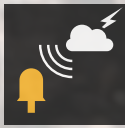


# EARTHING





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## > IMPORTANCE OF A SUITABLE EARTHING

A well designed earthing system is basic for any electrical installation to avoid the danger associated with fault currents, as established in the main earthing standards:

Spain: RBT2002 “Low Voltage Electrotechnical Regulation”. ITC-18 “Earthing systems”.

Great Britain: BS 7430 “Code of practice for Earthing”.

France: NF C 15-100 “Low Voltage Electrical Installations”.

Germany: DIN VDE 0100 Part 540 “Earthing arrangements, protective conductors, equipotential bonding conductors”

USA: UL 467 “Grounding and bonding equipment”.

### ✓ A LOW VOLTAGE EARTH TERMINATION SYSTEM IS AIMED AT:

- > Provide security for persons by limiting the touch voltage.
- > Protect installations and equipment by providing a low impedance path.
- > Improve the quality of the signal by minimizing the electromagnetic noise.
- > Fix a reference voltage for the system equipotentialization.

A low earth resistance is essential for obtaining an efficient earthing. Conductors with an accurate section should be used in order to carry the expected current. Besides, they must be durable against corrosion.

The electrical resistance of the earthing system should be measured isolated from any other conductive element. Therefore, it is necessary to use disconnectors to separate the earthing from the rest of the installation during the measuring process.

### ✓ OTHER DETERMINING FACTORS WHEN DESIGNING AN EARTHING SYSTEM INCLUDE:

- > The resistance should be measured regularly so it is necessary to place an inspection pit.
- > The soil humidity will reduce the earthing resistance.
- > Earthing enhancing compounds reduce the soil resistivity.
- > Buried electricity and gas installations should be known in order to respect the security distances for each case.
- > Buried pipes and water tanks should be known in order to bond them equipotentially with the earth termination.

To obtain a suitable earth resistance in earthing systems, special electrodes should be used for low-conductivity soils, enhanced electrodes, deep electrodes or ring conductors should be used in order to obtain a suitable earth resistance.

## > SPECIFIC CONSIDERATIONS FOR LIGHTNING PROTECTION

Particularly, the earth termination system is essential for lightning protection, since the lightning current should disperse there. Each down-conductor must have an earthing system, formed by conductive elements in contact with the soil that are able to disperse the lightning current in it.



In order to accomplish with these requirements, standards set as a first specification that the resistance of the LPS earthing should be lower than 10 Ω. On the other hand, it should be noticed that lightning current is an impulse and therefore it is not advisable to use a single, very long element. The employ of deep electrodes is interesting if the resistivity is very high at surface but there are lower layers with much more humidity. Triangle or ‘goose foot’ configurations are suitable for a good lightning current dispersion.

These considerations for improving the impedance should be taken into account when the earthing is made, since normally the measurements are taken afterwards with a conventional earth meter which only measures the earthing resistance, that is, its performance if current were continuous. A high inductance would not be measured by these earth meters and, in any case, it would be a significant obstacle for the passing current if it was an impulse, such as in the case of lightning.

In general, it is advisable to bond the lightning protection earth system with those of the installation in order to avoid surges and dangerous step voltages.

## > REGULATIONS

All the earthing materials manufactured by Aplicaciones Tecnológicas comply with the earthing and lightning protection standards. The minimum dimensions specified in these standards are the following:

### > EARTHING

**RBT ITC-18. Technical Guide for implementing Technical Instruction 18 (earthing systems) of the Spanish Low Voltage Electrotechnical Regulations.**

Type of electrode	Material	Minimum dimensions
Earth rod (*)	Copperbond steel (250 $\mu$ )	$\varnothing$ 14.2 mm
Earth rod	Galvanized steel (78 $\mu$ )	$\varnothing$ 20 mm
Solid plate	Electrolytic copper	1000 x 500 x 2 mm
Solid plate	Galvanized steel (78 $\mu$ )	1000 x 500 x 3 mm
Cable	Electrolytic copper	35 mm <sup>2</sup>

**BS 7430. Code of practice for Earthing.**

Type of electrode	Material	Minimum dimensions
Earth rod	Copperbond steel (250 $\mu$ )	$\varnothing$ 14 mm x 1.2 m
Earth rod	Electrolytic copper	$\varnothing$ 14 mm x 1.2 m
Earth rod	Stainless steel	$\varnothing$ 16 mm x 1,2 m
Earth rod	Galvanized steel	$\varnothing$ 14 mm x 1.2 m
Tape	Electrolytic copper	25 x 3 mm
Round	Electrolytic copper	$\varnothing$ 8 mm
Cable	Electrolytic copper	50 mm <sup>2</sup>

**NF C 15-100. Low voltage electrical installations.**

Type of electrode	Material	Minimum dimensions
Earth rod	Copperbond steel	$\varnothing$ 15 mm x 2 m
Earth rod	Galvanized steel	$\varnothing$ 25 mm x 2 m
Cable	Electrolytic copper	25 mm <sup>2</sup>
Cable	Galvanized steel	95 mm <sup>2</sup>

**UL 467. Grounding and bonding equipment.**

Type of electrode	Material	Minimum dimensions
Earth rod	Copperbond steel (250 $\mu$ )	$\varnothing$ 12.7 mm x 2.4 m
Earth rod	Stainless steel	$\varnothing$ 12.7 mm x 2.4 m
Earth rod	Electrolytic copper	$\varnothing$ 12.7 mm x 2.4 m
Tubular earth rod	Electrolytic copper	$\varnothing_{ext}$ 54 mm x 2.4 m

(\*) The minimum thickness of the copper coating the copperbond steel earth rods, as recommended by standard UNE 202006, is 100  $\mu$ . Nevertheless, the minimum measure of 250  $\mu$  given by the regulation of low voltage is of compulsory compliance.

### > LIGHTNING PROTECTION EARTHING

**IEC 62305 / EN 62305 / IEC 62561 (EN 50164 before). Protection against lightning.**

Type of electrode	Material	Minimum dimensions
Earth rod	Copperbond steel (250 $\mu$ )	$\varnothing$ 14 mm
Earth rod	Stainless steel	$\varnothing$ 15 mm
Earth rod	Electrolytic copper	$\varnothing$ 15 mm
Earth rod	Galvanized steel	$\varnothing$ 14 mm
Cross profile earth rod	Galvanized steel	50 x 50 x 3 mm
Tubular earth rod	Electrolytic copper	$\varnothing_{ext}$ 20 mm
Solid plate	Electrolytic copper	500 x 500 x 1.5 mm
Solid plate	Galvanized steel	500 x 500 x 3 mm
Cable	Electrolytic copper	50 mm <sup>2</sup> ( $\varnothing$ 1.7 mm each wire)
Tape	Electrolytic copper	50 mm <sup>2</sup> (min. thickness 2 mm)
Tape	Stainless steel	100 mm <sup>2</sup> (min. thickness 2 mm)
Tape	Galvanized steel	90 mm <sup>2</sup> (min. thickness 3 mm)
Round	Electrolytic copper	$\varnothing$ 8 mm
Round	Copperbond steel (250 $\mu$ )	$\varnothing$ 8 mm
Round	Stainless steel	$\varnothing$ 10 mm
Round	Galvanized steel	$\varnothing$ 10 mm

**BS 6651. Code of practice for protecting structures against lightning.**

Type of electrode	Material	Minimum dimensions
Earth rod	Copperbond steel (250 $\mu$ )	$\varnothing$ 14 mm
Earth rod	Stainless steel	$\varnothing$ 12 mm
Earth rod	Electrolytic copper	$\varnothing$ 12 mm
Earth rod	Galvanized steel	$\varnothing$ 14 mm
Tape	Electrolytic copper	20 x 2.5 mm
Tape	Galvanized steel	20 x 2.5 mm
Round	Electrolytic copper	$\varnothing$ 8 mm
Round	Galvanized steel	$\varnothing$ 8 mm

**NFPA 780.**

**Standard for the installation of lightning protection systems.**

Type of electrode	Material	Minimum dimensions
Earth rod	Copperbond steel	$\varnothing$ 12.7 mm x 2.4 m
Earth rod	Stainless steel	$\varnothing$ 12.7 mm x 2.4 m
Earth rod	Electrolytic copper	$\varnothing$ 12.7 mm x 2.4 m
Earth rod	Galvanized steel	$\varnothing$ 12.7 mm x 2.4 m
Solid plate	Electrolytic copper	600 x 300 x 0.8 mm
Solid plate	Galvanized steel	600 x 300 x 0.8 mm



> ENHANCED ELECTRODES FOR LOW-CONDUCTIVITY SOILS

### 133 > APLIROD® DYNAMIC ELECTRODE

A lack of free ions in the surrounding ground is detrimental to the correct performance of the earthing. Earthing systems using dynamic electrodes are based on the contribution of ions to the ground.

The system mainly consists of a copper electrode (**APLIROD®**) filled with a mixture of ionic compounds. The moisture condenser absorbs environmental moisture and dissipates it in the soil surrounding the electrode, adding free ions and gradually lowering the resistivity of the soil.

The effectiveness of this earth electrode is improved by placing a ground conductivity improver, such as **CONDUCTIVER PLUS** (AT-010L) around the electrode.

Soil resistivity and site characteristics are the main factors to be considered when determining the electrode model to use. Where the soil shows a lack of ion presence or the material that may be affected by lightning is extremely sensitive, longer electrodes, several earthing systems, or a combination of both, should be used.

The most appropriate configuration in most cases is a triangular arrangement. Vertical shapes are good to obtain low earth resistance values. L-shape models are better when you cannot make a deep excavation.

#### INSTALLATION

1. For vertical electrodes, bore a 25 x 25 cm hole x 25 cm in diameter (for the earth pit), and within this another Ø40 mm hole for the Ø28 mm electrodes or Ø75 mm for the Ø54 mm electrodes, with an approximate depth of 10 cm less than the length of the electrode. For the horizontal or L-shape electrodes, bore a trench suitable for the size of the electrode.
2. Remove the covers of the leach holes.
3. Place the electrode in the hole.
4. Fill the hole with the conductive compound **APLIFILL** supplied together with the electrode, mixing it with water outside the excavation and gradually fill it using 1 kilo of **APLIFILL** for every 4 litres of water.
5. Place the earth pit so that the cover remains at surface level. The electrode will hang out by approximately 10 cm over the bottom of the earth pit, leaving the breather holes uncovered.
6. Remove the covers of the upper breather holes.
7. Connect the grounding electrode to the test bonding bar.
8. More electrodes should be placed at regular intervals, interconnected with bare copper cable and buried at least 0.5 m deep. It is advisable to cover the conductor with **APLIFILL**.

APLIROD® APPLICATION



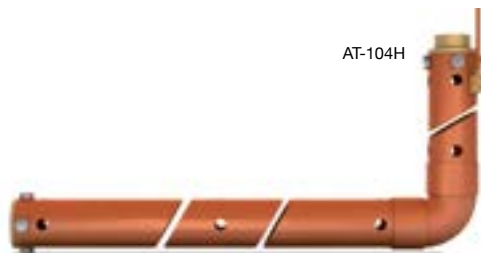
Reference	Dimensions (mm)	Shape	Includes	Material	Weight (kg)
AT-024H	Ø28 x 2000	Vertical	AT-020F + AT-031L	Copper + Salts	4.0
AT-025H	Ø28 x 2500	Vertical	AT-020F + AT-031L	Copper + Salts	4.5
AT-012H	Ø54 x (1000 + 2000)	Horizontal (L-shape)	AT-020F + 2 x AT-032L	Copper + Salts	62.5
AT-030H	Ø54 x (1000 + 3000)	Horizontal (L-shape)	AT-020F + 2 x AT-032L	Copper + Salts	67.0
AT-111H	Ø54 x 2500 (threaded)	Vertical	AT-020F + AT-032L	Copper + Salts	35.0
AT-102H	Ø28 x 2000	Vertical	50 mm <sup>2</sup> welded cable + AT-031L	Copper + Salts	4.0
AT-103H	Ø28 x 2500	Vertical	50 mm <sup>2</sup> welded cable + AT-031L	Copper + Salts	4.5
AT-108H	Ø54 x (1000 + 2000)	Horizontal (L-shape)	50 mm <sup>2</sup> welded cable + 2 x AT-032L	Copper + Salts	62.5
AT-104H	Ø54 x (1000 + 3000)	Horizontal (L-shape)	50 mm <sup>2</sup> welded cable + 2 x AT-032L	Copper + Salts	67.0
AT-112H	Ø54 x 2500 (threaded)	Vertical	50 mm <sup>2</sup> welded cable + AT-032L	Copper + Salts	35.0
AT-035H	Ø220 x 190		Load required for APLIROD®	Salts	5.5

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102

> ENHANCED ELECTRODES FOR LOW-CONDUCTIVITY SOILS



APLIROD® (application)



Moisture  
condenser

Leach holes

Ionic mixture





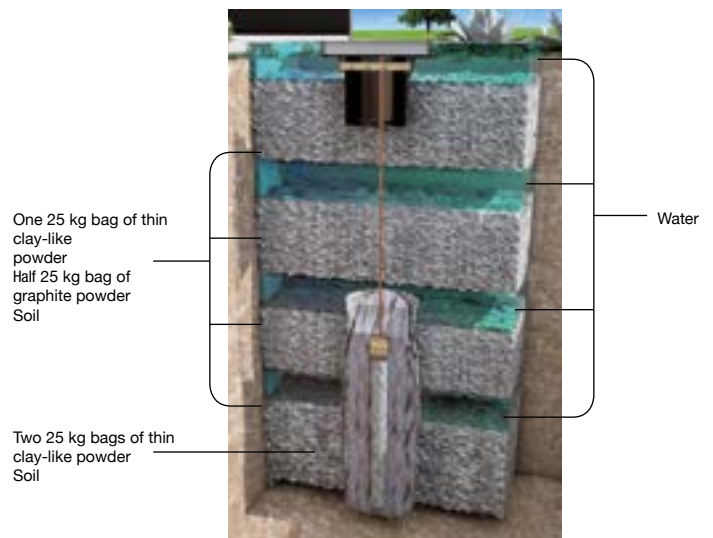
> ENHANCED ELECTRODES FOR LOW-CONDUCTIVITY SOILS

134 > GRAPHITE ELECTRODE

The fact that graphite exhibits high electrical and thermal conductivity and is unassailable and inert to chemical agents (apart from oxygen at a high temperature), makes it a very suitable element for building an earth electrode. The materials used as filling (graphite powder and thin clay-like powder) ensure contact between the electrode and the ground thanks to its capacity to penetrate even cracks in rocks.

Reference	Dimensions (mm)	Shape	Includes	Weight (kg)
AT-070H	Ø150 x 600	Rigid graphite core wrapped in ground enhancing product	AT-028F	10
AT-073H	Ø50 x 1500	Rigid graphite core	AT-028F + AT-032L	35

AT-070H



APPLICATION AT-070H

INSTALLATION

The reference AT-070H consists of a rigid graphite core surrounded by a layer of graphite powder and salts, which whilst helping to avoid mechanical damage during transportation and installation, also improves the conductivity of the electrode. This ensemble is placed into the perforation, which connects to the test bonding bar placed in the earth pit using Ø8-10 mm cable or 30 x 2 mm tape.

In order to optimize its duration and effectiveness, the hole should be filled with a thin clay-like powder and special graphite powder for earthing systems:

Ø200 mm borehole

Machinery needed:

- > Drill with Ø200 mm drill bit at least 2 m long.
- > Mixer (recommended)

Material:

- > 2 kg of graphite powder (AT-020L).
- > 6 kg of thin clay-like powder (AT-030L).

Procedure:

1. Make a Ø200 mm borehole with a depth of at least 2 m
2. Connect the necessary length of the Ø8-10 mm cable or the 30 x 2 mm tape to the electrode to be able to subsequently make the connections in the earth pit.
3. In an appropriate container (preferably a mixer), mix the fine clay-like powder (AT-030L) and the graphite powder (AT-020L) with 60 litres of water.  
Note: If a mixer or appropriate tool is not available, the borehole may be filled in batches. For example, the borehole may be filled in four stages, each time using approximately 15 litres of water, 1.5 kg of thin clay-like powder and 0.5 kg of graphite powder.
4. Empty the mixture into the borehole, making sure it reaches the bottom.
5. Place the electrode with the wrapping in the borehole, taking care not to knock it.
6. Carry out the necessary connections in the test bonding bar installed in the earth pit and close it.

1.5 x 1.5 x 2 meter hole

Machinery needed:

- > Backhoe

Material:

- > Two 25 kg bags of graphite powder (AT-020L)
- > Six 25 kg bags of thin clay-like powder (AT-030L)
- > Plenty of water

Procedure:

1. Using the backhoe, dig a hole 1.5 m wide and 2 m deep.
2. Mix two bags of thin clay-like powder (AT-030L) and enough earth to sufficiently cover approximately 30 cm of the hole. Fill the bottom of the excavation.
3. Connect the necessary meters of Ø8-10 mm cable or 30 x 2 mm tape to the electrode in order to be able to subsequently carry out the connections in the earth pit.
4. Place the electrode with the wrapping in the borehole, taking care not to knock it.
5. Cover with water until you reach a level of 10 cm (approximately 225 litres of water). Wait a few minutes for the water to filter and the increase in volume of the thin clay-like powder.
6. Continue filling the hole by mixing a bag of thin clay-like powder, half a bag of graphite powder and enough soil to fill another 30 cm in height Empty the mixture into the hole and spread evenly.
7. Repeat steps 5 and 6 until you have used up the thin clay-like powder and the graphite powder.
8. Carry out the necessary connections in the test bonding bar installed in the earth pit and close it.

## > EARTH ELECTRODES, GROUND ENHANCING PRODUCTS AND EARTH PITS

### 135 > 254 μm COPPERBOND EARTH RODS

Aplicaciones Tecnológicas, S.A. uses copperbond earth rods of a high quality which comply with even the most demanding regulations in order to achieve long-lasting earthing. All these earth rods are electrolytically coated with copper which is 254 μm thick and 99.9% pure, with a proven resistance to corrosion. This type of electrolytic coating prevents cracks or fissures, which may be caused in the outer layer of the earth rods with mechanical coating.

Numerous regulations specify that the copper coating on the copperbond earth electrodes should be at least 250 μm:

- > BS 7430: Implementation guide for earthing systems (Great Britain)
- > UL 467: Grounding and bonding equipment (United States)
- > Section 250 of National Electrical Code (NEC) (United States)
- > Technical Guide for implementing no. 18 of the Spanish Low Voltage Electrotechnical Regulations
- > IEC 62305-3 (international lightning protection standard)
- > EN 50164 (IEC 62561-2 (international standard on components of lightning protection systems))

Using the appropriate accessories, threaded copperbond earth rods enable the electrode to extend in order to obtain better earth resistances.

Reference	Dimensions (mm)	Ø minimum (mm)	Shape	Weight (kg)
AT-076H	Ø16 x 1200	14.23	Two 5/8" threads	1.50
AT-077H	Ø16 x 1500	14.23	Two 5/8" threads	1.90
AT-078H	Ø16 x 1800	14.23	Two 5/8" threads	2.28
AT-041H	Ø16 x 2000	14.23	Two 5/8" threads	2.53
AT-016H	Ø16 x 2400	14.23	Two 5/8" threads	3.00
AT-098H	Ø16 x 3000	14.23	Two 5/8" threads	3.80
AT-069H	Ø14,23 x 1200	14.23	No thread	1.50
AT-071H	Ø14,23 x 1500	14.23	No thread	1.90
AT-053H	Ø14,23 x 1800	14.23	No thread	2.28
AT-072H	Ø14,23 x 2000	14.23	No thread	2.53
AT-026H	Ø14,23 x 2400	14.23	No thread	3.00
AT-043H	Ø14,23 x 3000	14.23	No thread	3.80
AT-086H	Ø19 x 1200	17.28	Two 3/4" threads	2.15
AT-087H	Ø19 x 1500	17.28	Two 3/4" threads	2.75
AT-017H	Ø19 x 1800	17.28	Two 3/4" threads	3.27
AT-042H	Ø19 x 2000	17.28	Two 3/4" threads	3.62
AT-018H	Ø19 x 2400	17.28	Two 3/4" threads	4.35
AT-019H	Ø19 x 3000	17.28	Two 3/4" threads	5.44
AT-079H	Ø17,28 x 1200	17.28	No thread	2.15
AT-081H	Ø17,28 x 1500	17.28	No thread	2.75
AT-027H	Ø17,28 x 1800	17.28	No thread	3.27
AT-082H	Ø17,28 x 2000	17.28	No thread	3.62
AT-028H	Ø17,28 x 2400	17.28	No thread	4.35
AT-029H	Ø17,28 x 3000	17.28	No thread	5.44

Complies with BS 7430, UL 467, IEC 62305, EN 50164 (IEC 62561), NFPA 780, UNE 21186, NF C 17-102

Other copper thickness also available. Please contact us.

### > ACCESSORIES FOR COPPERBOND EARTH RODS

Reference	Denomination	Dim. (mm)	Material	Weight(g)
AT-002K	5/8" threaded coupling (Ø16 mm)	Ø19 x 70	Gunmetal	124
AT-003K	5/8" threaded driving stud (Ø16 mm)	54 x 22	Stainless steel	60
AT-004K	Threaded clamp 3/4" (Ø19 mm)	Ø24 x 70	Gunmetal	192
AT-005K	Threaded driving stud 3/4" (Ø19 mm)	54 x 25	Stainless steel	130

Complies with EN 50164 (IEC 62562), BS EN 1982

### INSTALLATION

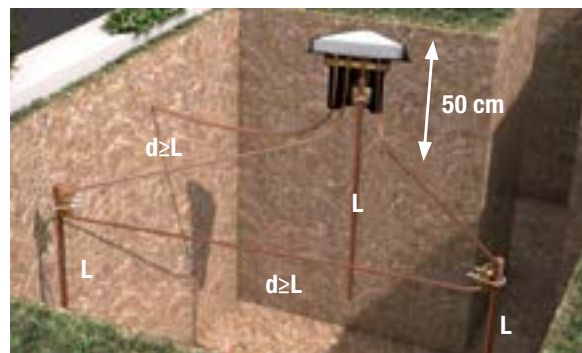
The electrodes should be placed at a depth of at least 50 cm.

It is preferable to use several conductors conveniently spread out rather than one very long conductor. In the case of an earthing system made up of various interconnected electrodes, it is recommended that:

- > The buried earth rods must be placed in a triangle or line and spaced out at a distance of at least that of their buried depth.
- > The buried earth rods are connected by an identical or compatible conductor to the one used for the down-conductor.
- > The conductor joining the earth rod should be buried at a depth of at least 50 cm.
- > Apply the ground enhancing product CONDUCTIVER PLUS (AT-010L) to the buried electrodes in order to obtain a lower earth resistance.



APPLICATION AT-041H







> EARTH ELECTRODES, GROUND ENHANCING PRODUCTS AND EARTH PITS

136 > SOLID COPPER EARTH RODS



AT-031H

Solid copper rods enable long-lasting earthing in ground with high corrosion levels. Threaded electrodes with the correct accessories enable the length to be increased, thus achieving a better earth resistance.

Reference	Dimensions (mm)	Shape	Weight (kg)
AT-031H	Ø15 x 1200	M10 internal thread	1.63
AT-036H	Ø20 x 1200	M16 internal thread	3.35

Complies with BS 7430, UL 467, IEC 62305, EN 50164 (IEC 62561), NFPA 780, UNE 21186, NF C 17-102



APPLICATION AT-031H

137 > STAINLESS STEEL EARTH RODS



AT-080H



AT-038H

Stainless steel earth rods enable long-lasting earthing in ground with high corrosion levels. Threaded electrodes with the correct accessories enable the length to be increased, thus achieving a better earth resistance.

Reference	Dimensions (mm)	Shape	Weight (kg)
AT-000H	Ø10 x 1500	No thread	1.50
AT-099H	Ø16 x 1000	No thread	1.60
AT-100H	Ø16 x 1500	No thread	2.20
AT-080H	Ø16 x 2000	No thread	3.33
AT-038H	Ø20 x 1500	Extendible type Z	3.75
AT-037H	Ø16 x 1200	M10 internal thread	1.65

Complies with BS 7430, UL 467, IEC 62305, EN 50164 (IEC 62561), NFPA 780, UNE 21186, NF C 17-102



AT-037H



APPLICATION AT-038H

138 > ACCESSORIES FOR SOLID COPPER AND STAINLESS STEEL EARTH RODS



AT-006K

AT-008K

AT-007K

AT-067K

Reference	Denomination	Dimensions (mm)	Material	Weight (g)
AT-006K	15/16 mm driving stud	Ø14 x 39	Stainless steel	40
AT-007K	15/16 mm spike	Ø14 x 42	Stainless steel	40
AT-008K	M10 Coupling dowel	Ø10 x 40	Stainless steel	20
AT-086K	M16 Coupling dowel	Ø15 x 40	Stainless steel	40
AT-009K	20 mm driving stud	Ø19 x 42	Stainless steel	60
AT-042K	20 mm spike	Ø19 x 55	Stainless steel	80
AT-067K	Z and S type driving studs	Ø19 x 42	Stainless steel	60

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102

> EARTH ELECTRODES, GROUND ENHANCING PRODUCTS AND EARTH PITS

139 > GALVANIZED STEEL EARTH RODS

Galvanized steel earth rods are a good option to obtain a good earth resistance in unaggressive ground. There are extendible models to reach longer lengths and achieve better earth resistances.

Reference	Dimensions (mm)	Shape	Weight (kg)
AT-039H	Ø16 x 1000	No thread	1.65
AT-044H	Ø16 x 1500	No thread	2.53
AT-045H	Ø16 x 2000	No thread	3.42
AT-046H	Ø20 x 1500	Extendible type Z	3.71
AT-003H	Ø20 x 1500	Extendible type S	3.71
AT-047H	Ø25 x 1500	Extendible type Z	5.62
AT-049H	Ø25 x 1500	Extendible type S	5.62
AT-093H	1000 x 50 x 50 x 5	X-shape profile	3.90
AT-094H	1500 x 50 x 50 x 5	X-shape profile	5.85
AT-095H	2000 x 50 x 50 x 5	X-shape profile	7.81
AT-096H	2500 x 50 x 50 x 5	X-shape profile	9.75
AT-097H	3000 x 50 x 50 x 5	X-shape profile	11.75

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102



AT-045H



AT-046H



AT-095H



APPLICATION AT-003H



APPLICATION AT-095H

> ACCESSORIES FOR GALVANIZED STEEL EARTH RODS

Reference	Denomination	Dimensions (mm)	Material	Weight (g)
AT-037K	Impact tip for Ø20 mm earth rods	Ø20 x 40	Galvanized steel	50
AT-038K	Impact tip for Ø25 mm earth rods	Ø25 x 45	Galvanized steel	70
AT-067K	Z and S type driving studs	Ø19 x 42	Stainless steel	60

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102



AT-037K

AT-067K

140 > GOOSE FOOT

The goose foot is a configuration recommended by lightning protection standards UNE 21186 and NF C 17-102 in order to obtain low inductance in the earthing system. It consists of 30 x 2 mm tin-plated copper tape.

INSTALLATION

- > Make trenches at least half a meter deep.
- > Extend the tape and cut the lengths required.
- > Unscrew the clamp and insert the stretches of tape as indicated in the drawing at a 45° angle.
- > Attach the clamp screws.

Reference	Dimensions (mm)	Material	Weight (kg)
AT-000K	30 x 2 mm (4 m + 3 x 7 m)	Tin-plated copper tape	13
AT-001K	30 x 2 mm (1 m + 3 x 3 m)	Tin-plated copper tape	5

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102

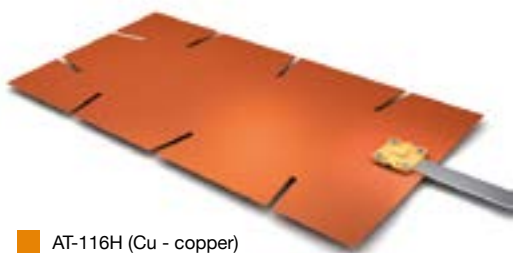


AT-000K



> EARTH ELECTRODES, GROUND ENHANCING PRODUCTS AND EARTH PITS

141 > EARTH PLATES



- AT-116H (Cu - copper)
- AT-122H (GS - galvanised steel)

The use of earth plates as electrodes significantly reduces the resistance of earthing in stony grounds, as it increases the area of contact between the electrode and the ground.

The references AT-116H and AT-122H comply with the minimum dimensions recommended in the Technical Guide for implementing no. 18 of the Spanish Low Voltage Electrotechnical Regulations of 2002.

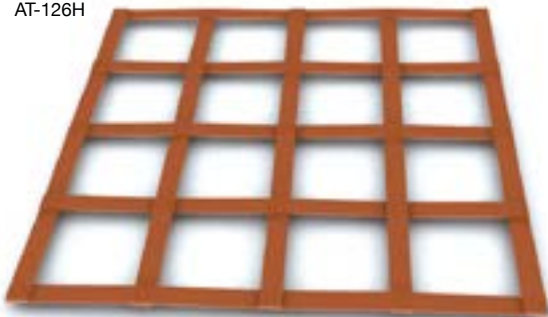
Reference	Dimensions (mm)	Includes	Material	Weight (kg)
AT-050J	500 x 500 x 2	AT-020F	Copper	4
AT-116H	1000 x 500 x 2	AT-020F	Copper	8
AT-117H	600 x 600 x 1.5	AT-020F	Copper	5
AT-118H	600 x 600 x 3	AT-020F	Copper	10
AT-119H	900 x 900 x 1.5	AT-020F	Copper	11
AT-120H	900 x 900 x 3	AT-020F	Copper	22
AT-121H	500 x 500 x 3	AT-046C	Galvanized steel	4
AT-122H	1000 x 500 x 3	AT-046C	Galvanized steel	8

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102

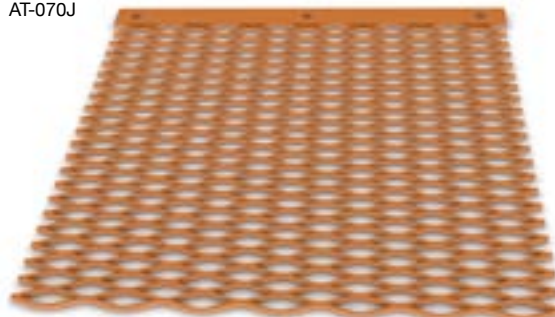
142 > COPPER LATTICES AND GRIDS

Mesh earthing systems are a more cost-effective option than earth plates and still work well in stony ground, reducing the step or contact voltages that may occur. AT-070J is recommended to avoid step voltages in public buildings with low resistivity soil.

AT-126H



AT-070J



Reference	Dimensions (mm)	Grille	Weight (kg)
AT-128H	1000 x 1000 x 2	115 x 55 mm	3.0
AT-123H	2000 x 1000 x 2	115 x 55 mm	4.0
AT-070J	3000 x 1000 x 2	115 x 55 mm	5.0
AT-126H	600 x 600 x 3	120 x 120 mm	4.0
AT-125H	900 x 900 x 3	190 x 190 mm	7.3

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102

> EARTH ELECTRODES, GROUND ENHANCING PRODUCTS AND EARTH PITS

143 > JOINT PROTECTION

Strips to protect buried connections from corrosion.

Reference	Dimensions	Material	Weight (g)
AT-000J	20 mm x 10 m roll	Self-vulcanizing strip	180
AT-010J	50 mm x 10 m roll	Denso tape (Bituminous strip)	610

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102



AT-000J



AT-010J

144 > EARTH PITS

Aplicaciones Tecnológicas earth pits cover all industrial and commercial applications as they are available in 3 materials: polypropylene, concrete and cast iron.

AT-010H can withstand 5,000 kg loads. The main advantage of this earth pit is:

- > Designed to facilitate handling and storage.
- > Good resistance to chemical substances.
- > Resistant to UV rays.
- > Attached using two individual screws



AT-010H



AT-010K

Reference	Dimensions (mm)	Material	Weight (kg)
AT-010H	250 x 250 x 250	Polypropylene	1.5
AT-010K	410 x 410 x 300	Concrete	60.0
AT-012K	390 x 390 x 30	Iron cast	8.9

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102



AT-012K



> EARTH ELECTRODES, GROUND ENHANCING PRODUCTS AND EARTH PITS

145 > CONDUCTIVER PLUS



AT-010L

**CONDUCTIVER PLUS** is a ground enhancing gel with low solubility which is, nonetheless, very hygroscopic. It is made of an electrolyte base, which contributes to the conductivity of the mixture.

The conductivity of the ground is almost exclusively of an electrolytic nature due to the salts dispersed in the water which impregnate it and concentrate on the surface due to adhesion of the sand grains and clay in the ground.

It is therefore possible to increase the conductivity of the ground, improving its absorption power, water retention and increasing its concentration of soluble salts.

It would be very easy to achieve this effect using a simple method, impregnating the ground with any electrolyte, such as common salt (NaCl) or sodium carbonate (Na<sub>2</sub>CO<sub>3</sub>). However, the high solubility of these salts, as well as their low absorption in the ground mean that they are quickly swept away by the infiltration waters and, as a result, their effect is very short term. Another inconvenience of common salts is their corrosive effect on the earthing electrodes.

The components of the **CONDUCTIVER PLUS** gel have been selected according to their solubility, in order to obtain a low soluble product from the soluble components, which will provide us with a long-lasting conductive material deposit. **The main advantage of this product is that a gel is formed below the soil near the electrode.**

EMPLOYMENT MODE

1. The ground can be dry. No previous preparation is necessary.
2. Prepare a solution of the yellow product in 5 litres of water using the measuring container.
3. Pour the first solution into the ground and add another 5 litres of water.
4. Let the product completely disappear into the ground.
5. Clean the container of any residue before continuing with the next product.
6. Prepare a second solution with the white product and 5 litres of water. Pour this mixture evenly onto the ground. Add another 5 litres of water. Leave to filter until complete absorption.
7. Once the second product has filtered, the earth resistance measurement can then be taken.

In summary, the **CONDUCTIVER PLUS** is characterised by:

- > Its capacity to create partially ionized electrolytes, with a high charge and capacity to retain water and form gels.
- > Remaining in the ground for a long time, thanks to the formation of bonds with the particles.
- > Increasing the conductivity of the ground for one year (considering rainfall of 700 litres/m<sup>2</sup>).
- > Not causing corrosion of the earth electrodes.
- > Being totally ecological.

Reference	Denomination	Description	Weight (kg)
AT-010L	CONDUCTIVER PLUS	Non-corrosive and ecological gel that improves soil conductivity	4.5

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102

## > EARTH ELECTRODES, GROUND ENHANCING PRODUCTS AND EARTH PITS

### 146 > APLICEM

In high resistivity soils it is necessary to use a specific material to obtain a suitable grounding resistance.

APLICEM ground enhancing cement improves grounding effectiveness around any type of earthing rod.

This product is very useful in industries that require a low grounding resistance such as computer installations, radio frequency facilities and substations etc.

**APLICEM** increases the conductive surface of the earth electrode, reducing the earthing resistance of the loose electrode.

Additionally, resistance remains stable regardless of soil moisture

Therefore, costs are reduced as it requires fewer boreholes for appropriate resistance.

Moreover, as it is an inert material, it prevents any corrosion forming on the electrode.



AT-034L

### INSTALLATION

**APLICEM** ground enhancing cement is supplied in 11.5 kg bags, and is to be mixed with 5 litres of water. The bag contains two parts: the conductive mixture and the cement.

It is installed as filling or resistance improver with two applications:

**1. Vertical boreholes:** for filling the ground around the electrode, increasing its size and thus reducing the earthing resistance.

- > Make the borehole with the required dimensions.
- > Mix the cement included in the **APLICEM** conductive mixture bag with water.
- > Pour water into the ground to moisten the soil and insert the electrode.
- > Fill the rest of the hole with **APLICEM**, stirring the electrode to ensure even coverage.

**2. Trenches:** for filling the ground around the conductor in order to prevent the corrosion of the conductor and preserve the obtained resistance.

- > Dig the trench with the dimensions that are required
- > Mix the cement included in the **APLICEM** conductive mixture bag with water.
- > Cover the bottom of the trench with **APLICEM** until achieving a thickness of at least 5 cm.
- > Place the conductor on the **APLICEM** layer.
- > Cover the conductor with **APLICEM** until achieving a thickness of at least 5 cm.
- > Let the mixture harden before filling the rest of the trench.

Number of APLICEM bags for backfilling around earth rods

Øhole	Depth						
	1.5 m	2 m	2.5 m	3 m	4 m	5 m	6 m
7.5 cm	2	2	2	2	4	4	4
10.0 cm	2	3	3	3	6	7	7
12.5 cm	3	4	4	5	9	10	10
15.0 cm	5	5	6	7	13	14	15
17.5 cm	6	7	8	9	17	19	20
20.0 cm	8	9	11	12	22	25	26
22.5 cm	10	12	13	15	28	31	32
25.0 cm	12	14	16	18	34	38	40

Meters of trench for each APLICEM bag:

Trench Width	APLICEM total thickness (cm)			
	2.5	5	7.5	10
10 cm	4.30 m	2.10 m	1.40 m	1.00 m
15 cm	2.80 m	1.40 m	0.90 m	0.70 m
20 cm	2.10 m	1.00 m	0.70 m	0.60 m
25 cm	1.70 m	0.80 m	0.60 m	0.40 m
30 cm	1.40 m	0.70 m	0.50 m	0.35 m

**APLICEM** allows rapid and versatile installation, maintains a constant volume. It does not filter through the ground, therefore its resistivity values remain constant. It is not corrosive for the conductor, reduces installation and maintenance costs and is easily stored for long periods.

Reference	Denomination	Description	Weight (kg)
AT-034L	APLICEM	Ground enhancing cement for improving grounding effectiveness	11.5

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102



> EARTH ELECTRODES, GROUND ENHANCING PRODUCTS AND EARTH PITS

## 147 > APLIFILL AND OTHER GROUND ENHANCING PRODUCTS

**APLIFILL** is a highly hygroscopic compound, and therefore retains the moisture around the electrode if we use it to fill the excavation made for soil replacement.



AT-032L

Reference	Denomination	Description	Weight (kg)
AT-020L	Graphite powder	Backfill specifically for earthing systems	25
AT-030L	Thin clay-like powder	Backfill specifically for earthing systems	25
AT-031L	APLIFILL	Compound that reduces soil resistivity by retaining moisture	1
AT-032L	APLIFILL	Compound that reduces soil resistivity by retaining moisture	25
AT-0205L	Graphite powder	Backfill specifically for earthing systems	5
AT-0305L	Thin clay-like powder	Backfill specifically for earthing systems	5

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102

> EQUIPOTENTIAL BONDING

148 > BONDING BARS FOR EARTH PITS

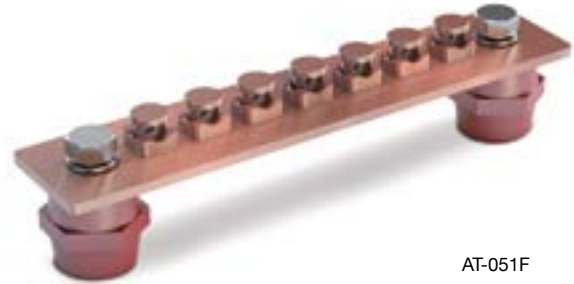


- AT-020H (NB - naval brass)
- AT-021J (SS - Stainless steel)

AT-020H and AT-021J enable the down-conductor of the lightning protection system to disconnect from the earth electrode in order to correctly measure the earth resistance. They are ready to be fixed to the AT-010H earth pit. Up to 4 copper cables or round bars and 3 tapes can be connected.

AT-051F enables up to 7 copper cables or round bars to be connected. The isolators at the end of the bar are separated by 264 mm and have a M10 thread.

AT-006J enables up to 5 conductors to be connected by table 151 terminals. This equipotential bar can be attached to the AT-010K earth pit (Table 144).



AT-051F



APPLICATION AT-020H



APPLICATION AT-006J

Reference	Dimensions (mm)	Conductor dimension range		Material	Weight (kg)
		Round	Tape		
AT-020H	235 x 40 x 25	4 x (Ø8 - 10 mm) (50 - 70 mm <sup>2</sup> )	3 x (30 x 2 mm - 30 x 3.5 mm)	Naval brass	0.50
AT-021J	235 x 40 x 25	4 x (Ø8 - 10 mm) (50 - 70 mm <sup>2</sup> )	3 x (30 x 2 mm - 30 x 3.5 mm)	Stainless steel	0.50
AT-051F	325 x 70 x 6	7 x (Ø8 - 10 mm) (50 - 70 mm <sup>2</sup> )	-	Copper	1.50
AT-006J	300 x 64 x 53	5 M10 screws		Copper	1.11

IEC 62305, IEC 62561, UNE 21186, NF C 17-102

149 > EQUIPOTENTIAL BONDING BAR

Equipotential bar enabling several conductors to be connected to each other (cable, tape, round bar). The attachment holes at the end of the bar are separated by 164 x 35 mm and have a diameter of 8.5 mm.



APPLICATION AT-050F



Reference	Dimensions (mm)	Conductor dimension range		Material	Weight (g)
		Round	Tape		
AT-050F	190 x 52 x 42	6 x (2.5 - 25 mm <sup>2</sup> ) / 2 x (Ø8 - 10 mm)	30 x 2 mm - 30 x 3.5 mm	Tin-plated copper (contact bar)	200

Complies with BS 2874





> EQUIPOTENTIAL BONDING

150 > EARTH BARS



Equipotential bars enable connection of various cables or round conductors with tin-plated copper connection terminals (for instance, AT-021K) carried out using 50 x 5 mm tape.

Reference	Denomination	Dimensions (mm)	Conductor connections	Material	Weight (kg)
AT-053J	Insulator	Ø36 x 51	M10 screw	Polyester	0.12
AT-150J	4 way earth bar	300 x 90 x 90	M10 screw	Copper	1.40
AT-054J	6 way earth bar	400 x 90 x 90	M10 screw	Copper	1.80
AT-116J	6 way earth bar	400 x 90 x 90	M10 screw	Stainless steel	1.00
AT-055J	6 way earth bar with single disconnecting link	475 x 90 x 96	M10 screw	Copper	2.30
AT-056J	6 way earth bar with twin disconnecting links	550 x 90 x 96	M10 screw	Copper	2.80
AT-057J	Disconnecting link	125 x 90 x 90	M10 screw	Copper	0.60
AT-058J	8 way earth bar	500 x 90 x 90	M10 screw	Copper	2.20
AT-117J	8 way earth bar	500 x 90 x 90	M10 screw	Stainless steel	1.20
AT-020J	8 way earth bar with single disconnecting link	575 x 90 x 96	M10 screw	Copper	2.70
AT-079J	8 way earth bar with twin disconnecting links	650 x 90 x 96	M10 screw	Copper	3.20
AT-090J	10 way earth bar	600 x 90 x 90	M10 screw	Copper	2.80
AT-118J	10 way earth bar	600 x 90 x 90	M10 screw	Stainless steel	1.40
AT-062J	10 way earth bar with single disconnecting link	675 x 90 x 96	M10 screw	Copper	3.30
AT-063J	10 way earth bar with twin disconnecting links	750 x 90 x 96	M10 screw	Copper	3.80
AT-064J	12 way earth bar	700 x 90 x 90	M10 screw	Copper	3.20
AT-119J	12 way earth bar	700 x 90 x 90	M10 screw	Stainless steel	1.60
AT-065J	12 way earth bar with single disconnecting link	775 x 90 x 96	M10 screw	Copper	3.70
AT-066J	12 way earth bar with twin disconnecting links	850 x 90 x 96	M10 screw	Copper	4.20
AT-067J	14 way earth bar	800 x 90 x 90	M10 screw	Copper	3.60
AT-068J	14 way earth bar with single disconnecting link	875 x 90 x 96	M10 screw	Copper	4.10
AT-069J	14 way earth bar with twin disconnecting links	950 x 90 x 96	M10 screw	Copper	4.60
AT-059J	16 way earth bar	900 x 90 x 90	M10 screw	Copper	4.00
AT-071J	16 way earth bar with single disconnecting link	975 x 90 x 96	M10 screw	Copper	4.50
AT-072J	16 way earth bar with twin disconnecting links	1050 x 90 x 96	M10 screw	Copper	5.00
AT-073J	18 way earth bar	1000 x 90 x 90	M10 screw	Copper	4.40
AT-074J	18 way earth bar with single disconnecting link	1075 x 90 x 96	M10 screw	Copper	4.90
AT-075J	18 way earth bar with twin disconnecting links	1150 x 90 x 96	M10 screw	Copper	5.40
AT-076J	20 way earth bar	1100 x 90 x 90	M10 screw	Copper	5.00
AT-077J	20 way earth bar with single disconnecting link	1175 x 90 x 96	M10 screw	Copper	5.50
AT-078J	20 way earth bar with twin disconnecting links	1250 x 90 x 96	M10 screw	Copper	6.00

Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561

> EQUIPOTENTIAL BONDING

## 151 > TIN-PLATED COPPER COMPRESSION TERMINALS

Copper compression terminals to correctly connect cable with screw-nut connections.

Reference	Cable dimensions (mm <sup>2</sup> )	Screw size	Weight (g)
AT-091K	10	M5	2.2
AT-092K	10	M6	2.0
AT-015K	16	M6	5.0
AT-016K	16	M8	4.0
AT-017K	25	M8	8.0
AT-018K	25	M10	9.0
AT-019K	35	M8	10.0
AT-020K	35	M10	9.0
AT-093K	50	M10	15.0
AT-021K	50	M12	14.0
AT-022K	70	M10	22.0
AT-023K	70	M12	20.0
AT-094K	95	M10	28.0
AT-024K	95	M12	25.0
AT-070K	120	M12	44.5
AT-028K	120	M16	41.0
AT-061K	150	M12	56.0
AT-030K	150	M16	53.0
AT-095K	185	M12	67.0
AT-031K	185	M16	63.0
AT-072K	240	M12	117.0
AT-032K	240	M16	112.0



AT-021K

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102

Other dimensions, please contact us

## 152 > EARTH POINTS

Equipotential earth points which are fixed to the structure to provide attachment points for the earthing conductors.

Reference	Denomination	Dimensions (mm)	Material	Weight (g)
AT-096J	1 hole (M8 x 15 mm)	Ø33 x 80	Gunmetal	140
AT-097J	2 holes (M8 x 12 mm)	80 x 63 x 63	Gunmetal	280
AT-098J	4 holes (M8 x 14 mm)	80 x 63 x 63	Gunmetal	410
AT-099J	1 hole (M8 x 15 mm) with 500 mm tail, 70 mm <sup>2</sup>	Ø33 x 80	Gunmetal / PVC coated copper	560
AT-100J	2 holes (M8 x 12 mm) with 500 mm tail, 70 mm <sup>2</sup>	80 x 63 x 63	Gunmetal / PVC coated copper	840
AT-101J	4 holes (M8 x 14 mm) with 500 mm tail, 70 mm <sup>2</sup>	80 x 63 x 63	Gunmetal / PVC coated copper	1140

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102



AT-096J



AT-097J



AT-098J



AT-100J



APPLICATION AT-100J



> EQUIPOTENTIAL BONDING

153 > EARTH BOSS

Earth boss for metal structure. M10 thread.

Reference	Dimensions	Material	Weight (g)
AT-102J	50 x 50 x 65 mm	Mild steel	800
Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102			



AT-102J

154 > FIXED EARTHING TERMINAL

Terminal which is attached to the structure to provide accessible earth point. M10 thread.

Reference	Dimensions	Material	Weight (g)
AT-120J	Ø80 x 200 mm	Stainless steel	300
Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102			



AT-120J

155 > DISTANCE HOLDER

Allows the use of galvanized steel tape as a ground conductor at foundation level.

Reference	Dimensions (mm)	Conductor dimension range		Material	Weight (g)
		Round	Tape		
AT-036K	280 x 35 x 8	Ø8 - 10 mm / 50 - 70 mm <sup>2</sup>	30 x 2 mm - 40 x 3.5 mm	Galvanized steel	80
Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102					



APPLICATION AT-036K

156 > TAPE SUPPORT

Allows the formation of an equipotential ring using tape conductor.

- APPLICATION AT-040K (GS - galvanized steel)
- AT-039K (Cu - copper)
- AT-041K (SS - stainless steel)

Reference	Dimensions (mm)	Conductor dimension range		Material	Weight (g)
		Tape			
AT-033K	60 x 36 x 27	30 x 2 mm - 50 x 6 mm		Copper	120
AT-034K	60 x 36 x 27	30 x 2 mm - 50 x 6 mm		Galvanized steel	120
AT-035K	60 x 36 x 27	30 x 2 mm - 50 x 6 mm		Stainless steel	120
AT-039K	70 x 40 x 27	30 x 2 mm - 50 x 11 mm		Copper	120
AT-040K	70 x 40 x 27	30 x 2 mm - 50 x 11 mm		Galvanized steel	120
AT-041K	70 x 40 x 27	30 x 2 mm - 50 x 11 mm		Stainless steel	120

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102



> EQUIPOTENTIAL BONDING

157 > SPARK GAP FOR EARTH BONDING



AT-050K

Reference	Dimensions (mm)	Conductor dimension range		Material	Weight (kg)
		Round	Tape		
AT-050K	216 x 57 x 38	Ø8 - 10 mm (50 - 70 mm <sup>2</sup> )	3 x (30 x 2 mm - 30 x 3.5 mm)	Naval brass (contact)	1

The lightning protection regulations earth connections, i.e. those relating to both the earthing system and the lightning protection system. In this way, we avoid serious problems due to resistive earth couplings.

However, on some occasions this connection cannot be made as, for example, it may cause corrosion problems. In these cases, the AT-050K is the most appropriate means of joining the different earth connections.

In normal conditions, this protector keeps the earth connections isolated, thus avoiding corrosion problems. When a discharge occurs and the voltage increases in the earth connections, the spark gap will activate, directly joining the earth connections and thus preventing current passing from one to another through equipment or internal installations.

> INSTALLATION

The protector has two AT-020F clamps for installation. It is advisable to carry out installation in a specific earth pit.



APPLICATION AT-050K

> TECHNICAL DATASHEET

Lightning impulse current (10/350µs wave):	$I_p (10/350 \mu s) > 100 \text{ kA}$
Nominal discharge current:	$I_n(8/20 \mu s) = 50 \text{ kA}$
Protection level (1.2/50 µs wave):	$U_p < 4 \text{ kV}$
Working temperature:	-55 °C to +85 °C
Dimensions:	Ø32 x 40 mm
Connections:	SPCR: clamp for Ø8 - 10 mm round bar or 30 x 2 mm / 25 x 3 mm tape
Material	Polyurethane resin
Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102	



> EARTH CLAMPING

158 > MULTIPURPOSE CLAMP



AT-090H  
(APPLICATION WITH CABLE)



AT-090H  
(APPLICATION WITH TAPE)

Earth clamp for connection between cable, round bar or copper tape and copper or copperbond earth rods.

Reference	Dimensions (mm)	Earth rod	Range		Material	Weight (g)
			Round	Tape		
AT-090H	52 x 41 x 30	Ø14 - 19 mm	Ø8 - 10 mm (50 - 70 mm <sup>2</sup> )	30 x 2 mm - 30 x 3.5 mm	Naval brass	240

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102

159 > ROD TO TAPE A CLAMP



AT-080J



APPLICATION AT-080J

Earth clamp for connection between copper tape and copper or copperbond earth rods.

Reference	Dimensions (mm)	Earth rod	Range		Material	Weight (g)
			Tape			
AT-080J	51 x 36 x 18	Ø12 - 20 mm	25 x 3 mm - 26 x 12 mm		Gunmetal	150
AT-081J	44 x 51 x 22	Ø16 - 20 mm	30 x 2 mm - 40 x 12 mm		Gunmetal	240
AT-082J	47 x 69 x 21	Ø16 - 20 mm	50 x 6 mm - 51 x 12 mm		Gunmetal	300

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102, BS EN 1982

160 > ROD TO CABLE G CLAMP



- AT-083J (Gu - gunmetal)
- AT-112J (GS - galvanized steel)



APPLICATION AT-083J

Earth clamp for connection between cable or round bar and earth rod.

Reference	Dimensions (mm)	Earth rod	Range		Material	Weight (g)
			Round			
AT-083J	41 x 21 x 18	Ø16 mm	16 - 50 mm <sup>2</sup>		Gunmetal	60
AT-112J	41 x 21 x 18	Ø16 mm	16 - 70 mm <sup>2</sup>		Galvanized steel	60
AT-086J	48 x 30 x 19	Ø20 mm	35 - 95 mm <sup>2</sup>		Gunmetal	60

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102, BS EN 1982

> EARTH CLAMPING

161 > U-BOLT ROD E CLAMP

Earth clamp for connection between copper tape and earth rods or metal re-bars.

Reference	Range		Material	Weight (g)
	Earth rod	Tape		
AT-087J	Ø16 mm	25 x 3 mm	Gunmetal	260
AT-088J	Ø20 mm	25 x 3 mm	Gunmetal	260

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102, BS EN 1982



AT-087J



APPLICATION AT-087J

162 > ROD TO CABLE CGUV CLAMP

Earth clamp for connection between copper cable or round bar and earth rods or metal re-bars.

Reference	Range		Material	Weight (g)
	Earth rod	Round		
AT-089J	Ø14 - 20 mm	2 x (50 - 120 mm <sup>2</sup> )	Naval brass	250
AT-092J	Ø14 - 20 mm	2 x (150 - 300 mm <sup>2</sup> )	Naval brass	240

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102



APPLICATION AT-089J

163 > ROD TO CABLE LUG B CLAMP

Earth clamp for connection between copper cable with copper compression terminal (table 151) and copper or copperbond earth rods.

Reference	Dimensions (mm)	Range		Material	Weight (g)
		Earth rod	Round		
AT-093J	52 x 26 x 25	Ø16 mm	M10 screw	Gunmetal	300
AT-095J	50 x 29 x 28	Ø20 mm	M10 screw	Gunmetal	300

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102, BS EN 1982



AT-093J



APPLICATION AT-093J



> EARTH CLAMPING

164 > DISCONNECTING SLEEVE



AT-135J

Linear earth clamp for connection between galvanized steel round bar and galvanized steel earth rods.

Reference	Dimensions (mm)	Earth rod	Range		Material	Weight (g)
			Round			
AT-135J	43 x 41 x 30	Ø16 mm	Ø7 - 10 mm (35 - 70 mm <sup>2</sup> )		Galvanized steel	120

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102

165 > UNIVERSAL DISCONNECTING CLAMP FOR CABLE



- AT-114J (GS - galvanized steel)
- AT-115J (SS - stainless steel)
- AT-113J (GS / Cu - galvanized steel/copper)



APPLICATION AT-114J

Earth clamp for connection between cable or round bar and galvanized steel or Stainless steel earth rods.

Reference	Dimensions (mm)	Earth rod	Range		Material	Weight (g)
			Round			
AT-113J	58 x 30 x 20	Ø16 mm (Galvanized steel)	Ø8 - 10 mm (50 - 70 mm <sup>2</sup> ) (copper)		Bimetal	150
AT-114J	58 x 30 x 20	Ø16 mm	Ø8 - 10 mm (50 - 70 mm <sup>2</sup> )		Galvanized steel	150
AT-115J	58 x 30 x 20	Ø16 mm	Ø8 - 10 mm (50 - 70 mm <sup>2</sup> )		Stainless steel	100

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102

166 > UNIVERSAL CLAMP



- AT-025F (SS - stainless steel)
- AT-127J (Cu - copper)
- AT-128J (GS - galvanized steel)



APPLICATION AT-025F

L or cross-shape earth clamp for connection between cable or round bar and earth rod.

Reference	Dimensions (mm)	Earth rod	Range		Material	Weight (g)
			Round			
AT-126J	70 x 70 x 80	Ø15 - 25 mm	Ø8 - 10 mm (50 - 70 mm <sup>2</sup> )		Galvanized steel	380
AT-025F	48 x 44 x 20	Ø16 mm	Ø8 - 10 mm (50 - 70 mm <sup>2</sup> )		Stainless steel	130
AT-127J	48 x 44 x 20	Ø16 mm	Ø8 - 10 mm (50 - 70 mm <sup>2</sup> )		Copper	130
AT-128J	48 x 44 x 20	Ø16 mm	Ø8 - 10 mm (50 - 70 mm <sup>2</sup> )		Galvanized steel	130

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102

> EARTH CLAMPING

167 > T AND L CLAMP



■ APPLICATION AT-015J (GS - galvanized steel)  
■ AT-017J (Cu - copper)  
■ AT-016J (SS - stainless steel)



■ AT-136J (GS - galvanized steel)  
■ AT-137J (SS - stainless steel)  
■ AT-138J (Cu - copper)

T and L-shape earth clamp for connection between cable, round bar or tape and earth rod.

Reference	Dimensions (mm)	Earth rod	Range		Material	Weight (g)
			Round	Tape		
AT-136J	60 x 60 x 22	Ø16 mm	Ø8 - 10 mm (50 - 70 mm <sup>2</sup> )	-	Galvanized steel	330
AT-137J	60 x 60 x 22	Ø16 mm	Ø8 - 10 mm (50 - 70 mm <sup>2</sup> )	-	Stainless steel	330
AT-138J	60 x 60 x 22	Ø16 mm	Ø8 - 10 mm (50 - 70 mm <sup>2</sup> )	-	Copper	330
AT-015J	60 x 60 x 19	Ø16 mm	-	30 x 2 mm - 30 x 3.5 mm	Galvanized steel	330
AT-016J	60 x 60 x 19	Ø16 mm	-	30 x 2 mm - 30 x 3.5 mm	Stainless steel	330
AT-017J	60 x 60 x 19	Ø16 mm	-	30 x 2 mm - 30 x 3.5 mm	Copper	330

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102

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APPLICATION AT-130J

■ AT-130J (GS - galvanized steel)  
■ AT-133J (SS - stainless steel)

Cross-shape earth clamp for connection between cable, round bar or tape and earth rod.

Reference	Dimensions (mm)	Earth rod	Range		Material	Weight (g)
			Round/Tape			
AT-129J	108 x 30 x 22	Ø20 mm	Ø8 - 10 mm (50 - 70 mm <sup>2</sup> ) / 30 x 2 mm - 30 x 3.5 mm		Galvanized steel	370
AT-130J	108 x 30 x 18	Ø16 mm	Ø8 - 10 mm (50 - 70 mm <sup>2</sup> ) / 30 x 2 mm - 30 x 3.5 mm		Galvanized steel	370
AT-131J	108 x 30 x 27	Ø25 mm	Ø8 - 10 mm (50 - 70 mm <sup>2</sup> ) / 30 x 2 mm - 30 x 3.5 mm		Galvanized steel	370
AT-132J	108 x 30 x 22	Ø20 mm	Ø8 - 10 mm (50 - 70 mm <sup>2</sup> ) / 30 x 2 mm - 30 x 3.5 mm		Stainless steel	370
AT-133J	108 x 30 x 18	Ø16 mm	Ø8 - 10 mm (50 - 70 mm <sup>2</sup> ) / 30 x 2 mm - 30 x 3.5 mm		Stainless steel	370
AT-134J	108 x 30 x 27	Ø25 mm	Ø8 - 10 mm (50 - 70 mm <sup>2</sup> ) / 30 x 2 mm - 30 x 3.5 mm		Stainless steel	370

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102