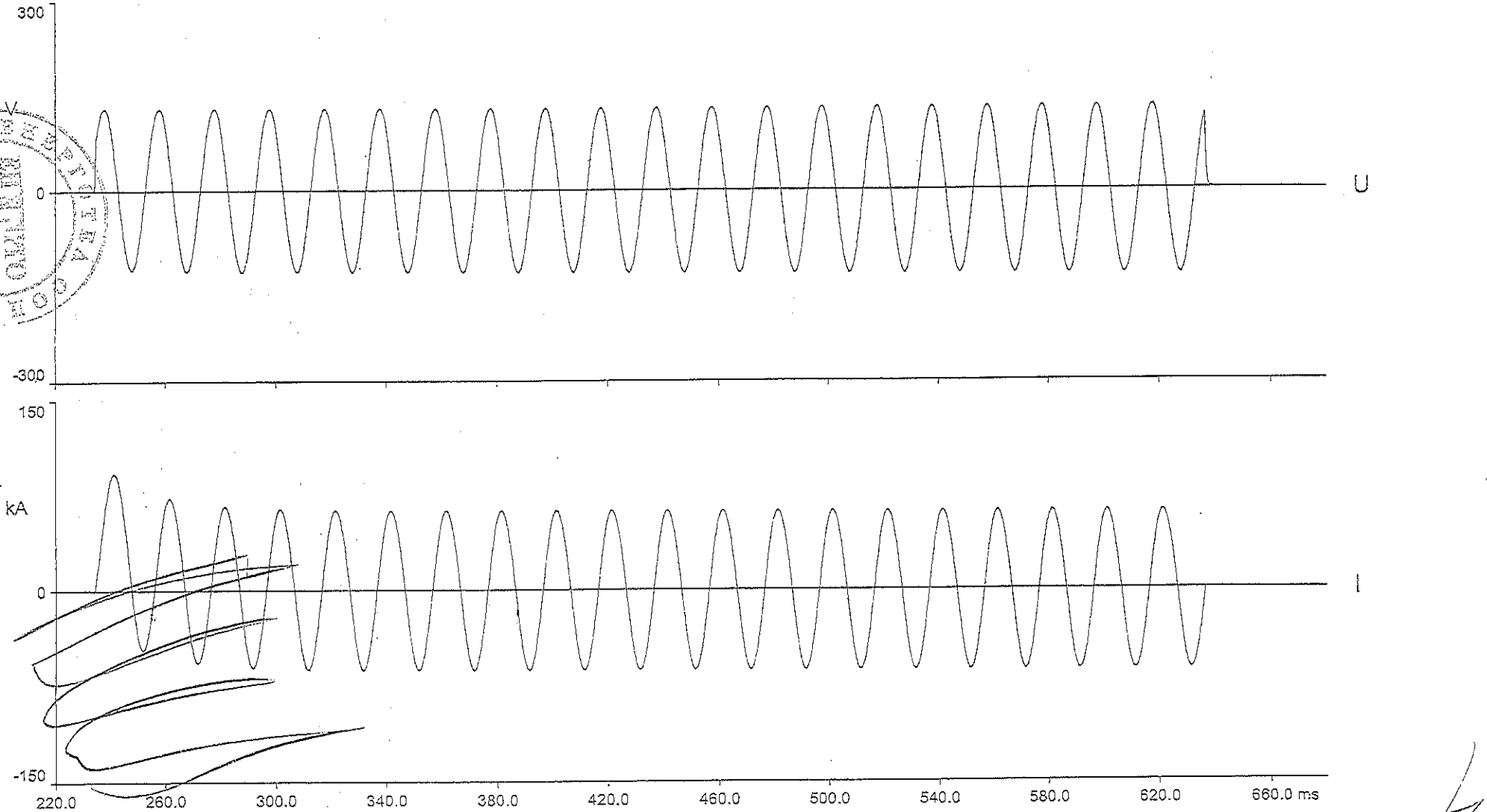
VEIKI-VNL Ltd.
HUNGARY - Budapest
www.vnl.hu

Osc.No.: BDG 1005
6822 / VNL

ВЯРНО С ОРИГИНАЛА

Arcus Elektrotechnik Alois Schiffmann GmbH
Short-circuit current test on line clamps for short-circuiting device

Sample rate: 50 us
Date: 10. 07. 2012.



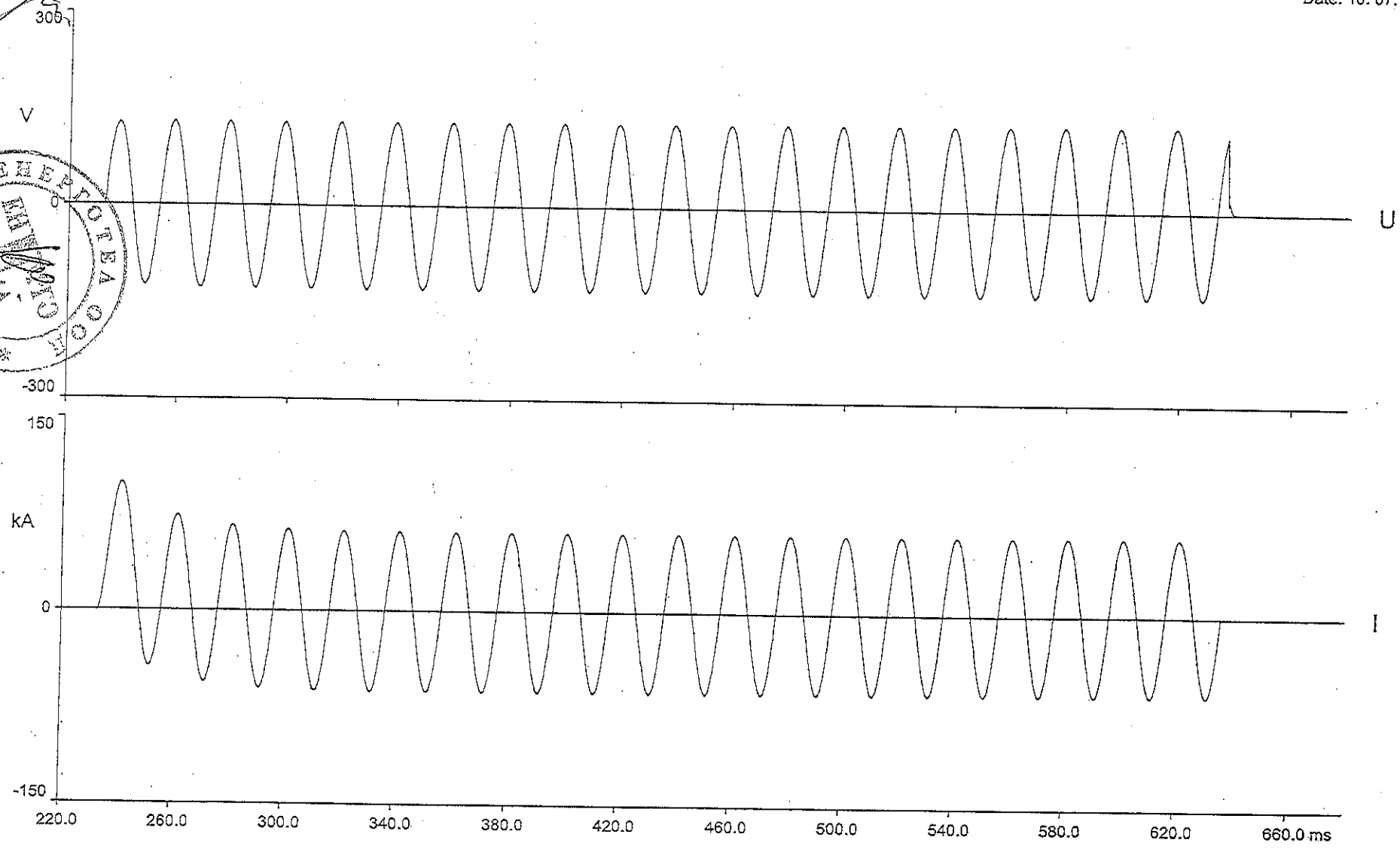
VEIKI-VNL Ltd.
HUNGARY - Budapest
www.vnl.hu

Osc.No.: BDG 1027
6822 / VNL

ВЯРНО С ОРИГИНАЛА

Arcus Elektrotechnik Alois Schiffmann GmbH
Short-circuit current test on line clamps for short-circuiting device

Sample rate: 50 us
Date: 10. 07. 2012.

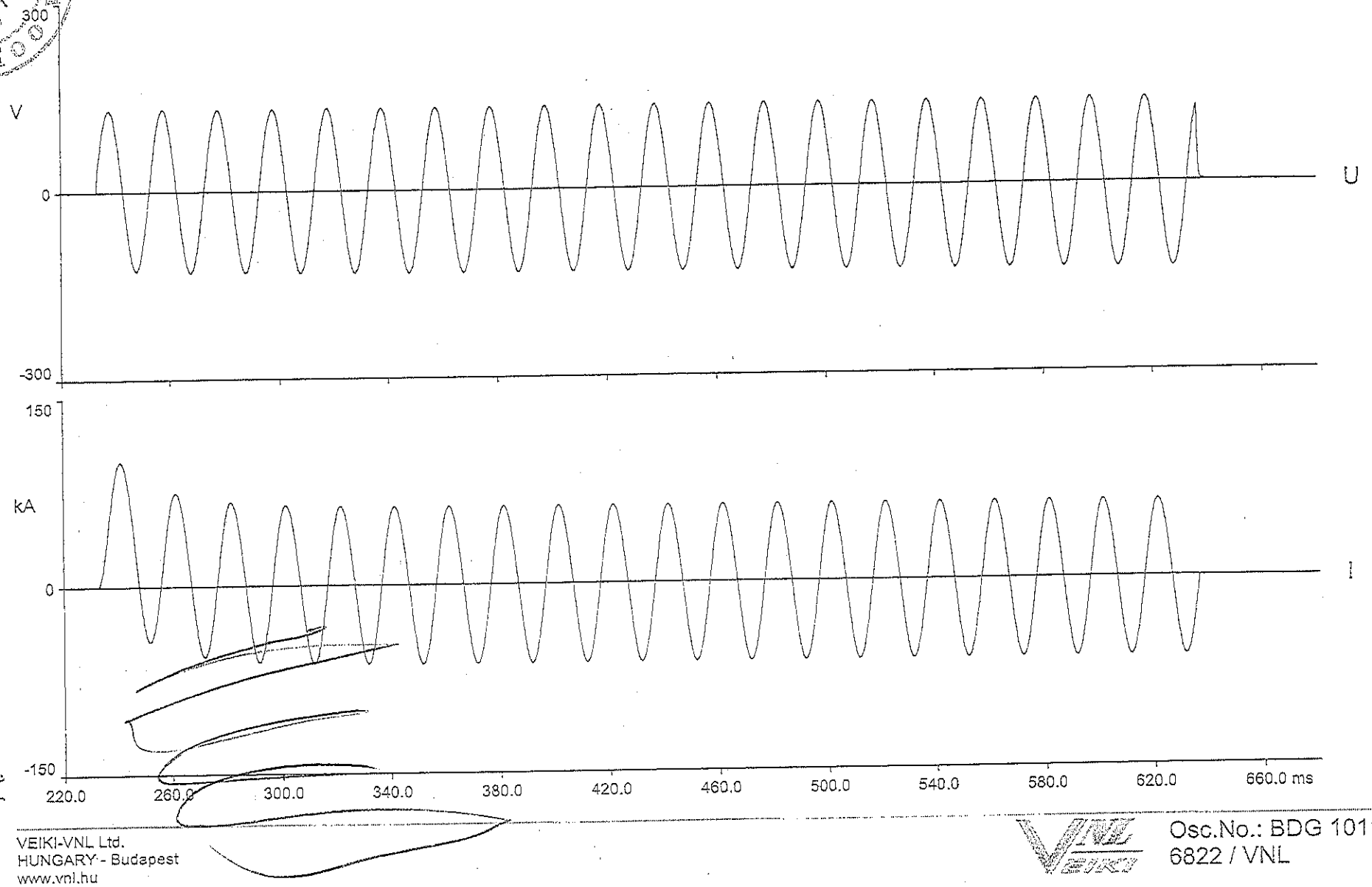


VEIKI-VNL Ltd.
HUNGARY - Budapest
www.vnl.hu

Osc.No.: BDG 1009
6822 / VNL

Arcus Elektrotechnik Alois Schiffmann GmbH
Short-circuit current test on line clamps for short-circuiting device

Sample rate: 50 us
Date: 10. 07. 2012.



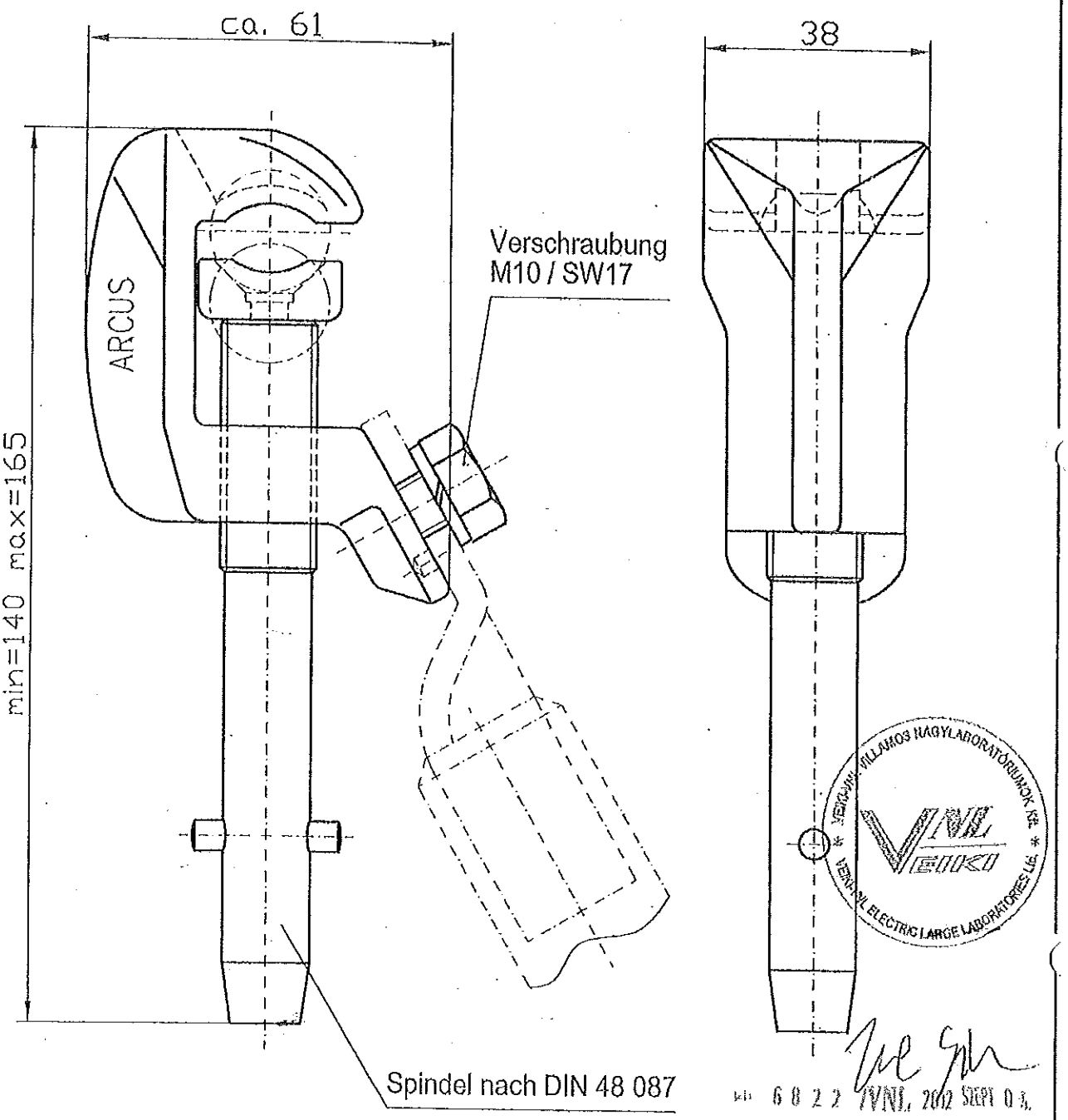
ВЯРНО С ОРИГИНАЛА

VEIKI-VNL Ltd.
HUNGARY - Budapest
www.vnl.hu

Osc.No.: BDG 1011
6822 / VNL

~~GEWASCHEN GEBEIZT~~ .....
OBERFLÄCHE SAUBER UND GRATFREI
KANTEN ENTSCHÄRFT

Abweichungen für Maße ohne Toleranzangabe
a) Für Rohteilmaße:
b) Für Maße der Bearbeitung: ISO 2768-m



...äße unterliegen nicht der Stichprobenkontrolle durch QW:
...Vorrichtungsmaße [ ]...Konstruktionsmaße

...ung darf ohne meine Genehmigung weder kopiert noch dritten...ersonen oder Konkurrenzfirmen zugänglich gemacht werden. §§ 17 u. 18 des Gesetzes gegen den unlauteren Wettbewerb.

Ausgabevermerk:		
Kurz-zeichen	Datum Monat	Jahr
01	Jan	03
02	Feb	04
03	Mär	05
04	Apr	06
05	Mai	07
07	Jun	08
08	Jul	09
Kalk.	Aug	10
Must.	Sep	11
	Okt	12
	Nov	13
	Dez	14

Datum
Änd.Nr.

Maßstab: 1:1

Werkstoff:

Einsatzlänge: Gew. in kg Roh: Fertig:

Bezeichnung: Kundenzeichnung
Universal-Phasenanschlussklemme
für Flachleiter bis 20, T-Bolzen 15,
Kugel ø 20, Rd. ø 9-22

ARCUS
ALOIS SCHIFFMANN GMBH
CAD-Zeichnung, keine manuelle Änderung!

Erstellt Dat.	16.08.01	Name	T-Re
Bearbeitet Dat.	15.05.12	Name	T-N
Geprüft Dat.		Name	
Ersatz für:			
Ersetzt durch:			
Dateiname:	507042k.dwg		
Sach-Nr.	507 042		

ВЕРНО С ОРИГИНАЛА

~~GEWASCHEN GEBEIZT~~

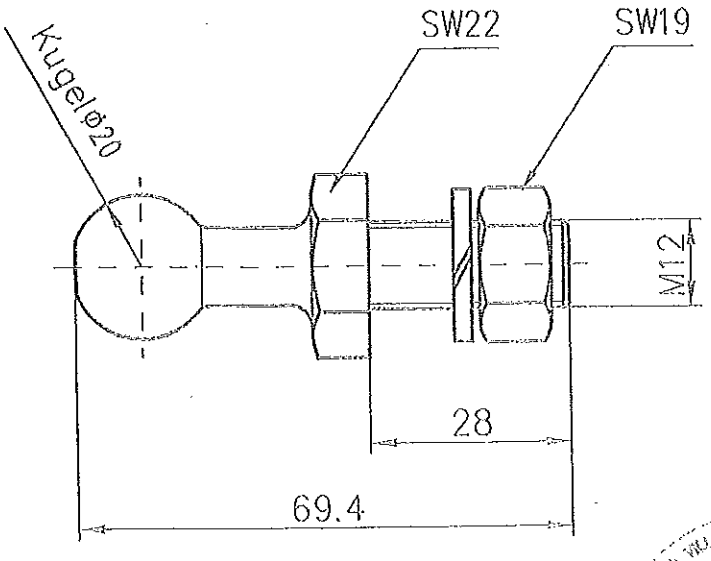
OBERFLÄCHE SAUBER UND GRATFREI

KANTEN ENTSCHÄRFT

Abweichungen für Maße ohne Toleranzangabe

a) Für Rohteilmaße:

b) Für Maße der Bearbeitung: ISO 2768-m



unterliegen nicht der Stichprobenkontrolle durch QW:
...Vorrichtungsmaße [ ]...Konstruktionsmaße

Ausgabevermerk:		
Kurzzeichen	Datum Monat	Jahr
01	Jan	03
02	Feb	04
03	Mär	05
04	Apr	06
05	Mai	07
07	Jun	08
08	Jul	09
Kalk.	Aug	10
Must.	Sep	11
	Okt	12
	Nov	13
	Dez	14

Datum

Änd.Nr.

Maßstab: 1:1

Werkstoff:

Einsatzlänge: Gew. in kg Roh: Fertig:

Bezeichnung: Kundenzeichnung
Kugelbolzen DIN 48 088-20-Sn
M12x28

ARGUS
ALOIS SCHIFFMANN GMBH
CAD- Zeichnung keine manuelle Änderung!

Erstellt	Dat.	23.04.12	Name	T-Sc
Bearbeitet	Dat.	15.05.12	Name	T-N
Geprüft	Dat.		Name	
Ersatz für:				
Ersetzt durch:				
Dateiname:		515107KU.dwg		
Sach-Nr.		515 107 D		

VEIKI-VNL ELECTRIC LARGE LABORATORIES LTD.

No. 6176/VNL

Test Report

Short-circuit current test on line clamps type 507 006 for short-circuiting device

14th June 2011

MSZ EN ISO 9001

STL participant

The accreditation of VEIKI-VNL Ltd.
refers to the test activities registered by HAB (Hungarian Accreditation Board) under No.: NAT-1-1251/2007

H-1158 Budapest, Vasgolyó u. 2-4.
Phone:+36.1.417 3157, Fax:+36.1.417 3163
E-mail: vnl@vnl.hu
www.vnl.hu

ВЯРНО С ОРИГИНАЛА

Subject:	Short-circuit current test on line clamps type 507 006 for short-circuiting device
Kind of the test:	Type test
Client:	ARCUS ELEKTROTECHNIK ALOIS SCHIFFMANN GMBH Truderinger Strasse 199. D-81673 München GERMANY
Reference and date of the order:	63045; 16th February 2011
Our reference number:	NTL-14 / 2011
Place and date of the test:	VEIKI-VNL Electric Large Laboratories Ltd. H-1158 Budapest, Vasgolyó u. 2-4 HUNGARY 11th-13th of April 2011
Present at the test in charge of the purchaser:	Mr. Christian Niklis ARCUS GMBH Mr. Andreas Hanusch ARCUS GMBH

ВЯРНО С ОРИГИНАЛА

ЕНЕРГОТЕА ООД ЕНЕРГО ТЕСТ гр. СОФИЯ

Details of the tested object:

Designation:	Line clamps for short-circuiting device
Manufacturer:	ARCUS GMBH
Type:	507 006
Rated voltage:	> 1kV
Rated frequency:	50 Hz
Rated current:	42 kA
Rated time:	0.5 s
Rated peak factor:	2.5
Diameter of the installation conductor:	First test : Ø35 mm; aluminium circular conductor Second test: Ø 6 mm; copper circular conductor

The first test arrangement consisted of the following elements:

- Aluminium circular conductor with Ø35 mm diameter
- Line clamp (Drawing number: 507 006)
- Flexible, insulated, 150 mm^2 Cu short-circuiting cable (1m)
- Line clamp (Drawing number: 507 006)
- Aluminium circular conductor with Ø35 mm diameter

The second test arrangement consisted of the following elements:

- Copper circular conductor with Ø6 mm diameter
- Line clamp (Drawing number: 507 006)
- Flexible, insulated, 150 mm^2 Cu short-circuiting cable (1m)
- Line clamp (Drawing number: 507 006)
- Copper circular conductor with Ø6 mm diameter

Number of the manufacturer's drawing for the identification of the test object:
507 006 – Kundenzeichnung, Phasenanschlußklemme Al für Rundleiter von Ø6-35

Requirements of manufacturer or purchaser:
Requirements regarding to the test setup and the properties of applied circular conductor are detailed on Page 5.

The test was carried out in accordance with the following standard:

IEC 61230:2008	Live working - Portable equipment for earthing or earthing and short-circuiting.

ВЯРНО С ОРИГИНАЛА

Summary of the test results:

Short-circuit current tests were carried out on four preconditioned line clamps type 507 006 for short-circuiting device. The test arrangement consisted of installation conductors, line clamps and short-circuiting cable.

The tests were carried out with the following parameters:

First arrangement (Sample 1 and 2): $I_t = 50.73$ kA / $\hat{i}_{tm} = 121.09$ kA / $t_t = 444$ ms
Second arrangement (Sample 3 and 4): $I_t = 7.79$ kA / $\hat{i}_{tm} = 20.03$ kA. / $t_t = 444$ ms

The tested line clamps for short-circuiting device withstood the mechanical and thermal effects of the applied short-circuit currents without any damages or visible deformations.
It can be stated, that the tested line clamp type 507 006 for Ø6-35mm circular conductor met the short-circuit current test requirements of Sub-Clause 5.7 of IEC 61230 standard.

Budapest, 14th of June 2011

VEIKI-VNL
Villamos Nagylaboratóriumok Kft.
1158 Budapest, Vasgolyó u. 2-4.

/ Ferenc Bukor /
Responsible for the work

/ László Tóth/
Supervised by

/Dr. László Varga /
Managing director

Numbered sheets:	6	Tables:	1	Oscillograms:	2
Figures:	3	Photos:	4	Drawings:	1

ВЯРНО С ОРИГИНАЛА

1. The test objects

Short-circuit current tests were carried out on line clamps type 507 006 for short-circuiting device. For the tests installation circular conductors were used in test arrangement according to Figure 6a of the standard (See: Figure 3). The drawing of the tested clamps given by the manufacturer is enclosed to the test report. Before the commencement of the tests the identification of the test samples was made. The applied flexible copper short-circuiting cable was not part of the test objects.

2. The tests carried out

Short-circuit current tests were carried out on four new line clamps for short-circuiting device. The test arrangement consisted of installation conductors, line clamps and short-circuiting cable. The preconditioning of clamps was performed before the short-circuit current tests. The tests were carried out in accordance with the referred standard. The scheme of the test circuit is shown in Figure 1. The applied test arrangement can be seen on Photos 1, 3 and in Figure 3.

First test:

Two line clamps were clamped onto aluminium circular conductor with diameter of 35 mm and connected to each other by flexible copper short-circuiting cable with cross section of 150 mm^2. The test was carried out with the maximum conductor size at the rated current of the clamps.

Second test:

Two line clamps were clamped onto copper circular conductor with diameter of 6 mm and connected to each other by flexible copper short-circuiting cable with cross section of 150 mm^2. This test was carried out with the minimum conductor size at the rated current of the applied conductor.

3. Results of the tests

During the short-circuit tests, during the visual inspection damages could not be observed. The tested clamps withstood the mechanical and thermal effects of the applied short-circuit current without any damages or visible deformations. The condition of the tested elements is shown on Photos 2 and 4. The test parameters and results are collected in Table 1.
It can be stated, that the tested line clamp type 507 006 for Ø6-35mm circular conductor met the short-circuit current test requirements of Sub-Clause 5.7 of IEC 61230 standard.

4. The recorded quantities taken during the short-circuit current tests

During all tests oscillograms were taken. The quantities were recorded by transient recorder with sampling rate of 50 μs. The meaning of the symbols on the enclosed oscillograms are the next:

U_a - voltage measured at the test arrangement;
I_a - short-circuit current flowing through the tested line clamp.

Same notations are applied in Figures. The test parameters evaluated from the oscillograms are collected in Table 1. The measuring circuit with the applied elements are shown in Figure 2.

ВЯРНО С ОРИГИНАЛА

5. Measurement uncertainty

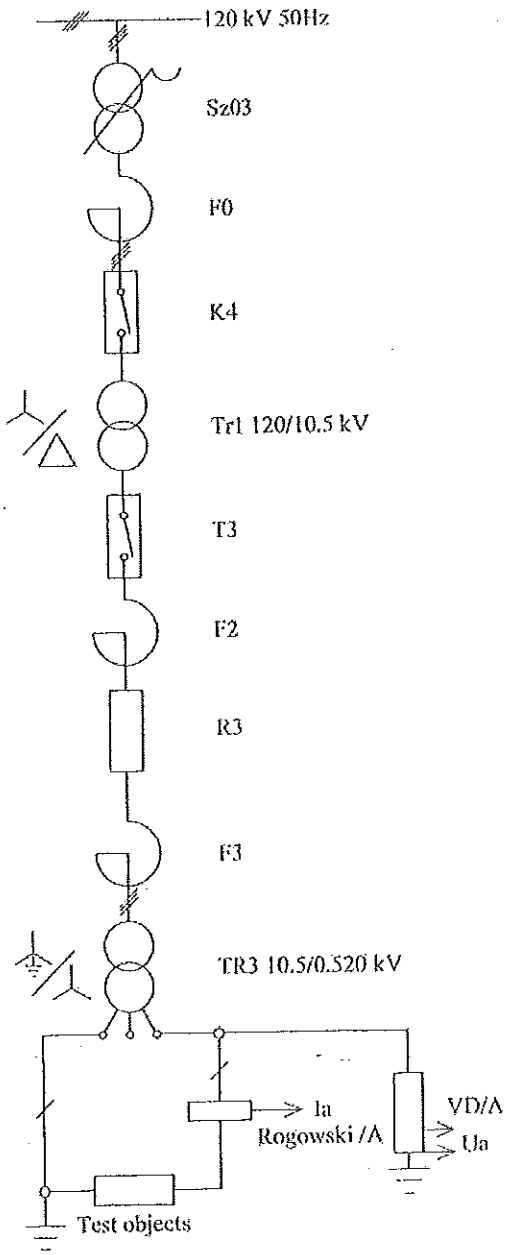
Measured parameter	Uncertainty
Voltage measurement:	0.30 %
Current measurement:	0.20 %

The uncertainty values given in this report are standard deviation values multiplied by k=2. Measurement uncertainty was estimated according to the method described in the EAL-R2 document.

6. Measuring devices used to the tests:

No.	Designation	Manufacturer	Type	Serial number
[1]	Rogowski/A	3D-Motion Control Mérnökiroda Kft.	DCM-R1 Rogowski Coil / DCM R1 Secondary Converter	2010-RC-001/2010-IU-001/1
[2]	VD/A 1kV/100V	VEIKI	R-C-R	21
[3]	PSO 9001	ECKELMANN	PSO 9001	1294-3015

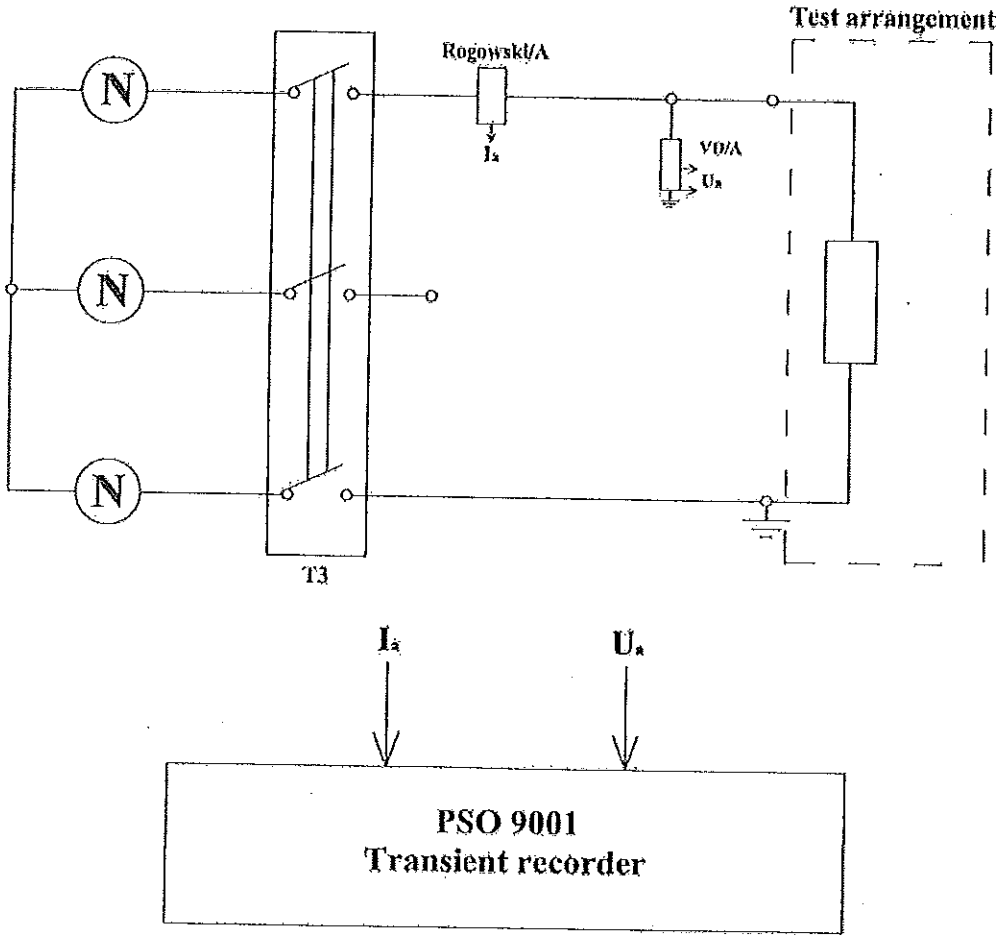
ВЯРНО С ОРИГИНАЛА



Sz03	-	regulating transformer
F0, F2, F3	-	reactors
R3	-	resistor
K4	-	protective circuit-breaker
Tr1, Tr3	-	short-circuit transformers
T3	-	making switch
Rogowski / A (I_a)	-	Rogowski current measuring system [1]
VD/A (U_a)	-	voltage divider [2]

Figure 1
The test circuit of the short-circuit current tests

ВЯРНО С ОРИГИНАЛА



N	-	50 Hz power network
T3	-	making switch
Rogowski/A	-	Rogowski current measuring system (I_a) [1]
VD/A	-	voltage divider (U_a) [2]
PSO 9001	-	transient recorder [3]

Figure 2
The measuring circuit of the short-circuit current tests

ВЯРНО С ОРИГИНАЛА

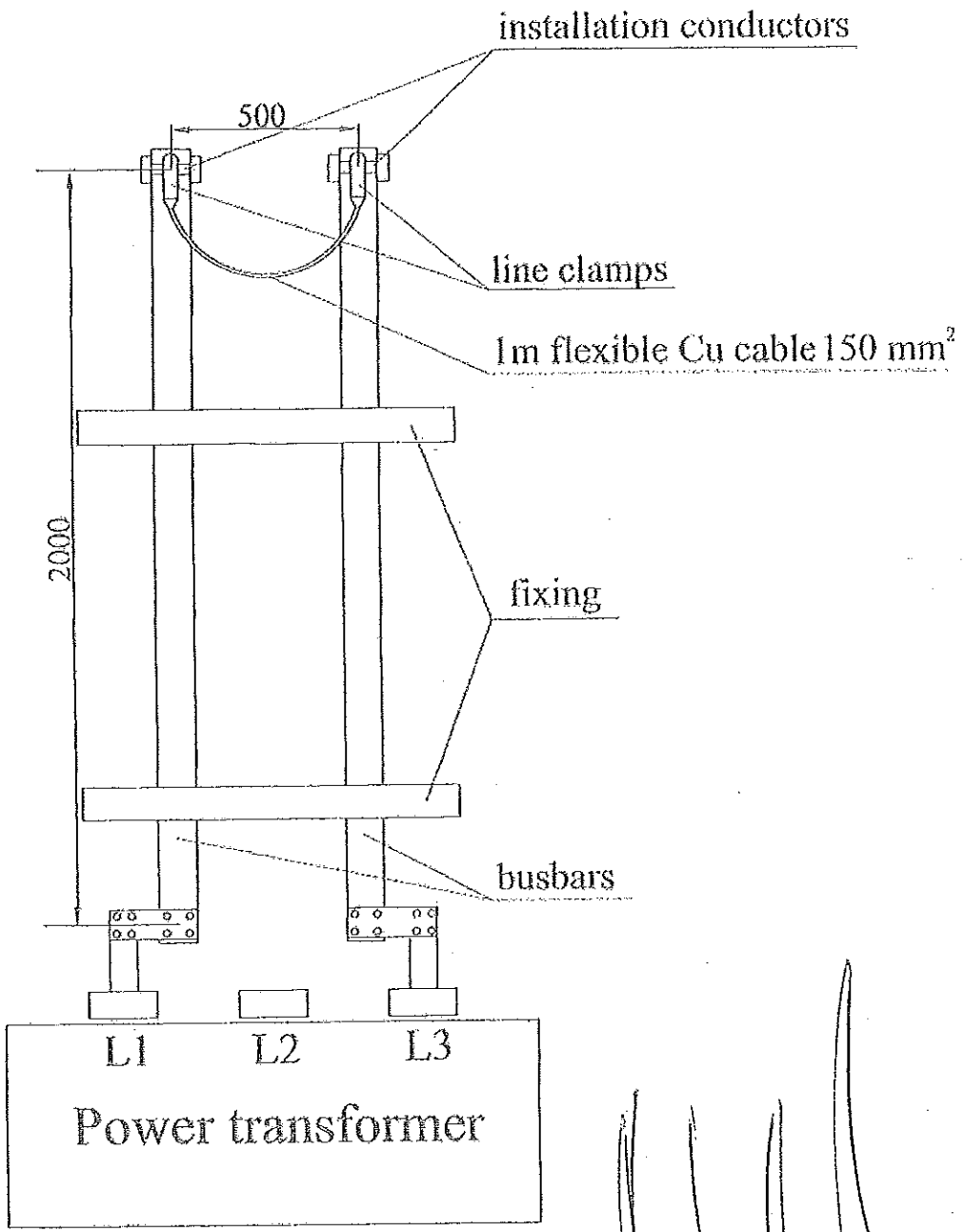


Figure 3
Test arrangement

ВЯРНО С ОРИГИНАЛА

Short-circuit current test on line clamps for short-circuiting device

The components of the tested arrangements:

First test:	Second test:
- 2 pcs aluminium circular conductor with Ø35 mm - 2 pcs line clamp - Flexible, insulated 150 mm^2 Cu cable (1m)	- 2 pcs copper circular conductor with Ø 6 mm - 2 pcs line clamp - Flexible, insulated 150 mm^2 Cu cable (1m)

Test circumstances:

- Test arrangement : Figure 3, Photos 1, 3
- Test circuit: Figure 1
- Measuring circuit: Figure 2

Test No.	Oscillogram No.	Parameters of short-circuit current			
		Highest current peak [kA]	RMS value of the A.C. component [kA]	Joule-integral [(kA)^{2}s]	Duration of short-circuit [ms]
1	BCD 1216	121.09	50.73	1202	444
2	BCD 1323	20.03	7.79	31	444

Comments, remarks:

No damages or breakages were found after the tests. The Photos 2 and 4 show the condition of the samples after the test.

Table 1
The test parameters and results

ВЯРНО С ОРИГИНАЛА

ЕНЕРГОТЕХ ООД

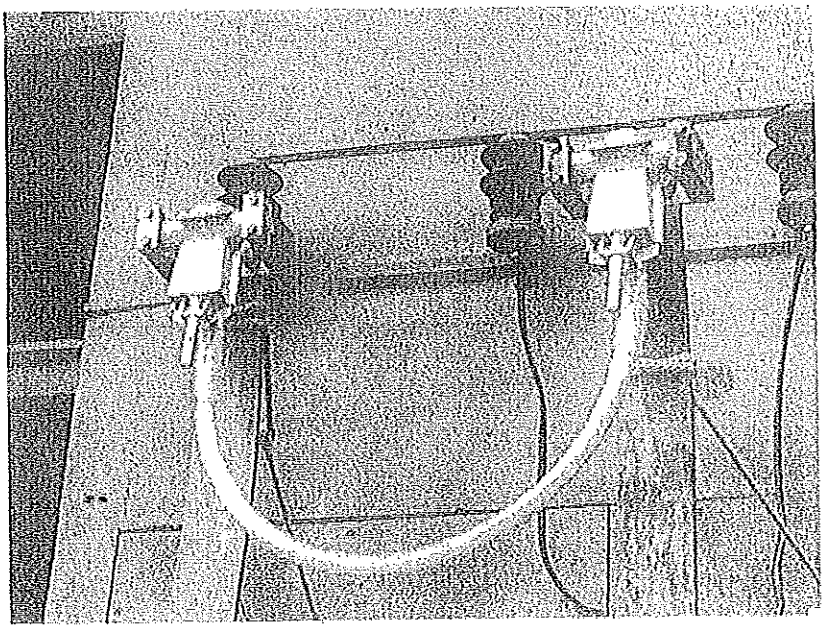


Photo 1
The first test object prepared for the test

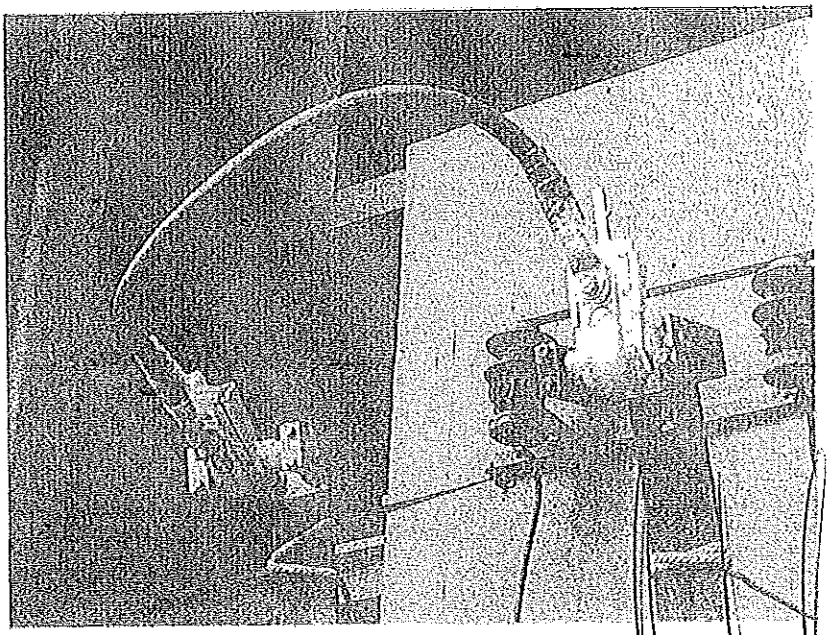


Photo 2
The condition of the first test object after the test

ВЯРНО С ОРИГИНАЛА

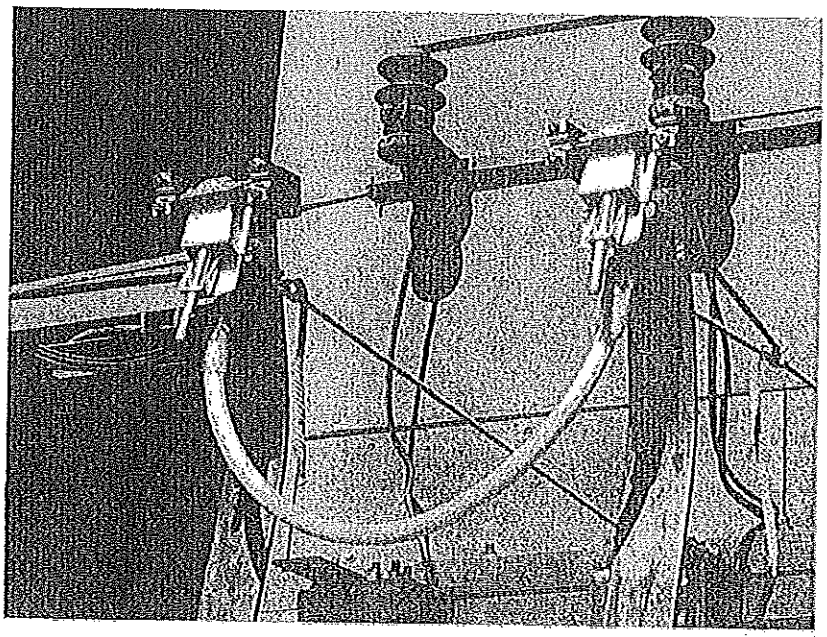


Photo 3
The second test object prepared for the test

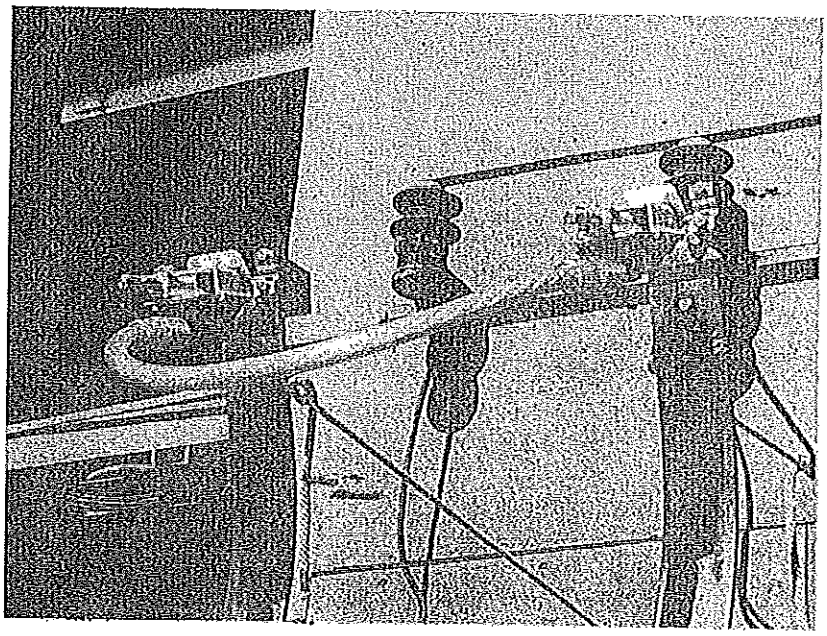


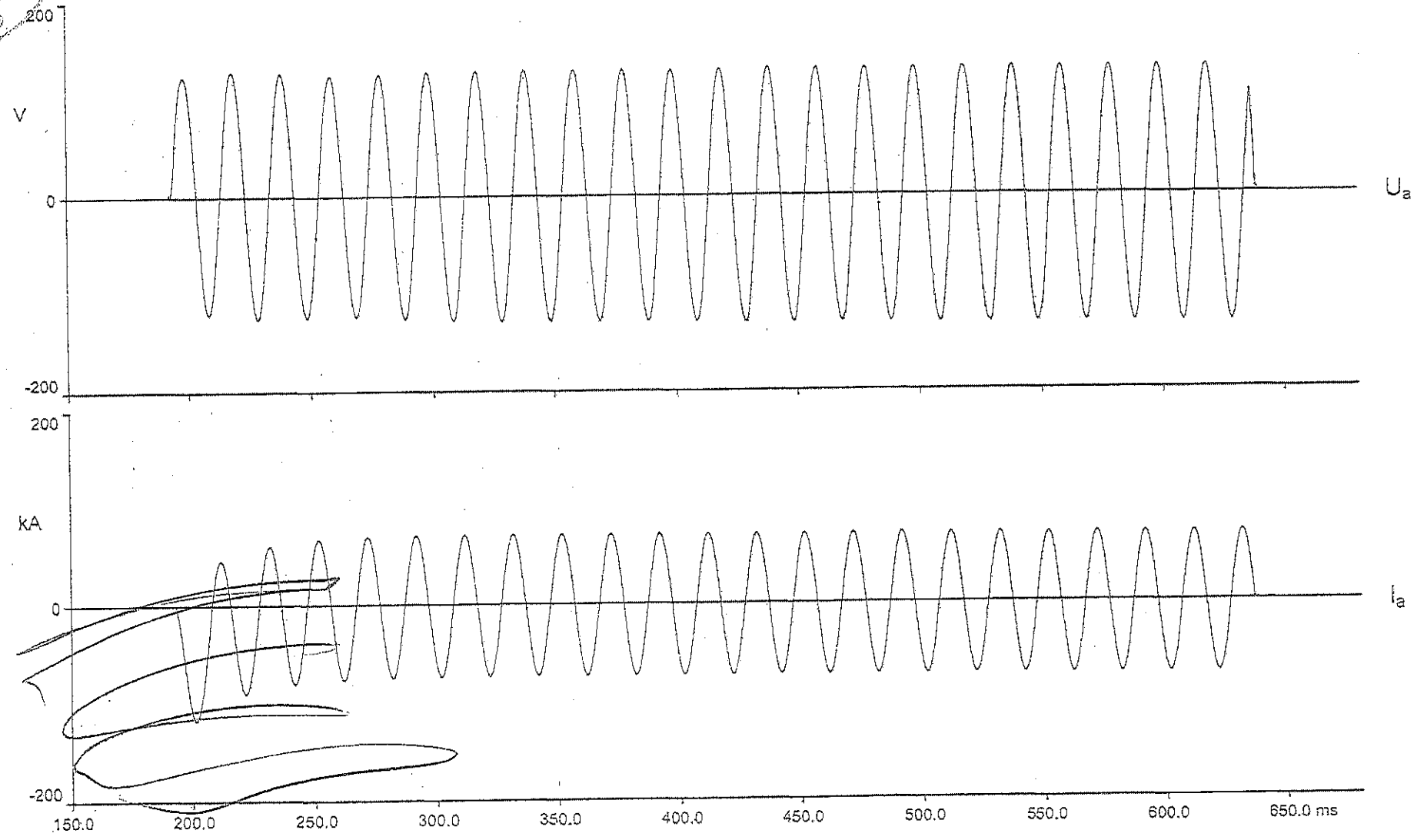
Photo 4
The condition of the second test object after the tests

ЕНЕРГОТЕХ ООД
ЕНЕРГО ТЕХ
ЕООД
гр. СОФИЯ

ВЯРНО С ОРИГИНАЛА

Arcus Elektrotechnik Alois Schiffmann GmbH
Short-circuit test on line clamps for short-circuiting device

Sample rate: 50 us
Date: 12. 04. 2011.

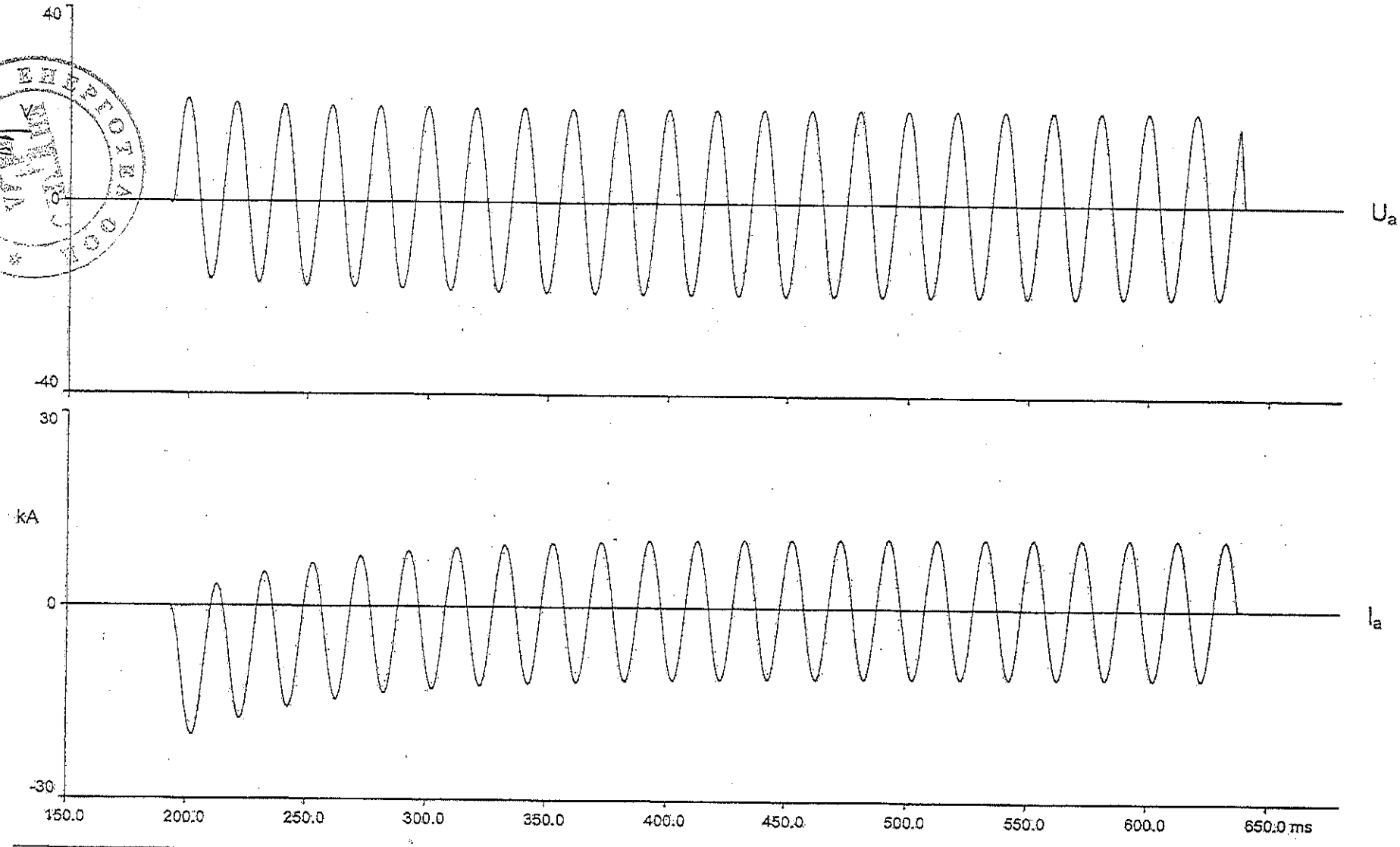


VEIKI-VNL Ltd.
HUNGARY - Budapest
www.vnl.hu

Osc.No.: BCD 1216
6176 / VNL

Arcus Elektrotechnik Alois Schiffmann GmbH
Short-circuit test on line clamps for short-circuiting device

Sample rate: 50 us
Date: 13. 04. 2011.



VEIKI-VNL Ltd.
HUNGARY - Budapest
www.vnl.hu

Osc.No.: BCD 1323
6176 / VNL

Test Report No. G537/67 dated 22 November 1967

Earthing and Short Circuiting Device For Low Voltage Distribution Cabinets Type 508 051 and 508 052

ARCUS ELEKTROTECHNIK ALOIS SCHIFFMANN GMBH
P.O.Box 80 16 08 * D-81616 München * Phone +49/ 89 / 43604 - 0 * Fax +49/ 89 / 43604 - 73
E-Mail: ARCUS-Schiffmann@t-online.de * Internet: www.ARCUS-Schiffmann.de

ВЯРНО С ОРИГИНАЛА

Test Report No.G 537/67 München, 22 November 1967

REPORT

Of the Elektrisches Prüfamt 3 München (Electric Test Institute 3 Munich)

Subject

Short circuit tests on 5 universal earthing and short circuiting devices for open and closed low voltage distribution cabinets

Type 508 051 – 0.0.
Type 508 051 – 0.0/626
Type 508 052 – 0.0
Type 508 052 - 0.0/626 and
Type 508 052 – 0.0 SA

of Messrs. Alois Schiffmann, special manufacturer for electrotechnics, München

on order of Messrs.Alois Schiffmann, München 8, Streitfeldstrasse 15

Test

Tets samples were connected to a high current generator and charged with the following short circuit test:

3 current impulses each 1 s with a short circuit current as per VDE 0105 part 1/8.64 "Standards for the Operation of High Current Installations" § 7, table 1, column 4.

Between the current impulses test samples were cooled down to room temperature.

The result is shown as follows.

ВЯРНО С ОРИГИНАЛА

Prüfbericht
Nr. G 537/67

München, den 22. November 1967

B e r i c h t

des Elektrischen Prüfamtes 3 München

über

Kurzschlußversuche an 5 Universal - Kurzschließ- und Erdungssteckvorrichtungen für offene und geschlossene Niederspannungsverteiler - Anlagen

Typ 508.51 - 0.0
Typ 508.51 - 0.0/626
Typ 508.52 - 0.0
Typ 508.52 - 0.0/626 und
Typ 508.52 - 0.0 SA

der Firma Alois S c h i f f m a n n , Spezialfabrik für Elektrotechnik, München

auf Antrag der Firma Alois Schiffmann, München 8, Streitfeldstraße 15.

P r ü f u n g

Die Prüflinge wurden an einen Hochstromtransformator angeschlossen und folgender Kurzschlußprüfung unterzogen:
3 Stromstöße je 1 s mit einem Kurzschlußstrom nach VDE 0105 Teil 1/ 8.64 "Bestimmungen für den Betrieb von Starkstromanlagen" § 7 Tafel 1 Spalte 4.

Zwischen den Stromstößen wurden die Prüflinge auf Raumtemperatur abgekühlt.
Nachfolgend ist das Ergebnis aufgeführt.

ВЯРНО С ОРИГИНАЛА

Bericht Nr. G 537/67
report no.

Ergebnis

RESULT

Prüfling test sample Nr.	Typ type	Querschnitt des Cu-Erdungsseiles mm² cable cross sect.	Kurzschlußstrom short circuit current: Sollwert A reference value	Istwert true value impulse A Stoß 1.	Istwert A Stoß 2.	Istwert A Stoß 3.	Zeit time s	Befund result
1	508.51 - 0.0	35	5500	6800	6800	6800	1	Keine nachteiligen Veränderungen. No disadvantageous changes.
2	508.51 - 0.0/626	35	5500	5850	5500	5500	1	
3.	508.52 - 0.0	50	8000	8800	8800	8800	1	
4.	508.52 - 0.0/626	50	8000	8000	8200	7900	1	
5.	508.52 - 0.0 SIA	70	11500	11800	11600	11200	1	

ВЯРНО С ОРИГИНАЛА

Diese Zeichnung darf ohne meine Genehmigung weder kopiert noch dritten Personen oder Konkurrenzfirmen zugänglich gemacht werden. §§ 17 u. 18 des Gesetzes gegen den unlauteren Wettbewerb.

Elektrisches Prüfamt 3
München

Приложение 3 към Техническото предложение

1. *Срокове за доставка.* Таблица с количества до 30 дни, минимална партида.

№	Съкратено наименование на материала съгласно технически стандарт	Минимале н размер на партида, бр.	Предложение на участника на количество с възможност за доставка до 30 кал. дни
1	2	3	4
	Преносими заземители за НН за въздушна мрежа с неизолирани проводници – със заземителен кабел и кабел за свързване на късо(гъвкави медни въжета)- 35mm²;	1	1
2	Преносими заземители за НН за кабелни разпределителни шкафове /касети/– със заземителен кабел и кабел за свързване на късо(гъвкави медни въжета) -50mm²;	1	1
3	Преносими заземители за Ср.НН за въздушна мрежа с неизолирани проводници – със заземителен кабел и кабел за свързване на късо(гъвкави медни въжета)– 35mm²;	1	1
4	Преносими заземители за Ср.НН за шини за ЗРУ Ср.Н – със заземителен кабел и кабел за свързване на късо(гъвкави медни въжета)- 50mm²;	1	1
5	Преносими заземители за ВН.НН за шини за уредби 110kV – със заземителен кабел и кабел за свързване на късо(гъвкави медни въжета)– 95mm²;	1	1

Дата 22.10.2015 г.

ПОДПИС и ПЕЧАТ:

(Николай Калев)

Управител

(длъжност на представляващия участника)

Приложение 3 към рамково споразумение

ПРОЕКТ НА КОНКРЕТЕН ДОГОВОР

Днес, ...201... г. (дата на сключване), в град София, България, между страните:

(1) "ЧЕЗ РАЗПРЕДЕЛЕНИЕ БЪЛГАРИЯ" АД, със седалище и адрес на управление: Република България, гр. София 1712, район "Младост", бул. "Цариградско шосе" № 159, БенчМарк Бизнес Център, вписано в Търговския регистър при Агенцията по вписванията с ЕИК: 130277958, ИН по ЗДДС: BG 130277958, Банкова сметка: код: UNCRBGSF; сметка: BG43UNCR76301002ERPBUL; при банка: Уникредит Булбанк, представлявано от .....– Изпълнителен Директор и ....., наричано за краткост "**ВЪЗЛОЖИТЕЛ**", от една страна

и

(2) ....., със седалище и адрес на управление: гр....., ул....., тел..... факс: ....., e-mail: ....., вписано в Търговския регистър при Агенцията по вписванията с ЕИК ....., ИН по ЗДДС: BG ....., представлявано от.....– ....., наричано за краткост **"ИЗПЪЛНИТЕЛ"**, от друга страна,

в резултат на проведена открита процедура за възлагане на обществена поръчка с реф. № PPD ..... и предмет: ....., сключено Рамково споразумение № .../... г. и на основание чл. 41 от ЗОП, се сключи настоящият договор за следното:

1. ПРЕДМЕТ НА ДОГОВОРА

1.1. Съгласно условията на настоящия договор и последващите поръчки за доставка, **ИЗПЪЛНИТЕЛЯТ** се задължава да достави и продаде, а **ВЪЗЛОЖИТЕЛЯТ** да приеме и купи стоки, представляващи:....., описани по вид и количество в Приложение 1 от настоящия договор и отговарящи на техническите изисквания (характеристики) от Приложение 2 на рамковото споразумение. За целите на договора и за краткост описаните стоки от Приложение 1, ще бъдат наричани по-долу "**СТОКА**".

1.2. Стоката, предмет на настоящия договор, се доставя и купува по поръчки, генерирани през SAP и отправени от **ВЪЗЛОЖИТЕЛЯ** до **ИЗПЪЛНИТЕЛЯ**. **ВЪЗЛОЖИТЕЛЯТ** не е длъжен да поръчва стока по предмета на договора всеки месец, нито да поръча, приеме и закупи цялото прогнозно количество от стоката през срока на действие на договора. **ВЪЗЛОЖИТЕЛЯТ** ще поръчва само толкова стока, колкото му е необходима според неговата готовност. В поръчката се включват данни за вида на стоката, конкретните количества, единична и обща цена, срок и място за доставка. Местата за доставка на стоката по предмета на договора са складове на **ВЪЗЛОЖИТЕЛЯ**, находящи се на територията на страната в следните населени места: гр. София, гр. Враца, гр. Левски и гр. Дупница. Точният адрес на съответната складова база се посочва в поръчката на **ВЪЗЛОЖИТЕЛЯ**.

1.3. Предаването на стоката се извършва в посочения в поръчката склад с приемно - предавателен протокол, двустранно подписан от страните по този договор или от техни надлежно упълномощени представители. Приемно-предавателният протокол се изготвя в 3 (три) еднообразни екземпляра в съответствие с образеца от Приложение 3 към договора, като един остава за **ИЗПЪЛНИТЕЛЯ** и два се предават на **ВЪЗЛОЖИТЕЛЯ**, заедно с документите, описани в Приложение 5 към т. 4.2 от настоящия договор.

1.4. (1) Протоколът по т. 1.3. се подписва и от подизпълнителя, ако в поръчката по т. 1.2 са включени стоки, за доставка на които **ИЗПЪЛНИТЕЛЯТ** е сключил договор за подизпълнение, съгласно 4.10. от договора.

(2) Точка 1.4, ал.1 не се прилага, ако **ИЗПЪЛНИТЕЛЯТ** представи на **ВЪЗЛОЖИТЕЛЯ** доказателства, че договорът за подизпълнение е прекратен, или доставката на стока или част от нея не е възложена на подизпълнителя.

1.5. Собствеността и рискът от погиването и повреждането на стока преминават върху **ВЪЗЛОЖИТЕЛЯ** с подписването на приемно-предавателния протокол по т. 1.3 по-горе.

2. ЦЕНА И НАЧИН НА ПЛАЩАНЕ

2.1. (1) Единичните цени на стоката, предмет на договора, са описани в **Приложение 1**, неразделна част от него.

Единичната цена за всеки вид стока, посочена в Приложение 1 към настоящия договор, не може да бъде по-висока от базовата единична цена за съответната стока по сключеното рамково споразумение.
(2) При надлежно и своевременно осъществяване предмета на договора **ВЪЗЛОЖИТЕЛЯТ** ще заплаща на **ИЗПЪЛНИТЕЛЯ** поръчаната по реда на т. 1.2 и приета по реда на т. 1.3 стока по единични цени от Приложение 1. При фактурирането се начислява дължимият в момента ДДС според законодателството на Република България. Единичните цени, по които се плаща стоката, са определени до франко складове на **ВЪЗЛОЖИТЕЛЯ**, посочени в т. 1.2 по-горе, като включват всички разходи: транспорт, такси, застраховки, опаковка, документация и всички други съпътстващи доставката на стоката разходи.
2.2. ВЪЗЛОЖИТЕЛЯТ се задължава да заплаща поръчаната по реда на т. 1.2. и приета по реда на т. 1.3. стока чрез банкови преводи по банкова сметка на **ИЗПЪЛНИТЕЛЯ**, извършени в срок до 60 (шестдесет) календарни дни, считано от датата на издаване от **ИЗПЪЛНИТЕЛЯ** и предоставяне на **ВЪЗЛОЖИТЕЛЯ** на оригинална фактура за стойността на конкретната доставка и документите, посочени в т. 4.2 от договора, които придружават стоката. Във фактурата трябва да са посочени: № и дата на договора, № и дата на рамковото споразумение, № и дата на приемно-предавателния протокол по т. 1.3 и № на поръчката за доставка. **ИЗПЪЛНИТЕЛЯТ** е длъжен да представи на **ВЪЗЛОЖИТЕЛЯ** издадената фактура и документите, които придружават стоката, най-късно в срок до 5 (пет) дни, считано от датата на издаването на фактурата, като при забава за представяне на фактура и придружаващите стоката документи, срокът за плащане се удължава съответно със срока на забавата.
2.3. Максималната стойност на договора е в размер на ..... (.....) лева без ДДС. Независимо от това дали срокът на договора по т. 3.1 е изтекъл, при достигане на максималната стойност по тази точка, договорът се прекратява автоматично, без която и да е от страните да дължи уведомление или предизвестие на другата страна.
2.4. ВЪЗЛОЖИТЕЛЯТ извършва окончателното плащане по договор за обществена поръчка, за който има сключени договори за подизпълнение, след като получи от **ИЗПЪЛНИТЕЛЯ** доказателства, че е заплатил на подизпълнителите всички работи, приети по реда на т. 5.7.
2.5. Условието по т.2.4. не се прилага в случаите по т. 5.8.

3. СРОКОВЕ
3.1. Договорът се сключва за срок от **..... (.....) месеца**, считано от датата на влизането му в сила.
3.2. Съответните срокове за доставка на съответните максимални количества от стоката са посочени в Приложение 2.
3.3. Срокът за доставка по предходната т. 3.2 тече от датата на поръчката по т. 1.2.
3.4. ВЪЗЛОЖИТЕЛЯТ има право да поръча едновременно от всички видове стоки, предмет на договора.
3.5. Независимо от това колко вида стоки са поръчани едновременно, **ИЗПЪЛНИТЕЛЯТ** е длъжен да достави поръчаните му стоки в уговорения срок от датата на поръчката, ако за всеки от поръчаните видове стоки е спазено съответното максимално количество, посочено в т. 3.2. от настоящия договор.
3.6. В случай, че в поръчката са включени количества, по-големи от договорените по т. 3.2., за количеството над максималното, това обстоятелство ще бъде посочено текстово в съответната поръчка изпратена към **ИЗПЪЛНИТЕЛЯ**. С потвърждението на поръчката, **ИЗПЪЛНИТЕЛЯТ** вписва в същата очаквана дата за доставка, която се отнася само за количествата над максималните, посочени в т. 3.2, като **ИЗПЪЛНИТЕЛЯТ** е длъжен да достави уговореното максимално количество по т. 3.2 в 30-дневен срок от датата на поръчката.

4. ПРАВА И ЗАДЪЛЖЕНИЯ НА ИЗПЪЛНИТЕЛЯ
4.1. ИЗПЪЛНИТЕЛЯТ е длъжен да достави стоката във вид, качество и с технически показатели, отговарящи на техническите изисквания, определени в Приложение 2 от Рамково споразумение № ...../....., сключено между същите страни, и в съответствие с регламентите, определени в настоящия договор.
4.2. ИЗПЪЛНИТЕЛЯТ е длъжен да достави стоката, комплектована с документите, описани в Приложение 4, неразделна част от настоящия договор.
4.3. ИЗПЪЛНИТЕЛЯТ се задължава да уведоми писмено **ВЪЗЛОЖИТЕЛЯ** най-малко два дни преди изпращането на стоката за очакваната дата на пристигането ѝ в местоизпълнението /местоназначението/, посочено в съответната поръчка, чрез факс съобщение или съобщение на електронна поща. Неизпълнението на това задължение освобождава **ВЪЗЛОЖИТЕЛЯ** от забава за приемането на стоката.
4.4. ИЗПЪЛНИТЕЛЯТ отговаря пред **ВЪЗЛОЖИТЕЛЯ**, ако трети лица предявят правото си на собственост или други права по отношение на стоката, които могат да бъдат противопоставени на **ВЪЗЛОЖИТЕЛЯ**.

4.5. ИЗПЪЛНИТЕЛЯТ е длъжен да върне на **ВЪЗЛОЖИТЕЛЯ** платената цена заедно с лихвите, както и да заплати разноските по договора в случаите, когато се докаже, че продадената стока принадлежи изцяло или отчасти на трето лице, като в тези случаи **ВЪЗЛОЖИТЕЛЯТ** има право да развали договора по т. 9.1., ал. 1.

4.6. ИЗПЪЛНИТЕЛЯТ се задължава да определи свой представител за предаване на стоката по т. 1.1. с приемно-предавателния протокол по т. 1.3.

4.7. ИЗПЪЛНИТЕЛЯТ е длъжен да замени дефектната или неотговаряща на изискванията стока, констатирано в съответствие с т. 5.2. или т. 6.5. на договора, в сроковете, определени в договора.

4.8. ИЗПЪЛНИТЕЛЯТ има право да получи цената на поръчаната, реално доставена и приета стока, съгласно условията на настоящия договор.

4.9. При изпълнението на настоящият договор **ИЗПЪЛНИТЕЛЯТ** няма да използва/ще използва следнитя/те подизпълнител/и ..... (*попълва се при сключване на договора, ако участникът, определен за изпълнител, е декларирал в заявлението си, че при изпълнение на договора ще използва подизпълнители*) за изпълнение на ..... (*посочват се видовете работи, които ще се изпълняват от подизпълнителя/ите*), представляващи .....(.....)% от общата стойност на поръчката (*попълва се съобразно декларацията от заявлението на участника*).

4.10. ИЗПЪЛНИТЕЛЯТ сключва договор за подизпълнение с подизпълнителите, посочени в офертата, и в срок до три дни от датата на сключване изпраща оригинален екземпляр от договора за подизпълнение на **ВЪЗЛОЖИТЕЛЯ**.

4.11. ИЗПЪЛНИТЕЛЯТ няма право да възлага изпълнението на една или повече от работите, включени в предмета на договора, на лица, които не са посочени като негови подизпълнители в т. 4.9 по-горе, и с които не е сключен и представен на **ВЪЗЛОЖИТЕЛЯ** договор за подизпълнение.

4.12. ИЗПЪЛНИТЕЛЯТ има право да замени подизпълнителя/ите по т. 4.9, когато:

а) За подизпълнителя/ите е налице или възникне обстоятелство чл. 47, ал. 1 и ал. 5 от ЗОП;

б) Подизпълнителят/ите не отговарят на нормативно изискване за изпълнение на работите, включени в предмета на договора за подизпълнение;

в) Договорът за подизпълнение е прекратен по вина на подизпълнителя/ите, включително ако подизпълнителя/ите превъзлагат една или повече работи, включени в предмета на договора за подизпълнение.

4.13. ИЗПЪЛНИТЕЛЯТ е длъжен да прекрати договор за подизпълнение, ако по време на изпълнението му възникне обстоятелство по чл. 47, ал. 1 и ал. 5 от ЗОП, както и ако подизпълнителят превъзлага една или повече работи, включени в предмета на договора за подизпълнение.

4.14. В случаите по т. 4.12 и 4.13 **ИЗПЪЛНИТЕЛЯТ** сключва нов договор за подизпълнение или допълнително споразумение към договор за подизпълнение и изпраща оригинален екземпляр на **ВЪЗЛОЖИТЕЛЯ** в срок до три дни от датата на сключване, заедно с доказателства за липса на обстоятелствата по чл. 47, ал. 1 и ал. 5 от ЗОП за подизпълнителя.

4.15. Сключване на договор за подизпълнение или на допълнително споразумение към договор за подизпълнение не освобождава **ИЗПЪЛНИТЕЛЯ** от отговорността му за изпълнение на настоящия договор. Използването на подизпълнител/и не изменя задълженията на **ИЗПЪЛНИТЕЛЯ** по договора. **ИЗПЪЛНИТЕЛЯТ** отговаря за действията на подизпълнителя/ите като за свои действия.

4.16. Приложимите клаузи на договора са задължителни за изпълнение от подизпълнителя/ите.

4.17.Подизпълнителите нямат право да превъзлагат една или повече от дейностите, които са включени в предмета на договора, за подизпълнение.

4.18. Доставката на стоки, материали или оборудване, необходими за изпълнението на обществената поръчка, не се счита за наемане на подизпълнител, когато такава доставка не включва монтаж, както и сключването на договори за услуги, които не са част от настоящия договор за обществена поръчка, съответно - от договора за подизпълнение.

5. ПРАВА И ЗАДЪЛЖЕНИЯ НА ВЪЗЛОЖИТЕЛЯ

5.1. ВЪЗЛОЖИТЕЛЯТ се задължава да определи свой представител за приемане на стоката по т. 1.1. с приемно-предавателния протокол по т. 1.3.

5.2. (1) ВЪЗЛОЖИТЕЛЯТ провежда входящ контрол за качество на доставената стока с цел установяване на съответствието ѝ с изискванията, посочени в настоящия договор и приложенията към него. За проведения входящ контрол **ВЪЗЛОЖИТЕЛЯТ** изготвя протокол.

(2) При установяване на недостатъци по време на входящия контрол, **ВЪЗЛОЖИТЕЛЯТ** е длъжен писмено да уведоми **ИЗПЪЛНИТЕЛЯ** в срок до 10 /десет/ дни от датата на протокола по ал. 1. В писменото уведомление по предходното изречение **ВЪЗЛОЖИТЕЛЯТ** описва недостатъците (дефектите) на доставената стока и начинът за отстраняването им. **ИЗПЪЛНИТЕЛЯТ** е длъжен да прегледа уведомлението с констатациите на **ВЪЗЛОЖИТЕЛЯ** за недостатъци (дефекти) на стоката и да го уведоми писмено (по факс или на електронна поща) за това дали приема констатациите - съответно предложеният начин за отстраняване на недостатъците (дефектите) или не ги приема. **ИЗПЪЛНИТЕЛЯТ** следва да изпълни задължението си за уведомяване по предходното изречение в

срок до 1 /един/ работен ден от датата на получаване на уведомлението на **ВЪЗЛОЖИТЕЛЯ** за резултатите от входящия контрол. В случай, че **ИЗПЪЛНИТЕЛЯТ** не уведоми **ВЪЗЛОЖИТЕЛЯ** за решението си относно констатациите от входящия контрол в срока по предходното изречение, се счита, че не ги приема, вследствие на което **ВЪЗЛОЖИТЕЛЯТ** пристъпва към съставянето на констативен протокол по ал. 3. В случай че **ИЗПЪЛНИТЕЛЯТ** приеме констатациите и предложенията на **ВЪЗЛОЖИТЕЛЯ**, констативен протокол по ал. 3 не се съставя, а **ИЗПЪЛНИТЕЛЯТ** е длъжен да отстрани констатираните недостатъци (дефекти) в срок до 15 /петнадесет/ календарни дни, считано от датата на писменото им приемане. В случай, че **ИЗПЪЛНИТЕЛЯТ** не приеме констатациите и предложенията на **ВЪЗЛОЖИТЕЛЯ**, последният го уведомява писмено за дата, час и място за съставяне на констативен протокол по ал. 3. Писменото уведомление за съставянето на констативен протокол по ал. 3 се изпраща на **ИЗПЪЛНИТЕЛЯ** не по-късно от три дни преди посочената в уведомлението дата за съставяне на протокола.

(3) При отказ на **ИЗПЪЛНИТЕЛЯ** да приеме констатациите на **ВЪЗЛОЖИТЕЛЯ** относно недостатъците (дефектите) на стоката и начина на тяхното отстраняване по предходната алинея, страните по договора съставят и подписват констативен протокол, в който се описват установените недостатъци, начинът и срокът за тяхното отстраняване. Срокът за отстраняване на недостатъците (дефектите) на стоката не може да бъде по-дълъг от 15 /петнадесет/ календарни дни.

(4) Неявяването на **ИЗПЪЛНИТЕЛЯ** за съставяне и подписване на констативния протокол по предходната алинея не го освобождава от отговорност. В този случай констативният протокол се съставя само от представители на **ВЪЗЛОЖИТЕЛЯ** и се изпраща на **ИЗПЪЛНИТЕЛЯ** по факс или електронна поща за изпълнение. В този случай срокът за отстраняване на недостатъците, посочен в констативния протокол, започва да тече от датата на изпращането на протокола на **ИЗПЪЛНИТЕЛЯ**.

(5) При съставянето на констативния протокол по ал. 3, респективно по ал. 4, страните отчитат уговореното в т. 5.3. от договора.

5.3. При установяване на недостатъци (дефекти) на стоката по реда на т. 5.2. или т. 6.5. от договора **ВЪЗЛОЖИТЕЛЯТ** има следните алтернативни права:

(1) да иска замяна на дефектната или неотговаряща на изискванията стока с нова за сметка на **ИЗПЪЛНИТЕЛЯ**; или

(2) да задържи стоката и да иска отбив от цената; или

(3) да откаже да приеме стоката или да върне приетата, но дефектна или неотговаряща на изискванията стока, съответно да не я заплати или ако вече е заплатена, да иска връщането на платената за нея цена.

5.4. При доставка на дефектна стока или стока, която не отговаря на изискванията на **ВЪЗЛОЖИТЕЛЯ**, констатирано в съответствие с т. 5.2. или т. 6.5., и в случай, че **ИЗПЪЛНИТЕЛЯТ** не отстрани недостатъците, съответно не замени дефектната стока с качествена в уговорените срокове, то **ВЪЗЛОЖИТЕЛЯТ** има право да предприеме действия за отстраняване на недостатъците от трета страна или да ги отстрани сам, за сметка на **ИЗПЪЛНИТЕЛЯ**. В този случай **ВЪЗЛОЖИТЕЛЯТ** има право на неустойката по т. 7.2.

5.5. В случаите на т. 5.3., **ВЪЗЛОЖИТЕЛЯТ** може да приеме неотговарящата на изискванията или дефектна стока на отговорно пазене, като вземе всички възможни мерки за безопасното й съхранение за максимален срок от един месец.

5.6. ВЪЗЛОЖИТЕЛЯТ е длъжен, съгласно условията на този договор, да изплати на **ИЗПЪЛНИТЕЛЯ** договорената цена за поръчаната, реално доставена и приета стока.

5.7. ВЪЗЛОЖИТЕЛЯТ приема изпълнението на дейност по договора за обществена поръчка, за която **ИЗПЪЛНИТЕЛЯТ** е сключил договор за подизпълнение, в присъствието на **ИЗПЪЛНИТЕЛЯ** и на подизпълнителя.

5.8. При приемането на работата **ИЗПЪЛНИТЕЛЯТ** може да представи на **ВЪЗЛОЖИТЕЛЯ** доказателства, че договорът за подизпълнение е прекратен, или работата или част от нея не е извършена от подизпълнителя.

6. ГАРАНЦИИ И РЕКЛАМАЦИИ

6.1. При подписване на настоящия договор **ИЗПЪЛНИТЕЛЯТ** представя гаранция за изпълнение на стойност от ..... (.....) лева под формата на паричен депозит по сметка на **ВЪЗЛОЖИТЕЛЯ,** както следва: SWIFT (BIC): UNCRBGSF; Банкова сметка (IBAN) в лева: BG43 UNCR 7630 1002 ERPB UL; при банка: Уникредит Булбанк или под формата на безусловна и неотменяема банкова гаранция, издадена в полза на **ВЪЗЛОЖИТЕЛЯ** със срок на валидност ...../...../ месеца.

6.2. (1) Гаранцията за изпълнение ще компенсира **ВЪЗЛОЖИТЕЛЯ** за всякакви вреди и загуби, причинени вследствие виновно неизпълнение/забава на договора (задължения по договора) от страна на **ИЗПЪЛНИТЕЛЯ**, както и за произтичащите от тях неустойки. В случай, че претърпените вреди на **ВЪЗЛОЖИТЕЛЯ** са в по-голям размер от размера на гаранцията за изпълнение по предходната точка, **ВЪЗЛОЖИТЕЛЯТ** има право да потърси обезщетение по общия съдебен ред пред компетентния български съд.

(2) За неуредените условия по отношение на гаранцията за изпълнение и в частност за попълването и при усвояване на суми от нея се прилага съответно Раздел 6 (в частност т. 6.5) от рамковото споразумение.

6.3.(1) Гаранцията за изпълнение или неинкасираната част от нея ще бъде освободена от **ВЪЗЛОЖИТЕЛЯ** и върната на **ИЗПЪЛНИТЕЛЯ** в срок до 30 /тридесет/ календарни дни след изтичане на срока на договора, съответно след прекратяването му на друго основание, ако изпълнението е надлежно,освен ако не е усвоена поради неизпълнение.

(2) За срока, през който гаранцията за изпълнение е престояла законосъобразно при **ВЪЗЛОЖИТЕЛЯ**, последният не дължи лихва.

6.4. Гаранционният срок на закупената стока е ..... месеца, считано от датата на подписването на приемно-предавателния протокол за приемането ѝ в склада на **ВЪЗЛОЖИТЕЛЯ** при спазване на указанията за съхранение, монтаж и експлоатация на производителя.

6.5. (1) По всяко време от действието на договора, **ВЪЗЛОЖИТЕЛЯТ** има право да проверява доставената стока, която не е в режим на експлоатация, за наличие на скрити недостатъци. Проверката по предходното изречение се извършва от служители на **ВЪЗЛОЖИТЕЛЯ**, притежаващи съответната техническа компетентност, и се удостоверява със съставянето на констативен протокол. При откриване на скрити недостатъци на доставената стока по реда на настоящата точка, същите се считат за гаранционни дефекти и **ИЗПЪЛНИТЕЛЯТ** е длъжен да ги отстрани в съответствие с гаранционните условия, при условие, че са спазени условията за съхранение на стоката.

(2) За гаранционни дефекти на стоката, освен скритите недостатъци по т. 6.5, ал. 1, се считат и всички дефекти на стоката, които са се проявили по време на експлоатацията ѝ и не са резултат от неправилни действия на **ВЪЗЛОЖИТЕЛЯ** и/или негови служители и са в рамките на гаранционния срок по т. 6.4.

(3) При констатиране на дефекти (неизправности) на стоката в рамките на гаранционния срок, **ВЪЗЛОЖИТЕЛЯТ** е длъжен да уведоми писмено **ИЗПЪЛНИТЕЛЯ** в 10 /десет/ дневен срок от откриването им. В писменото уведомление по предходното изречение **ВЪЗЛОЖИТЕЛЯТ** описва недостатъците (дефектите) на стоката и начинът за отстраняването им. **ИЗПЪЛНИТЕЛЯТ** е длъжен да прегледа уведомлението с констатациите на **ВЪЗЛОЖИТЕЛЯ** за недостатъци (дефекти) на стоката и да го уведоми писмено (по факс или на електронна поща) за това дали приема констатациите - съответно предложеният начин за отстраняване на недостатъците (дефектите) или не ги приема. **ИЗПЪЛНИТЕЛЯТ** следва да изпълни задължението си за уведомяване по предходното изречение в срок до 5 /пет/ работни дни от датата на получаване на уведомлението на **ВЪЗЛОЖИТЕЛЯ** за констатирания дефект на стоката в рамките на гаранционния срок. В случай, че **ИЗПЪЛНИТЕЛЯТ** не уведоми **ВЪЗЛОЖИТЕЛЯ** за решението си по отношение на предявената рекламация в срока по предходното изречение, се счита, че не я приема, вследствие на което **ВЪЗЛОЖИТЕЛЯТ** пристъпва към съставянето на констативен протокол. За съставянето и съдържанието на констативния протокол се прилагат съответно т. 5.2, ал. 2, 3, 4 и 4. При съставянето на констативния протокол страните отчитат уговореното в т. 6.6.

6.6. В рамките на гаранционния срок по т. 6.4, всички разходи по отстраняване на дефекти и/или замяна на стоката с нова, са за сметка на **ИЗПЪЛНИТЕЛЯ**.

6.7. Ако в рамките на гаранционния срок се констатират фабрични дефекти, които не могат да бъдат отстранени от **ИЗПЪЛНИТЕЛЯ** в срок до 15 /петнадесет/ календарни дни от датата, на която неизправната стока му е предадена за ремонт, **ИЗПЪЛНИТЕЛЯТ** е длъжен да замени дефектната стока с нова в срок до 1 (един) месец, считано от изтичането на 15-дневния срок за ремонт на стоката.

7. ОТГОВОРНОСТИ

7.1. При забава за изпълнение на задължения по този договор, с изключение на случаите по т. 8.1 на договора, **ИЗПЪЛНИТЕЛЯТ** дължи на **ВЪЗЛОЖИТЕЛЯ** неустойка в размер на 0,2% за всеки пълен ден забава, но не повече от 10% общо върху стойността на неизпълненото задължение.

7.2. За всеки отделен случай на неизпълнение на задълженията в рамките на гаранционния срок (с изключение на случаите по т. 8.1), **ИЗПЪЛНИТЕЛЯТ** дължи на **ВЪЗЛОЖИТЕЛЯ** неустойка, равна на 10% от стойността на реално доставената, но дефектна (неизправна) стока, по отношение на която е възникнало неизпълненото гаранционно задължение.

7.3. ВЪЗЛОЖИТЕЛЯТ има право да претендира неустойка в размер на 50% от стойността на гаранцията за изпълнение на договора, посочена в т. 6.1, в следните случаи:

(1) при прекратяване на договора по т. 9.1., ал. 2;

(2) при отказ на **ИЗПЪЛНИТЕЛЯ** да изпълни поръчка за доставка при условията на този договор;

(3) при прекратяване на договора по т. 9.1., ал. 3 и ал. 4.

7.4. При забава за плащане, **ВЪЗЛОЖИТЕЛЯТ** дължи на **ИЗПЪЛНИТЕЛЯ** обезщетение в размер на законната лихва за забава (равна на основния лихвен процент (ОЛП), обявен от БНБ, плюс 10%), начислена върху стойността на закъснялото плащане за периода на забавата, като стойността на обезщетението не може да бъде повече от 10% общо от стойността на забавеното плащане.

7.5. Неустойките по настоящия договор се заплащат в срок до 10 (десет) календарни дни, считано от датата на писмената претенция за тях от изправната до неизправната страна. **ВЪЗЛОЖИТЕЛЯТ** има право, ако в определения срок за плащане на дължимата неустойка **ИЗПЪЛНИТЕЛЯТ** не изпълни задължението си, да се удовлетвори за сумата на неустойката от гаранцията за изпълнение на договора в съответствие с т. 6.2 по-горе или да я прихване от следващо дължимо плащане по договора.

7.6. В случай, че не е уговорено друго, неустойките се начисляват върху стойността на закъснялото/неизпълнено задължение без ДДС.

7.7. В случаите, когато посочените по-горе неустойки не покриват действителния размер на претърпените от **ВЪЗЛОЖИТЕЛЯ** вреди, той може да търси от **ИЗПЪЛНИТЕЛЯ** по съдебен ред разликата до пълния размер на претърпените вреди и пропуснатите ползи.

7.8. В случай, че **ИЗПЪЛНИТЕЛЯТ** не изпълни задължението си да изпрати на **ВЪЗЛОЖИТЕЛЯ** оригинален екземпляр от договор за подизпълнение/допълнително споразумение към договор за подизпълнение по т. 4.10 и/или 4.14 от настоящия договор в срок до **три дни** от датата на сключване на договора, съответно споразумението към него, то той дължи на **ВЪЗЛОЖИТЕЛЯ** неустойка в размер на 2 000.00 лева.

7.9. При нарушаване на задължение по раздел 11 по-долу, виновната страна дължи на изправната страна неустойка за всеки конкретен случай на нарушение в размер на **50%** от гаранцията за изпълнение, заедно с обезщетяване на всички вреди над сумата на неустойката, настъпили вследствие нарушаване на задълженията по раздел 11 от договора.

8. НЕПРЕОДОЛИМА СИЛА ИЛИ НЕПРЕДВИДИМИ СЪБИТИЯ

8.1 В случаи на непреодолима сила по смисъла на чл. 306 от Търговския закон или на непредвидими събития и доколкото тези събития се отразяват върху изпълнението на задълженията на двете страни по договора, сроковете за изпълнение трябва да бъдат удължени за времето, през което е траела непреодолимата сила или непредвидимите събития. Страните се споразумяват за непредвидими събития да се считат издадени или изменени нормативни или ненормативни актове на държавни или общински органи, настъпили по време на изпълнение на договора, които се отразяват на изпълнението на задълженията, на която и да е от страните.

8.2 Двете страни трябва взаимно да се уведомяват писмено за началото и края на тези събития, както следва:

8.2.1. за непреодолимата сила известието трябва да бъде потвърдено от Търговската камара на страната, в която е настъпило, и да бъде изпратено на другата страна до 14 (четиринадесет) дни след започването му.

8.2.2. за непредвидимите събития – в 14-дневен срок от издаването или изменението на нормативен или ненормативн акт на държавен или общински орган.

8.3 В случай на непреодолима сила или непредвидимо събитие в страната на **ИЗПЪЛНИТЕЛЯ** и/или **ВЪЗЛОЖИТЕЛЯ** и ако то доведе до закъснение в изпълнението на задълженията на някоя от страните за повече от 1 (един) месец, всяка от страните има право да прекрати договора по т. 9.3.

9. РАЗВАЛЯНЕ И ПРЕКРАТЯВАНЕ НА ДОГОВОРА

9.1. ВЪЗЛОЖИТЕЛЯТ има право:

(1) да развали договора в случаите на т. 4.5. от договора;

(2) да прекрати договора с 10-дневно писмено предизвестие отправено до **ИЗПЪЛНИТЕЛЯ** при забава на **ИЗПЪЛНИТЕЛЯ** с повече от 30 дни, без да са налице обстоятелствата по т. 8.1, като в този случай **ВЪЗЛОЖИТЕЛЯТ** има право на неустойката по т. 7.3., ал. 1;

(3) да прекрати договора с 30-дневно писмено предизвестие до **ИЗПЪЛНИТЕЛЯ**, при повторна доставка на партида дефектна стока или на стока, неотговаряща на изискванията на **ВЪЗЛОЖИТЕЛЯ**, посочени в договора и в приложенията към него, когато това обстоятелство е установено по реда на точка 5.2. от настоящия договор, като в този случай **ИЗПЪЛНИТЕЛЯТ** дължи неустойката по т. 7.3., ал. 3. Настоящата клауза се прилага и в случаите, когато:

а) двете доставени партиди дефектна стока и/или стока, неотговаряща на изискванията на **ВЪЗЛОЖИТЕЛЯ**, не са поредни;

б) в рамките на срока на договора е установено един или повече пъти по реда на т. 6.5. и един или повече пъти по реда на т. 5.2. (кумулативно), че доставена стока е дефектна и/или не отговаря на изискванията на **ВЪЗЛОЖИТЕЛЯ**, посочени в договора и в приложенията към него.

(4) да прекрати договора без предизвестие, в случай, че по реда на т. 6.5 към **ИЗПЪЛНИТЕЛЯ** са отправяни три или повече претенции (които не е задължително да са последователни) за гаранционни дефекти на доставената стока, дори същите да са били отстранени. В този случай **ИЗПЪЛНИТЕЛЯТ** дължи неустойката по т. 7.3., ал. (3).

9.2. Настоящият договор може да се прекратява по взаимно писмено съгласие по всяко време, като двете страни уреждат взаимоотношенията си до момента на прекратяването.

9.3. В случаите на т. 8.3., всяка от страните има право да прекрати договора с 10-дневно писмено предизвестие до другата страна.
9.4. Договорът се прекратява и в следните случаи:
(1) по т. 2.3; и
(2) по т. 3.1.
9.5. Извън хипотезите по предходните точки, настоящият договор се прекратява или разваля и на следните основания:
(1) в изрично посочените случаи в рамковото споразумение, които не се съдържат в настоящия договор;
(2) на общо основание при условията и по реда на чл. 87 от Закона за задълженията и договорите (ЗЗД);
(3) при разваляне или прекратяване на рамковото споразумение, въз основа на което се сключва настоящия договор, като направените поръчки до момента на прекратяването съответно развалянето се довършват и заплащат при условията на договора.

10. РЕШАВАНЕ НА СПОРОВЕ

10.1. Всички спорове, възникнали във връзка с тълкуването и/или изпълнението на договора, се решават чрез преговори и постигане на взаимно изгодни договорености, материализирани в писмена форма за валидност.
10.2. Всички спорове, породени от този договор или отнасящи се до него, включително споровете, породени или отнасящи се до неговото тълкуване, недействителност, изпълнение или прекратяване, както и споровете за попълване празноти в него или приспособяването му към нововъзникнали обстоятелства, за които не е постигнато съгласие по реда на предходната точка, ще бъдат разрешавани по общия гражданскоправен ред, от компетентния съд в Република България със седалище в гр. София.
10.3. Отнасянето на спора за решаване от компетентния съд не ще се счита за причина за спирането на изпълнението на други задължения по настоящия договор, които нямат отношение към предмета на спора.
10.4. Решение от компетентен съд или изменение на законодателството, което прави някое от условията на този договор невалидно, недействително или неизпълнимо, ще се отнася само до това условие и няма да прави целия договор или някакво друго условие от него невалиден, недействителен или неизпълним и всички други условия на договора ще останат в пълна сила и ефект, така както са уговорени от страните. Страните поемат задължението да положат всички усилия, за да се договорят за заместващо условие на невалидното, недействителното или неизпълнимото условие с валидно, действително и изпълнимо условие, което най-близко отразява целта на невалидното, недействителното или неизпълнимото условие.

11. КОНФИДЕНЦИАЛНОСТ

11.1. Страните се задължават да пазят и да не допускат разпространяването на информацията определена за конфиденциална, получена от всяка от страните по повод сключването или по време на срока на действие на този договор, както и да използват тази информация единствено за целите на изпълнението. Страните ще считат за конфиденциална информацията съдържаща се в договора и информацията във връзка с начина на изпълнението му, както и всяка информация която се съдържа на хартиен или магнитен носител и е създадена или предоставена на някоя от страните във връзка с изпълнението на договора. Конфиденциална е и всяка информация, която е станала достъпна на някоя от страните по повод изпълнението на договора и която представлява ноу-хау, схеми на складове съответно схеми за достъп и охрана или фирмена тайна на другата страна, или която е определена изрично при предоставянето ѝ от съответната страна за конфиденциална. Конфиденциална е и информацията свързана с лични данни, станали известни на някоя от страните във връзка със сключването или изпълнението на договора.
11.2. Страните се съгласяват, че въпреки прекратяването на този договор поради каквато и да е причина, клаузите свързани с конфиденциалност, ще са в сила и задълженията във връзка с тях ще бъдат валидни за период от 2 (две) години след прекратяване на договора.
11.3. Клаузите за конфиденциалност не се прилагат когато някоя от страните е длъжна да предостави информация по договора на компетентен държавен орган, който е поискал тази информация във връзка с правомощията му по закон. При предоставяне на информация по тази точка, страната която я дава е длъжна незабавно да уведоми писмено другата страна.

12. ЗАКЛЮЧИТЕЛНИ РАЗПОРЕДБИ

12.1. Договорът влиза в сила считано от датата на подписването му от страните.
12.2. (1) При празноти в настоящия конкретен договор, сключен въз основа на рамково споразумение, субсидиарно ще се прилага уговореното в рамковото споразумение, доколкото то не противоречи на смисъла и съдържанието на настоящия конкретния договор.

(2) При противоречие на уговореното в рамковото споразумение и приложенията към него с уговореното в конкретния договор (и приложенията към него), сключен въз основа на настоящото рамково споразумение, с предимство ще се ползва и прилага уговореното в настоящия конкретен договор за обществена поръчка.

12.3. По отношение на този договор и за неуредените в него въпроси е приложимо действащото в Република България законодателство.

12.4. Всички съобщения и уведомления на страните по настоящия договор ще се извършват само в писмена форма, като условие за действителност. Тази форма ще се счита за спазена, ако съобщението е изпратено по e-mail или факс, доколкото съществува техническа възможност за установяване на момента на получаване на съобщението/уведомлението чрез генериране на известие за доставяне от техническото средство на изпращане.

12.5. (1) При преобразуване на изпълнителя в съответствие със законодателството на държавата, в която е установен, настоящият договор остава в сила, ако са налице едновременно следните условия:

1. Правоприемникът сключи договор за продължаване на настоящия договор за изпълнение;
2. Договорът за продължаване не променя настоящия договор за изпълнение;
3. Правоприемникът отговаря на условията на чл. 43, ал. 7 изречение второ от ЗОП.

(2) Ако правоприемникът не отговаря на предходната ал. 1, т. 3, настоящият договор се прекратява по право, като **ИЗПЪЛНИТЕЛЯТ**, съответно правоприемникът дължи обезщетение по общия исков ред.

12.6. Неразделна част от настоящия договор са следните приложения:

Приложение 1: Стока и цени;
Приложение 2: Количества със срокове за доставка и опаковка
Приложение 3: Образец на приемно-предавателен протокол
Приложение 4: Придружаващи доставката документи

Договорът е изготвен в два еднообразни екземпляра на български език – по един за всяка от страните, които след като се запознаха със съдържанието му и го приеха го подписаха, както следва:

ВЪЗЛОЖИТЕЛ : **ИЗПЪЛНИТЕЛ:**

Приложение 3 към договора

ДОСТАВЧИК	ПРИЕМО-ПРЕДАВАТЕЛЕН ПРОТОКОЛ
Договор № **……/……г**	**ПОЛУЧАТЕЛ:** **Централен склад -**
РО №……	**Дата на предаване на стоката:**

Днес, ……г., беше извършено предаване и приемане на следните материали:

SAP № на стоката	Наименование на стоката	Количество, бр.

Име на куриерската фирма, извършила доставката	
Транспортно средство – камион *(посочва се регистрационния номер)*	
Придружаващи доставката документи	Декларация за съответствие
	Опаковъчен лист, изготвен съгласно т.х на Договора
	Изисквания за транспортиране, съхранение и манипулиране
	Комплект документи за Дирекция „Логистика и бизнес обслужване“
Забележка *(попълва се при необходимост)*	

Предал:

……
(име и фамилия)

……
(длъжност)

(подпис)

Приел:

……
(име и фамилия)

……
(длъжност)

(подпис)

Приложение 4 към договора.....

ПРИДРУЖАВАЩИ ДОСТАВКАТА ДОКУМЕНТИ

1.1. **ИЗПЪЛНИТЕЛЯТ** е длъжен да достави стоката с два комплекта документи, единият от които трябва да съдържа:

1.1.1. **Приемо-предавателен протокол**, в три еднообразни екземпляри.

1.1.2. **Декларация за съответствие**, издадена от производител, която задължително да съдържа следната информация:

1.1.2.1. Име и адрес на производителя.

1.1.2.2. Име и адрес на упълномощения представител на производителя, ако има такъв.

1.1.2.3. Пълно наименование на стоката.

1.1.2.4. Директива(и).

1.1.2.5. Стандарт(и).

1.1.2.6. Дата и място на изготвяне на Декларацията за съответствие.

1.1.2.7. Име и фамилия на лицето, изготвило Декларацията за съответствие.

1.1.2.8. Подпис на лицето, изготвило Декларацията за съответствие.

1.1.2.9. Печат на производителя.

1.1.3.Протоколи от контрол на характеристики на конкретното електро защитно средство;

1.1.4.Инструкция за употреба на български език съгласно НСИОСЛПС, включително изисквания за правилно поддържане и използване и изисквания за периодичност на необходимите контролни изпитвания по време на експлоатация.

1.1.5.Инструкцията за употреба трябва да е изчерпателна и разбираема и да съдържа името и адреса на производителя и/или на неговия упълномощен представител, както и необходимата информация за:

- съхраняване, употреба, почистване, поддържане, обслужване и дезинфекция;
- препаратите за почистване, поддържане и дезинфекция, препоръчани от производителя, които не трябва да имат вреден ефект върху ЛПС и върху ползвателя, когато са приложени според указанията;
- резултати от изпитвания, доказващи класовете на защита, осигурявани от ЛПС;
- принадлежностите към ЛПС и характеристиките на резервните части;
- класовете на защита, съответстващи на различните нива на риска, и съответните ограничения за използване;
- крайната дата или периода на годност на ЛПС или на някои от неговите съставни части;
- подходящата опаковка за транспортиране на ЛПС;
- значението на използваните маркировки;

1.1.6. Маркировка:

1.1.6.1.Съгласно Наредбата за съществените изисквания и оценяване на съответствието на ЛПС, приета на основание чл.7, ал.1 от ЗТИП - върху опаковката трябва да има маркировка с информация най-малко за:

- име на производителя;
- маркировка за съответствие;
- дата на производство;
- хармонизиран европейски стандарт, на който ЛПС отговаря.

Приложение 4 към рамково споразумение

Срокове на доставка и опаковка

№	Съкратено наименование на материала съгласно технически стандарт	Минимален размер на партида, бр.	Количество със срок на доставка до 30 кал. дни
1	2	3	4
1	Преносими заземители за НН за въздушна мрежа с неизолирани проводници – със заземителен кабел и кабел за свързване на късо(гъвкави медни въжета)-35mm²;	1	1
2	Преносими заземители за НН за кабелни разпределителни шкафове /касети/– със заземителен кабел и кабел за свързване на късо(гъвкави медни въжета) -50mm²;	1	1
3	Преносими заземители за Ср.НН за въздушна мрежа с неизолирани проводници – със заземителен кабел и кабел за свързване на късо(гъвкави медни въжета)-- 35mm²;	1	1
4	Преносими заземители за Ср.НН за шини за ЗРУ Ср.Н – със заземителен кабел и кабел за свързване на късо(гъвкави медни въжета)- 50mm²;	1	1
5	Преносими заземители за ВН.НН за шини за уредби 110kV – със заземителен кабел и кабел за свързване на късо(гъвкави медни въжета)-- 95mm²;	1	1