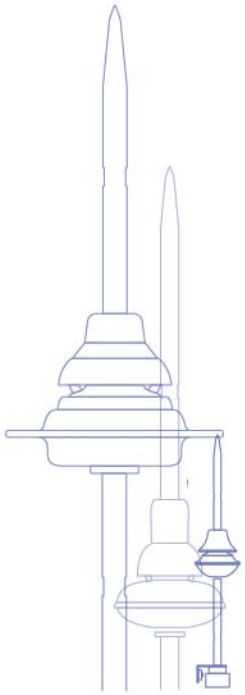
Liva® grup
ELEKTRİK ELEKTRONİK İNŞAAT
TAAHHÜT SAN. ve TİC. LTD. ŞTİ.

LIGHTNING ROD AND GROUNDING SYSTEMS



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As Liva Group, we render services on project designing, production, undertaking and consultancy about "Lightning Protection Systems," and in that context, we aspire to provide safe living conditions for you, your beloved ones and people around you.

While rendering these services, our target is to offer you "the best service with the most appropriate conditions." Accordingly, we have proved our business and production quality in many projects we have completed. With each passing day, our whole team is devoted to renewing and developing ourselves in order to be the best in the field and we work really hard for this objective.

We are well aware that being the best requires to be honest and reliable, to act with proud, and to work with dedication.

We wish to express our gratitude to our customers for being with us in the long adventure we have started, for trusting and preferring us.

Sincerely,

Liva Grup

GENERAL INFORMATION

DEFINITIONS RELATED TO LIGHTNING

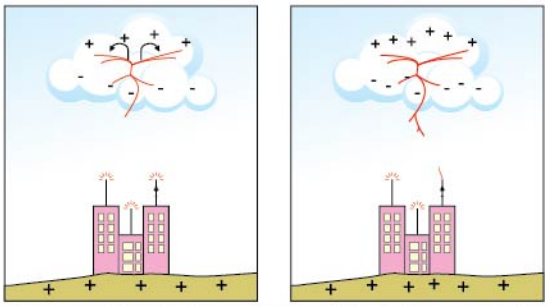
Lightning is the electrical discharge between an electrical charged cloud and the earth.
Flash is the electrical discharge between an electrical charged cloud and another cloud.

FORMATION OF LIGHTNING

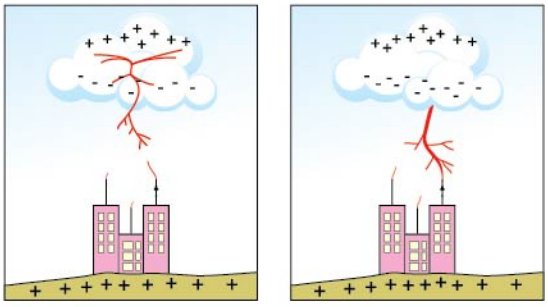
The formation of lightning depends first on the formation of a lightning cloud and loading of this cloud with electricity. Today, although we can clarify the process that leads to formation of lightning cloud, we do not have precise information as to how that cloud gets electrically loaded.

Natural events such as electrically charging of clouds, lightning and flashes are all together called "thunderstorm".
We should keep in mind that not all clouds perpetrate thunderstorm and the clouds that have a possibility of causing thunderstorm do not necessarily lead to lightning unless sufficient conditions are met. Each thunderstorm cloud comprises of an electric field of about 500kV/m. This fact leads to very strong vertical movement and forces inside such a cloud. If that cloud approaches the earth to a sufficient degree and if at the same time the atmospheric conditions (heat, moisture, etc.) are suitable, the physical conditions for the formation of a lightning would be met when the potential difference to exceed the perforation threshold of the air in the cloud occurs. Discharge of a lightning takes place when the electric field intensity reaches the rate of around 2500 kV/m. When the electric field intensity inside a thunderstorm cloud enhances, a discharge from cloud to cloud (flash) or from cloud to earth (lightning) may take place. If the field intensity on the earth had been destroyed due to certain reasons, (rough structure of the earth, high buildings, skyscrapers, etc.) an earth-cloud discharge may occur under these conditions.
In the event of lightning, discharge is not ceaseless. When the energy at the bottom of the cloud gets large enough, an electron beam starts to flow towards the earth gradually, with short or long steps and forward jumps.
The electron beam travels 10 to 100 meters with each forward jump with an approximate speed of 30.000 - 150.000 km/sec. (16% of light velocity). The period of steps between two jumps is between 30 and 90 µsec. This electron movement from the cloud to the earth is called the "leader stroke (discharge)"or the "corona discharge".

As the lightning approaches the ground, electric field intensities that concentrate on peak points on the earth form discharges, called as "capturing discharges" from these points towards the clouds. The speed of capturing discharges depends on electric charging of the discharge channel, particularly. (In other words, it depends on the active support of the capturing point.)



Generally as a result of formation of electric charges and separation of charges, the leader discharge of the cloud consists of negative space charges. However, on rare occasions, there are also leader discharges of clouds that consist of positive space charges. When the conductive channel in the thunderstorm cloud formed by leader discharges, and the capturing discharge at the opposite polarity according to the rising cloud meet, they constitute a conductive path that the main discharge will flow through. The lightning discharge occurs through this path.



The lightning discharge occurs not with jumps, but with the passing of a strong current through just one conductive path, which may be followed by second or third discharges. The lightning is not an ultrasonic incident, but a unipolar shocking discharge; a short winded, direct current stroke, measured to be of 20-100 million volt with 5-200 current value.

THE EFFECTS OF LIGHTNING

The lightning gets discharged with a current that may go up to 200.000 ampere and a potential difference up to 100 million volt. An electric stroke of that enormous strength may be highly destructive. We can investigate the effects of lightning under the following headings in general:

1. Electro-dynamic Effect
2. Pressure and Sound Effect
3. Electrochemical Effect
4. Light Effect
5. Thermal Effect

GENERAL INFORMATION

LIGHTNING PROTECTION SYSTEMS

These are installments that catch the lightning strike directly and transmit it to the earth.

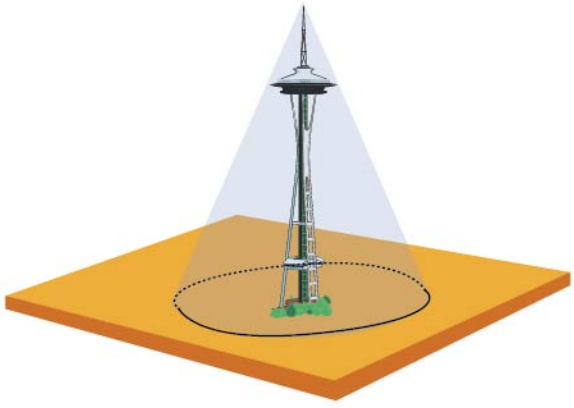
1. PASSIVE CAPTURING SYSTEMS

Generally speaking, there are three kinds of passive capturing systems:

A. Simple Capturing Rod (Franklin Rod)
B. Cage Method (Faraday Cage)
C. Stretched Conductive Line (Rope) Method

A. Simple (Passive) Capturing Rod (Franklin Rod)

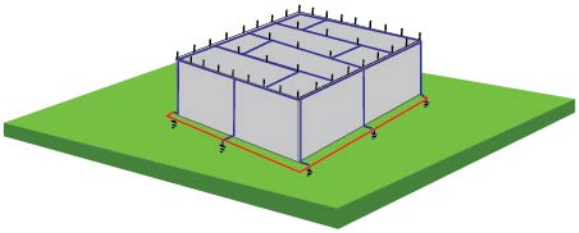
This is a lightning protection system where metal rods which have sharp ends are connected to the earth (to metal grounding electrode) with the help of a conductor; in this way, a possible lightning strike is captured by the simple capturing rod and transferred to the ground.
Passive capturing rods were found by Benjamin Franklin and are the oldest among lightning protection systems.
When the rods were first utilized, the domain where the passive capturing rods effected was calculated to be an area of cone, which has a radius equal to the height of the rod. Today, we define it as an area of cone that falls between 30° ile 45° from the peak point of the capturing rod in accordance with the grade (sensitivity) of the protection.
The passive capturing is accepted to be the best lightning protection for narrow and tall structures (towers, chimneys, lighthouses, small-size buildings, etc.); however, this method is usually not preferred for large surface buildings for the reason that it would be difficult to mount very long passive capturing rods.



B. Cage Method (Faraday Cage)

Cage Method is a lightning protection system where the body to be protected is enclosed by a conductive cage and protected that way.

When Michael Faraday's studies showed that the electricity field inside a conductive cage is zero, Melsens adopted this theory to practice and produced the cage system.



In practice, the roof and sidewalls of the building are covered with good conductive material vertically and horizontally, thus taken in a cage. Vertical pointed rods are placed on the roof at regular intervals and are connected to the cage. The cage is then connected to the earth at many points with the use of conductors and grounding electrodes on the base.
In this way, each point of the building becomes equal potentials and in case of a lightning discharge, the dangerous currents will be led to the earth through the copper cage that is totally covered and the building will get no harm. In this respect, the cage system is still the most trustworthy lightning protection system in the world.
The negative aspects of this system are the difficulties in implementation, imperfect applications due to unawareness, and the high cost of the project, implementation and maintenance. The studies for reduction of these costs influence the reliability of the system. Because of wrong or imperfect implementation, fatal accidents may take place. (An example to wrong implementation is the Mont Blanc Observatory. Many fatal accidents took place at the Observatory due to lightning strokes.)

C. Stretched Conductive Line (Rope) Method

The stretched line method functions in the same way as the cage system of lightning protection, but it is used when the lightning is meant to be isolated from the building.
The system is designed according to the principle of capturing the lightning before it touches the building by way of pulling a conductive rope, connected to the ground, over the rods placed on, around or on the roof of a building. In the area under the conductive rope, a protected body generates that is defined as "the rolling sphere" or the "angle method." Thus, the area located under the rope would be protected from the lightning.
The stretched line method is particularly preferred for buildings that encompass explosive, inflammable or dangerous material as the protection system captures the lightning before it touches the building. It can also be used at buildings, where the Faraday cage cannot be set due to the snow load, by means of placing the conductor over the snow level.

LIVA ACTIVE LIGHTNING RODS

2. ACTIVE CAPTURING SYSTEMS

ACTIVE LIGHTNING CONDUCTOR

Because of the above-mentioned disadvantages of those lightning protection systems of cage method and simple capturing rod, alternative systems of lightning protection are preferred more, today. One of those alternatives is the Active Lightning Conductor.
Our company has 7 different types of product, in this scope. Six of these products are designed to function in accordance with the principle of "Early Streamer Emission (ESE)," and the other lightning conductor method is designed both to work in accordance with the principle of "Early Streamer Emission" and the "Piezo Crystallized Emission System."

LIVA ACTIVE LIGHTNING RODS

A. The Lightning Rods Working with Early Streamer Emission (ESE)

1. LİVA "LAP-DX 250 Active Lightning Rod (ESE)
2. LİVA "LAP-AX 210 Active Lightning Rod (ESE)
3. LİVA "LAP-BX 175 Active Lightning Rod (ESE)
4. LİVA "LAP-BX 125 Active Lightning Rod (ESE)
5. LİVA "LAP-CX 070 Active Lightning Rod (ESE)
6. LİVA "LAP-CX 040 Active Lightning Rod (ESE)

B. Early Streamer Emission System (ESE) and Piezo Crystallized Lightning Rod:

7. LİVA "LAP-PEX 220 Active Lightning Rod" (ESE+ Piezo Crystallized)
You can find below detailed information about the lightning conductors that we produce, which work with Early Streamer Emission System (ESE). You will also find information about our Piezo Crystallized Lightning Rods in the following pages.

A. The Lightning Rods that Work with Early Streamer Emission System (ESE)

MATERIAL: The metal components of the conductor rod, which will carry the lightning, are produced of stainless steel (Inox) to resist against chemical interactions and corrosion. This feature of the lightning rod allows it to remain strong and durable against heavy elements of the nature.

WORKING SYSTEM: Electro Atmospheric Field Effective Liva Active Lightning Rod, which works in accordance with the principle of Early Streamer Emission System (ESE), obtains its energy from the density changes between electrostatic and electromagnetic fieds.
The lightning rods have four main components:

1. Capture Terminal
2. Body; (a) Ionic Tunnel (b) Energy Block
3. Bottom Mil
4. Conductor Connection Adaptor

TESTS AND DOCUMENTS

We present below the tests and certificates we have obtained with regards to Liva Active Lightning Rods. (*)

A. The Standard Strike Voltage Test: The Lightning Rod has been tested at the High Voltage Laboratories of the Middle East Technical University (METU) Department of Electrics and Electronics. The lightning strike value was tested between 1020 and 1675 kV (+) Positive and (-) Negative and was considered to be appropriate.

B. Lightning Rod Strike Voltage Jumping Time (Δt) Test:

1. The Lightning Rod Strike Voltage Jumping Time (Early Streamer Warning) (Δt) was applied to the Lightning Rod at NFC 17-102 (Appendix C) standarts at METU Department of Electrics and Electronics and the certificate of approval to relevant standarts was obtained for the Lightnig Rod.

2. Strike Voltage Jumping Time (Early Flow Warning) (Δt) Test was applied to the Lightning Rod at IEC 61083-1, IEC 60060-1 and NFC 17-102 (Appendix C) standards at CNAS (Ilac-MRA) Laboratories, which has International Accredation Certificate, and it was documented to be in conformance with the relevant standards.

C. Lightning Rod Strike Voltage Heavy Current Strike (Short Circuit kA) Test:

1. The Lightning Rod was tested with 25kA current strikes at High Voltage Laboratories of the METU Department of Electrics and Electronics, and it was certified that no change or deterioration took place in its qualities.

2. The Lightning Rod went through tests with 115kA current strikes at TS EN 50164-1 Standards at SIGMA Testing Laboratories, which certified that no change or deterioration took place in its qualities.

D. Temperature Test (-40 °C ile +120 °C) was applied to the Lightning Rod at Accredited Laboratories, which proved that no deterioration happened in its operation at these temperatures.

E. The Lightning Rod went through "Protection Test against Reaching Unsafe Parts and Solid Bodies, and Water Resistance Test" at TS 3033 EN 60529 standards at Laboratories accredited by European Co-operation for Accreditation (EA) and International Laboratory Accredetation Cooperation (ILAC). As a result of the tests, its conformity with relevant criteria was licensed.

F. Gost Document: The Lightning Rod has "GOST" Document

G. CE Certificate: The Lightning Rod has received "CE" Conformity to Europe document.

H.Warranty Period: The Lightning Rod has "30-Year Warranty" Document.

LIVA ACTIVE LIGHTNING RODS

B. Early Streamer Emission System (ESE) and Piezo Crystallized Lightning Rod:

MATERIAL: The metal components of the conductor rod, which will carry the lightning, are produced of stainless steel (Inox) to resist against chemical interactions and corrosion. This feature of the lightning rod allows it to remain strong and durable, just like the first day, against heavy elements of the nature.

OPERATION SYSTEM:
Electro Atmospheric Field and Wind Effective Liva Active Lightning Rod, which works in accordance with the principle of Early Streamer Emission System (ESE) and Piezo Crystallized Emission System, obtains its energy from the density changes between electrostatic and electromagnetic fieds in the air, and making use of the dynamic energy of the wind.

1. Capture Terminal
2. Wind Wings
3. Body;
   (a) Energy Block
   (b) Piezo Crystals and related equipment
4. Bottom Mil
5. Conductor Rod Connection Adaptor

TESTS AND DOCUMENTS

You can find below the tests that Liva Active Lightning Rods underwent.

Lightning Surge Voltage By-Passing Time (Δt) Test: Lightning Surge Voltage By-Passing (Early Streamer Warning) Time(Δt) Test at NFC 17-102 (Appendix C) was applied to the Lightning Rod at the High Voltage Laboratories of the Middle East Technical University (METU) Department of Electrics and Electronics. The tests proved that the Lightning Rod is in conformity with the relevant standards.

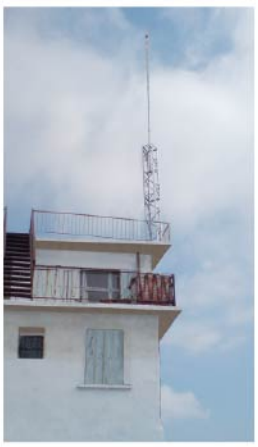
Gost Document: The Lightning Rod has "GOST" Document.
CE Certificate: The Lightning Rod has received "CE" Conformity to Europe document.

Warranty Period: The Lightning Rod has "30-Year Warranty" Document.

You can also find detailed information about our Active Lightning Rods on our website www.livaparatoner.com

TABLE OF LIVA LIGHTNING RODS PROTECTION LEVELS

Protection Levels		LEVEL- 1							LEVEL- 2							LEVEL- 3							LEVEL- 4						
Type of Lightning Rods		LAP-AX 210	LAP-BX 175	LAP-BX 125	LAP-CX 070	LAP-CX 040	LAP-DX 250	LAP-PEX 220	LAP-AX 210	LAP-BX 175	LAP-BX 125	LAP-CX 070	LAP-CX 040	LAP-DX 250	LAP-PEX 220	LAP-AX 210	LAP-BX 175	LAP-BX 125	LAP-CX 070	LAP-CX 040	LAP-DX 250	LAP-PEX 220	LAP-AX 210	LAP-BX 175	LAP-BX 125	LAP-CX 070	LAP-CX 040	LAP-DX 250	LAP-PEX 220
		Radius of Protection Area (Mt.)							Radius of Protection Area (Mt.)							Radius of Protection Area (Mt.)							Radius of Protection Area (Mt.)						
Height of the Pole (m)	4	100	81	58	48	39	115	155	108	89	65	55	45	123	164	120	100	74	64	53	134	176	130	110	83	72	60	146	188
	5	100	82	58	49	39	115	155	109	90	65	56	46	124	164	121	100	75	65	54	135	177	131	110	84	72	61	146	188
	6	101	82	58	49	40	115	155	109	90	66	56	46	124	164	121	101	76	65	54	135	177	131	111	84	73	62	146	188
	8	102	82	59	50	40	115	156	110	90	66	57	47	124	165	122	101	77	66	56	136	177	132	111	85	75	63	147	189
	10	102	82	59	50	41	116	156	110	91	67	58	48	124	165	122	102	77	67	57	137	178	133	112	87	76	65	148	190
	15	102	83	60	51	42	116	156	111	92	68	59	50	125	165	123	104	80	70	60	138	178	135	114	89	79	69	149	191
	20	102	83	60	51	42	116	156	112	92	69	60	51	126	166	125	105	81	72	62	139	179	136	116	92	82	72	151	192

LIVA ACTIVE LIGHTNING RODS

LAP-DX 250

LAP-DX 250

PHYSICAL PROPERTIES LAP-DX 250

Order code	Size	Package Size	Δt Early Streamer Warning Time (according to NFC 17 – 102 standards) (*)	Protection Radius (Mt.) (according to NFC 17 – 102 standards) (**)			
				Level 1	Level 2	Level 3	Level 4
LAP-DX 250	Length: 70 cm Net weight: 5.00 kg Gross weight: 5.70 k	25x25x50 cm	96 µsec.	115	124	135	146

LAP-AX 210

LAP-AX 210

PHYSICAL PROPERTIES LAP-AX 210

Order code	Size	Package Size	Δt Early Streamer Warning Time (according to NFC 17 – 102 standards) (*)	Protection Radius (Mt.) (according to NFC 17 – 102 standards) (**)			
				Level 1	Level 2	Level 3	Level 4
LAP-AX 210	Length: 100 cm Net weight: 5.00 kg Gross weight:5.70 kg	17x17x100 cm	82 µsec.	101	109	121	131

(*) Δt value shows the early streamer time advantage that a lightning rod (ESE lightning rod, for instance) has in arresting the lightning, compared to an ordinary capture terminal (S.R.). Bigger Δt value means that the active reaction of the lightning rod is better. It shows that it can attract the lightning to itself at a higher point, at a larger protection diameter and fastly.)

(**) It involves the situation that the lightning rod is mounted at least 6 m. higher than tha highest point of the building to be protected, with the help of the lightning pole. The protection diameter is calculated by taking into account the approximate early streamer warning time.

LIVA ACTIVE LIGHTNING RODS

LAP-BX 175

LAP-BX 175

PHYSICAL PROPERTIES LAP-BX-175

Order code	Size	Package Size	Δt Early Streamer Warning Time (according to NFC 17 – 102 standards) (*)	Protection Radius (Mt.) (according to NFC 17 – 102 standards) (**)			
				Level 1	Level 2	Level 3	Level 4
LAP-BX 175	Length: 100 cm Net weight: 4.80 kg Gross weight: 5.50 kg	17x17x100 cm	63 µsec.	82	90	101	111

LAP-BX 125

LAP-BX 125

PHYSICAL PROPERTIES LAP-BX 125

Order code	Size	Package Size	Δt Early Streamer Warning Time (according to NFC 17 – 102 standards) (*)	Protection Radius (Mt.) (according to NFC 17 – 102 standards) (**)			
				Level 1	Level 2	Level 3	Level 4
LAP-BX 125	Length: 80 cm Net weight: 4.20 kg Gross weight: 4.60 kg	17x17x80 cm	40 µsec.	58	66	76	84

(*) Δt value shows the early streamer time advantage that a lightning rod (ESE lightning rod, for instance) has in arresting the lightning, compared to an ordinary capture terminal (S.R.). Bigger Δt value means that the active reaction of the lightning rod is better. It shows that it can attract the lightning to itself at a higher point, at a larger protection diameter and fastly.)

(**) It involves the situation that the lightning rod is mounted at least 6 m. higher than tha highest point of the building to be protected, with the help of the lightning pole. The protection diameter is calculated by taking into account the approximate early streamer warning time.

LIVA ACTIVE LIGHTNING RODS

LAP-CX 070

LAP-CX 070

PHYSICAL PROPERTIES LAP-CX 070

Order code	Size	Package Size	Δt Early Streamer Warning Time (according to NFC 17 – 102 standards) (*)	Protection Radius (Mt.) (according to NFC 17 – 102 standards) (**)			
				Level 1	Level 2	Level 3	Level 4
LAP-CX 070	Length: 70 cm Net weight : 2.40 kg Gross weight: 3.10 kg	13x13x70 cm	31 µsec.	49	56	65	73

LAP-CX 040

LAP-CX 040

PHYSICAL PROPERTIES LAP-CX 040

Order code	Size	Package Size	Δt Early Streamer Warning Time (according to NFC 17 – 102 standards) (*)	Protection Radius (Mt.) (according to NFC 17 – 102 standards) (**)			
				Level 1	Level 2	Level 3	Level 4
LAP-CX 040	Length: 70 cm Net weight:2.30 kg Gross weight: 2.90 kg	13x13x70 cm	22 µsn	40	46	54	62

(*) Δt value shows the early streamer time advantage that a lightning rod (ESE lightning rod, for instance) has in arresting the lightning, compared to an ordinary capture terminal (S.R.). Bigger Δt value means that the active reaction of the lightning rod is better. It shows that it can attract the lightning to itself at a higher point, at a larger protection diameter and fastly.)

(**) It involves the situation that the lightning rod is mounted at least 6 m. higher than tha highest point of the building to be protected, with the help of the lightning pole. The protection diameter is calculated by taking into account the approximate early streamer warning time.

LIVA LIGHTNING RODS
PIEZO CRYSTAL AND ESE TYPES

LAP-PEX 220

LAP-PEX 220

PHYSICAL PROPERTIES LAP-PEX 220

Order code	Size	Package Size	Δt Early Streamer Warning Time (according to NFC 17 – 102 standards) (*)	Protection Radius (Mt.) (according to NFC 17 – 102 standards) (**)			
				Level 1	Level 2	Level 3	Level 4
LAP-PEX 220	Length: 150 cm Net weight : 15 kg Gross weight: 16.5 kg	16x160 cm	136 µsec.	155	164	177	188

(*) Δt value shows the early streamer time advantage that a lightning rod (ESE lightning rod, for instance) has in arresting the lightning, compared to an ordinary capture terminal (S.R.). Bigger Δt value means that the active reaction of the lightning rod is better. It shows that it can attract the lightning to itself at a higher point, at a larger protection diameter and fastly.)

(**) It involves the situation that the lightning rod is mounted at least 6 m. higher than tha highest point of the building to be protected, with the help of the lightning pole. The protection diameter is calculated by taking into account the approximate early streamer warning time.

THE TESTER OF LIVA LIGHTNING RODS&LIGHTNING STRIKE COUNTERS

Order Code	Class	Type	Accessories
TESTER LLRT-A1	Active Lightning Rod and Lightning Counter Test Device	Digital	Power Supply Unit, Energy cable/ Detector / Reference Props and Magnetic Generator

TECHNICAL PROPERTIES

Working Voltage	Reference Value	Maximum Working Temperature	Size	
220 volt - 50/60 Hz.	3 - 10	-20 °C ile +50 °C	Measuring Device	110x190x60 mm
			Magnetic Generator	280 x Ø60 mm
			Weight of Device	1.60 Kgs

"Liva LLRT-A1 Liva Active Lightning Rod and Lightning Counter Testing Device" is a combined testing device that can test Liva Active Lightning Rods and Liva Lightning Counters.

FEATURES
Active Lightning Rod and Lightning Counter Testing Device;
The device can test the following:

1- Liva Active Lightning Rods, which can be tested directly (the ones that have testing sockets on),

2- Other Liva Active Lightning Rods, which do not have testing sockets on them,

3- Lightning Counters, which can be tested directly (the ones that have testing sockets on).

The cables and other equipment that would be required for the operation of the testing device are given as accessories component to the device.

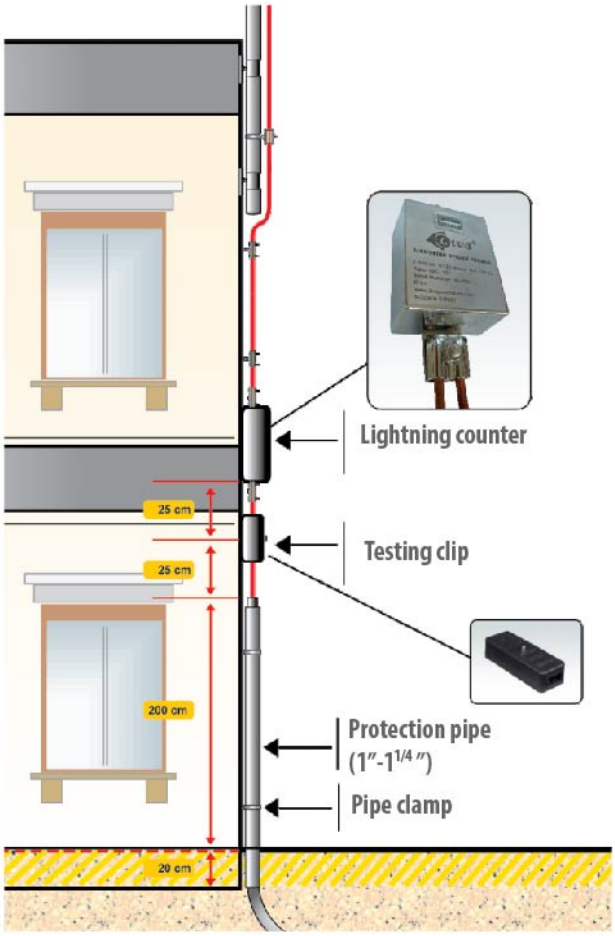
The device does not need any power supply other than it sown power supply for testing directly testable lightning rods and lightning counters.

The testing device has three testing sockets on it. Each socket is designed in a different way. In order to perform the test, the relevant socket is connected to the relevant cables present in the device content and/or other equipment can be used.

LIVA LIGHTNING STRIKE COUNTERS

Liva LG-4H Lightning Strike Counter : The device is designed to count and record the lightning strikes captured by lightning protection systems such as Active Lightning Rods, Simple Capturing Rods (Franklin Rod) and Cage Method (Faraday Method). The Lightning Counter is necessary to determine whether the lightning rod received any lightning strikes.
The device is connected to the landing line of the lightning and therefore it detects the impulse current caused by lightning discharge current, and it counts each strike and shows it by way of the numerator on it. With the help of the Lightning Counter, you can follow the number of lightning strikes arrested by your system of lightning protection and you can keep records about the operability of the system. The device does not need any maintenance within its operation limits. It does not require any additional power supply for its operation.

How to Mount the Device: The Lightning Counter is connected "in series" to the lightning landing line.
(1) In case of lightning protection systems having landing on just one line that had been installed by Active Lightning Rod and/or Simple Capturing Rod (Franklin Rod), the Lightning Counter can be connected on the landing line before the testing clamp or in place of the testing clamp.
(2) In case of lightning protection systems set in accordance with the Faraday Cage (Cage Method) and/or with Simple Capturing Rod where multiple landing lines are used, the device can be connected on the nearest landing line, close to the middle of the installment or the highest point of the building, having a potential of receiving lightning strike, before the testing clamp or in place of the testing clamp.
If the lightning protection system is used for projects where landing had been made through multiple lines or where the building is too high, we advice that a counter should be placed at each 100 meters.



Types of Lightning Counter: We have three types of Lightning Counters:
1. Standard Lightning Counter: It detects and counts lightning strikes and shows the result on the screen.
2. SMS-Sending Lightning Counter: It detects and counts lightning strikes and shows the result on its screen. Also, these lightning counters have a connection socket so that additional modules can be attached. By way of connecting an SMS module to this socket, the Lightning Counter can send the previously loaded SMS text to 6 different GSM numbers, respectively, as soon as it detects a lightning strike.
(Note: The speed of delivering the message depends on the communication speed of the GSM company.)
3. E-Mail Sending Lightning Counter: It detects and counts lightning strikes and shows the result on its screen. Also, these lightning counters have a connection socket so that additional modules can be attached. By way of connecting an E-mail module to this socket, the Lightning Counter can send the previously loaded e-mail text to 8 different e-mail addresses, as soon as it detects a lightning strike. (Note: The speed of delivery depends on the speedof the internet.)

TECHNICAL PROPERTIES

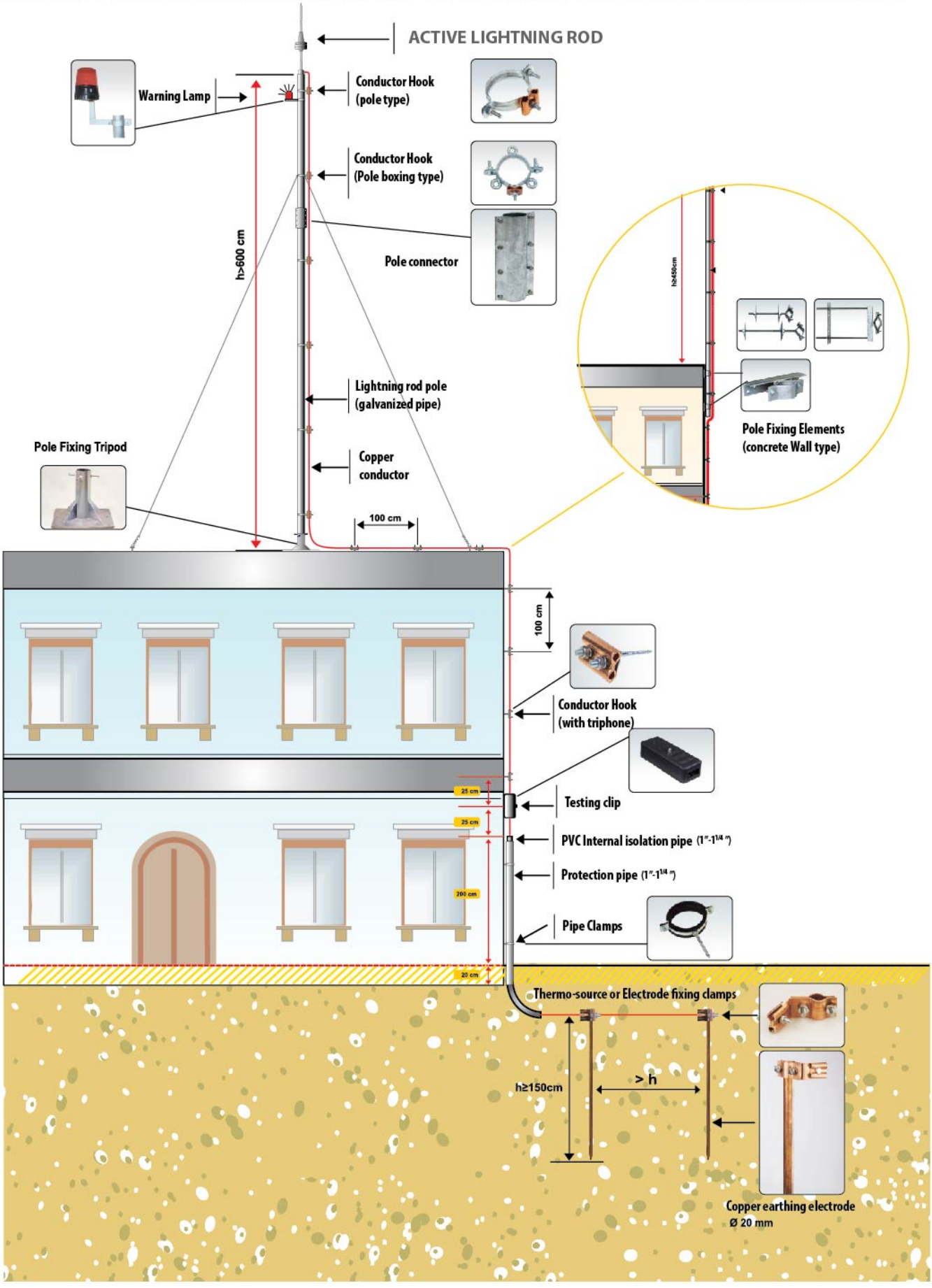
Product Code	Ligtning Count	Interval Minimum discharge Stream and Discharge Time Interval	Maximum discharge Stream	Input-Output Conductor	Operating temperature range	Size	Protection Class
LG-4H-001	000000 - 999999	1 kA (8/20µs)	100 kA	2x50 mm2 (Ø 2x8mm) + 3x30 mm Bara	-30 °C ile +80 °C	120 x 95 x 50 mm (200 mm with the connection clip)	IP 65

NOTE: If your lightning protection system had received a lightning strike, you should definitely have done the periodic controls of your system, the shortest time possible. In this respect;
1. The ground passing resistance should be measured,
2. The system should be examined for the possibility of a damage and if there are problems, those should be removed.

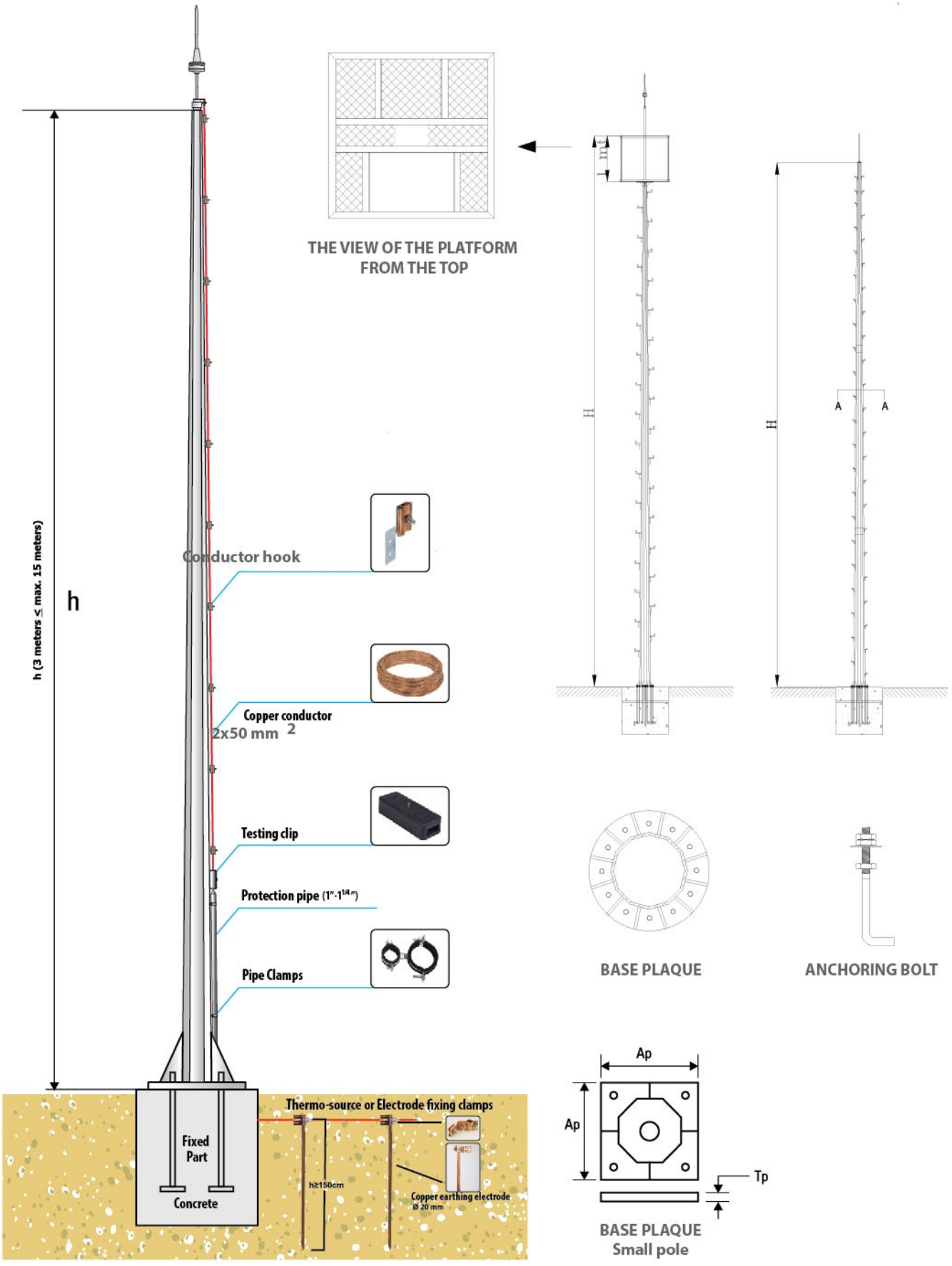
LIGHTNING WARNING SYSTEM

ORDER CODE	PRODUCT NAME
LG - 4H -001	Standard Lightning Strike Counter Bayındırlık Poz No: 980-311
LG4H - 0102	Testable Lightning Strike Counter
LG4H - 0103	Lightning Strike Counter with SMS Module
LG4h - 0104	Lightning Strike Counter with E-Mail Module

MOUNTING DRAWINGS OF LIVA ACTIVE LIGHTNING ROD



MOUNTING DRAWINGS LIVA ACTIVE LIGHTNING ROD



LIGHTNING PROTECTION INSTALLATION AND MOUNTING MATERIALS

CONDUCTOR HOOKS

Tile-Type Hooks

Order Code			Technical Information
Copper	Stainless Steel	Galvanize	Conductor
LG-4C-1201	LG-4C-2201	LG-4C-3201	1x50
LG-4C-1202	LG-4C-2202	LG-4C-3202	2x50
LG-4C-1203	LG-4C-2203	LG-4C-3203	3x30

Ride-Type Hooks

Order Code			Technical Information
Copper	Stainless Steel	Galvanize	Conductor
LG-4C-1301	LG-4C-2301	LG-4C-3301	1x50
LG-4C-1302	LG-4C-2302	LG-4C-3302	2x50
LG-4C-1303	LG-4C-2303	LG-4C-3303	3x30

Plon-type hooks

Order Code			Technical Information
Copper	Stainless Steel	Galvanize	Conductor
LG-4C-1401	LG-4C-2401	LG-4C-3401	1x50
LG-4C-1402	LG-4C-2402	LG-4C-3402	2x50
LG-4C-1403	LG-4C-2403	LG-4C-3403	3x30

U-type hooks

Order Code			Technical Information
Copper	Stainless Steel	Galvanize	Conductor
LG-4C-1601	LG-4C-2601	LG-4C-3601	1x50
LG-4C-1602	LG-4C-2602	LG-4C-3602	2x50
LG-4C-1603	LG-4C-2603	LG-4C-3603	3x30

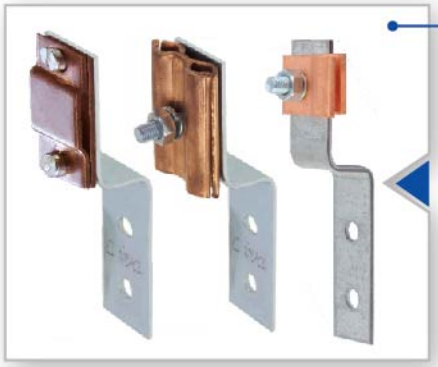
LIGHTNING PROTECTION INSTALLATION AND MOUNTING MATERIALS
CONDUCTOR AND CONDUCTOR HOOKS

Pole Landing Hook

Order Code			Technical Information	
Copper	Stainless Steel	Galvanize	Conductor	Diameter of Pipe
LG-4C-1101	LG-4C-2101	LG-4C-3101	1x50	2 inç
LG-4C-1102	LG-4C-2102	LG-4C-3102	2x50	2 inç
LG-4C-1103	LG-4C-2103	LG-4C-3103	3x30	2 inç
LG-4C-1104	LG-4C-2104	LG-4C-3104	1x50	2 inç
LG-4C-1105	LG-4C-2105	LG-4C-3105	2x50	2 inç
LG-4C-1106	LG-4C-2106	LG-4C-3106	3x30	2 inç

Triphoned Wall Hook

Order Code			Technical Information	
Copper	Stainless Steel	Galvanize	Conductor	Screw Height
LG-4C-1501	LG-4C-2501	LG-4C-3501	1x50	8 cm
LG-4C-1502	LG-4C-2502	LG-4C-3502	1x50	10 cm
LG-4C-1503	LG-4C-2503	LG-4C-3503	2x50	8 cm
LG-4C-1504	LG-4C-2504	LG-4C-3504	2x50	10 cm
LG-4C-1505	LG-4C-2505	LG-4C-3505	3x30	8 cm
LG-4C-1506	LG-4C-2506	LG-4C-3506	3x30	10 cm



Z-Type Hook

Order Code			Technical Information
Copper	Stainless Steel	Galvanize	Conductor
LG-4C-1701	LG-4C-2701	LG-4C-3701	1x50
LG-4C-1702	LG-4C-2702	LG-4C-3702	2x50
LG-4C-1703	LG-4C-2703	LG-4C-3703	3x30

Order Code	LG-4X-1101
Type	Copper Conductor
Conductor section	1x50 mm^2

Order Code	LG-4X-1301
Type	Copper Conductor
Conductor section	30x3 mm^2

Order Code	LG-4X-xxxx
Type	Conductor Additional Clips
Conductor section	2x50 mm^2

Order Code	LG-4X-xxxx
Type	Conductor Additional Clips
Conductor section	30x3 mm^2

LIGHTNING PROTECTION INSTALLATION AND MOUNTING MATERIALS

POLE FIXING EQUIPMENTS

Order Code	LG-4D-3106
Class	Pole Fixing Trestle
Type	Flat Roof Central Type
Size	2" Pole
Base 30 x 30 cm. Height 30 cm.	

Order Code	LG-4D-3105
Class	Pole Fixing Trestle
Type	Flat roof Wall type
Size	2" Pole
Base 30 x 25 cm. Height 30 cm.	

Order Code	LG-4D-3104
Class	Pole Fixing Trestle
Type	Flat roof corner type
Size	2" Pole
Base 25 x 25 cm. Height 30 cm.	

Order Code	LG-4D-3101
Class	Pole Fixing Clip
Type	Concrete Type
Size	2" Pole

Order Code	LG-4D-3102
Class	Pole Fixing Clip
Type	Brick/Wall Type
Size	2" Pole
30 cm. Rod Height	

Order Code	LG-4D-3103
Class	Pole Fixing Clip
Type	Brick/Wall Type
Size	2" Pole
50 cm. rod height	

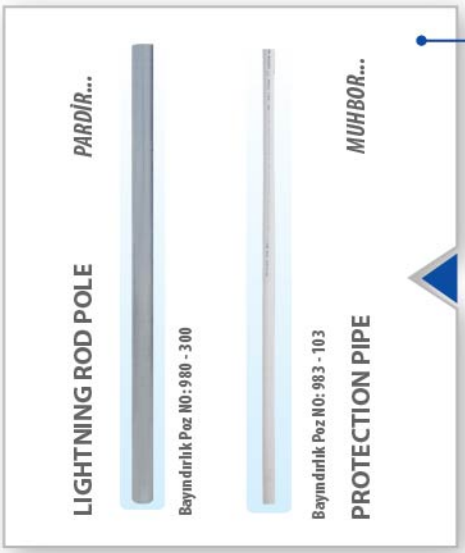
Order Code	LG-4D-3109
Class	Pole Fixing Clip
Type	Brick/Wall type
Size	2" Pole
50 cm Rod Height	

Order Code	LG-4D-3107
Class	Pole Fixing Clip Omega
Type	Wall - Open
Size	Ø 2"

Order Code	LG-4D-3108
Class	Pole Fixing Clip Omega Blind
Type	Wall - Closed
Size	Ø 2"

LIGHTNING PROTECTION INSTALLATION AND MOUNTING MATERIALS

LIGHTNING ROD POLE AND POLE STRETCHING APPARATUS



Lightning Rod Mounting Pole		
Order Code	**Diameter**	**Height**
LG-4D-3201	Ø 2"	3 mt
LG-4D-3202	Ø 2"	6 mt

Protection Pipe			
Order Code			
PVC	**Galvanize**	**Diameter**	**Height**
LG-4D-3303	LG-4D-3302	Ø 1"	2 mt
LG-4D-3304	LG-4D-3301	Ø 1"	3 mt

Order Code	LG-4D-3205
Class	Lightning Rod Additional Appearatus
Type	Lightning Rod Pole
Size	for 2" pole

Order Code	LG-4D-3402
Class	Protection Pipe Clip
Type	From Pipet P Pipe
Size	2" - 1"

Order Code	LG-4D-3403 / LG-4D-3404
Class	Protection Pipe Clip
Type	With Triphone (With Screw)
Size	2" / 1"

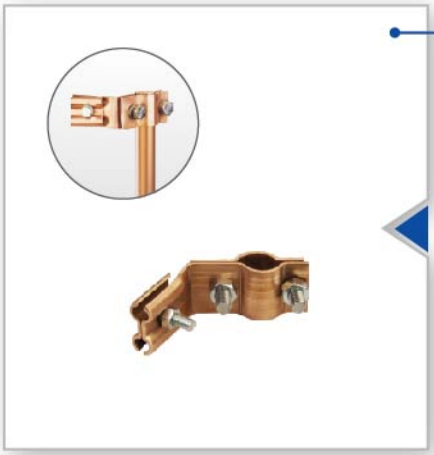
Order Code	LG-4D-3501
Class	Stretching Rope Clamp
Type	-
Size	30 cm

Order Code	LG-4D-3502
Class	Stretching Rope Clip
Type	-
Size	For ropes up to 5 mm

Sipariş Kodu	LG-4D-3503
Cinsi	Stretching Rope
Tip	PVC covered
Ebat	5 mm (the length can be as mcuh as wanted)

LIGHTNING PROTECTION INSTALLATION AND MOUNTING MATERIALS

ELECTRODE AND ELECTRODE FIXING CLAMP



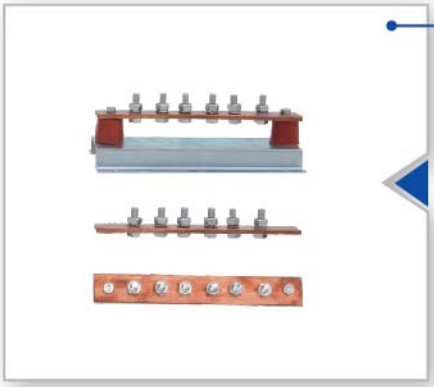
Electro Fixing Clamps

Order Code			Technical Information	
Thickness 1 mm	Thickness 1,5 mm	Thickness 2 mm	Conductor	Electrode
LG-4F-1101	LG-4F-1201	LG-4F-1301	1x50	14 mm
LG-4F-1102	LG-4F-1202	LG-4F-1302	1x50	16 mm
LG-4F-1103	LG-4F-1203	LG-4F-1303	1x50	18 mm
LG-4F-1104	LG-4F-1204	LG-4F-1304	1x50	20 mm
LG-4F-1105	LG-4F-1205	LG-4F-1305	2x50	20 mm
LG-4F-1106	LG-4F-1206	LG-4F-1306	3x30	20 mm

Earthing Electrode

Order Code			Technical Information	
Copper	Stainless Steel	Iron	Height mm	Electrode Ø
LG-4E-1101	LG-4E-2101	LG-4E-3101	1000	18 mm
LG-4E-1102	LG-4E-2102	LG-4E-3102	1500	18 mm
LG-4E-1103	LG-4E-2103	LG-4E-3103	2000	18 mm
LG-4E-1104	LG-4E-2104	LG-4E-3104	1000	20 mm
LG-4E-1105	LG-4E-2105	LG-4E-3105	1500	20 mm
LG-4E-1106	LG-4E-2106	LG-4E-3106	2000	20 mm
LG-4E- 1201	-	-	2 x 500 x 1000 mm	

EQUAL POTENTIAL BARS



Equal Potential Bar

Order Code			Technical Information	
3x30x210 mm	5x30x210 mm	5x50x400 mm	Ground	Coating Cr/ni
LG-4K-1101	LG-4K-1301	LG-4K-1401	Absent	Absent
LG-4K-1102	LG-4K-1302	LG-4K-1402	Present	Absent
LG-4K-1103	LG-4K-1303	LG-4K-1403	Absent	Present
LG-4K-1104	LG-4K-1304	LG-4K-1404	Present	Present

Order Code	LG-4K-1901
Class	Inside panel bar
Type	Neutral - Earthing
Size	Special Order

Sipariş Kod	LG-4K-1902
Cinsi	Inside Panel Bar
Tip	Type for 3-phase
Ebat	-

LIGHTNING PROTECTION INSTALLATION AND MOUNTING MATERIALS

CAPTURING POINTS AND FIXING APPARATUS

Capturing Points

Order Code			Technical Information	
Copper	Stainless Steel	Iron	Height mm	Electrode Ø
LG-4G-1101	LG-4G-2101	LG-4G-3101	500	16 mm
LG-4G-1102	LG-4G-2102	LG-4G-3102	600	16 mm
LG-4G-1103	LG-4G-2103	LG-4G-3103	800	16 mm
LG-4G-1104	LG-4G-2104	LG-4G-3104	500	20 mm
LG-4G-1105	LG-4G-2105	LG-4G-3105	600	20 mm
LG-4G-1106	LG-4G-2106	LG-4G-3106	800	20 mm

Order Code	LG-4G-3502
Class	Capturing Point Base
Type	Ridge Type
Size	Suitable with any kind of capturing point. It has a down entrance hole that allows connecting 50 mm² conductor

Order Code	LG-4G-3501
Class	Capturing Point Base Tile
Type	2 conductor
Size	Suitable with any kind of capturing point. It has a down entrance hole that allows connecting 50 mm

Order Code	LG-4G-3505
Class	Capturing Point Base
Type	Cross Type
Size	For 4 x50 mm² Conductor

Order Code	GL-4G-3503
Class	Capturing Point Base
Type	Concrete Type
Size	Suitable with any kind of capturing point. 4 x50 mm² conductor can be connected.

Order Code	LG-4G-3504
Class	Capturing Point Base
Type	Concrete Type
Size	Suitable with any kind of capturing point. 2x50 mm² conductor can be connected.

Order Code	LG-4G-3506
Class	Capturing Point Fixing Apparatus
Type	Pipe Type
Size	Suitable with any kind of capturing point. Appropriate for 2" pole.

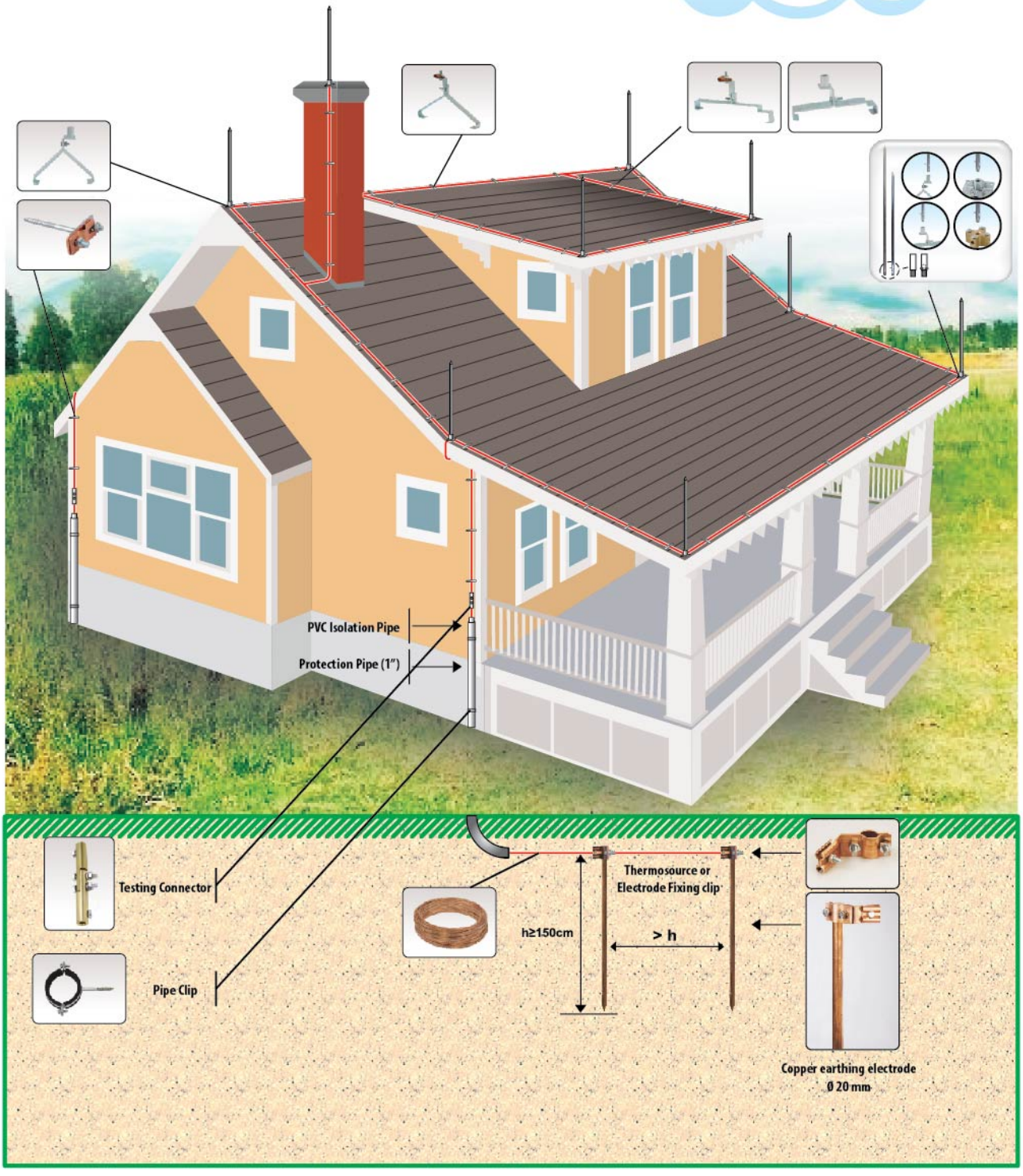
LIGHTNING PROTECTION INSTALLATION AND MOUNTING MATERIALS

BASIC EARTHING MOUNTING MATERIALS

Basic Earthing Mounting Material

Order Code			Technical Information	
Copper	Stainless Steel	Steel Galvenize	Conductor	Thichness (mm)
LG-4J-1103	LG-4J-2103	LG-4J-3103	Tape – Tape	1,5 mm
LG-4J-1104	LG-4J-2204	LG-4J-3104	Tape – Tape	2,0 mm
LG-4J-1201	LG-4J-2201	LG-4J-3201	Tape – Iron	1,0 mm
LG-4J-1202	LG-4J-2202	LG-4J-3202	Tape – Iron	1,2 mm
LG-4J-1203	LG-4J-2203	LG-4J-3203	Tape – Iron	1,5 mm
LG-4J-1204	LG-4J-2304	LG-4J-3304	Tape – Iron	2,0 mm
LG-4J-1301	LG-4J-2301	LG-4J-3301	Iron – Iron	1,0 mm
LG-4J-1302	LG-4J-2302	LG-4J-3302	Iron – Iron	1,2 mm
LG-4J-1303	LG-4J-2303	LG-4J-3303	Iron – Iron	1,5 mm
LG-4J-1304	LG-4J-2304	LG-4J-3304	Iron – Iron	2,0 mm

FARADAY CAGE MOUNTING DRAWINGS



SOIL CONDUCTIVITY MATERIAL (TİM)

Different types of soil resist very differently against electricity current in relationwith their geographical location and and minerals in their component. Especially at rocky regions where earth stratum is little and regions where gravelly sand is intense, electrical resistivity of the soil is strong and accordingly, itsper-meability is very low.

The basic aim of the earthing system is to conduct the electricity current to the soil at the shortest time possible. In the earthing systems where the electricity resistance of the soil is high, the back reflection resulting from undischarged electricity constitutes great danger and potential harm for life safety, primarily, and then for safety of goods. Therefore, the earthing resistance of business and surge arresters' earthing, and of communication systems, particularly, has to be low. For regions where earthing resistance is high, the only method of enhancing conductivity is using mixtures to reduce the permeability resistance of the soil. But the mixtures should not alter the natural structure of the soil, should not pollute underground and surface water resources; in short, the mixture should not ruin the ecological balance of the nature.

Liva Soil Conductivity Material (TİM) is a nature-friendly product, which has been chemically analyzed with respect to enhancing permeability of the soil; and relevant tests have certified that in practice Liva TİM gave much better results (4 to 20 times more permeability) compared to coefficient material in the market.

Liva Soil Conductivity Material (TİM) can be applied to all kind of terrains with all kind of soil.

THE IMPACT OF LIVA SOIL CONDUCTIVITY MATERIAL ON THE SOIL (TİM)

- It reduces the resistance of the soil by enhancing the existing conductivity of the soil.
- The conductivity of the soil that the material is applied remains stable for long years.
- The chemical or physical changes of the soil does not reduce its activation during implementation.
- No change occurs in its essential characteristics with the elapsing of time
- It reduces the risk of freezing by 20 per cent at very cold regions especially during winter time.
- It does not require adding of any other material (salt, coaldust, etc.) for productivity and also there is no need to keep the implementation area wet or moist.

THE ADVANTAGES OF LIVA SOIL CONDUCTIVITY MATERIAL (TİM)

- It allows great advantages in the waste of grounding electrode or tape material due to its high conductivity.
- It reduces the costs of reducing earthing resistance to the minimum.
- It shortens the laboring process needed for lessening the earthing resistance.
- It is not negatively affected from the water potentials inside the soil.
- It does not get into acidic reaction with salt based chemicals inside the soil.
- It does not make reaction with any chemical inside the soil, therefore it does not lead to galvanic corrosion.
- The gloves and dust mask needed for implementation is ready in the package.
- It is easy to implement.

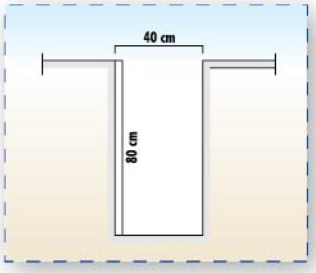
CE Certificate: The SCM has received "CE", Conformity to Europe document.

Bayındırlık Poz No: 988-100

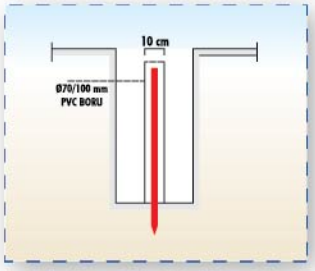
ORDER CODE	PRODUCT NAME	WEIGHT
TİM 115	Earth Conductivity Material	10 Kg.
TİM 050	Earth Conductivity Material	5 Kg.

SOIL CONDUCTIVITY MATERIAL (TİM) PRACTICE PRINCIPLES

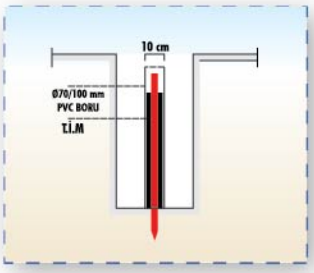
IMPLEMENTATION WITH EARTH ELECTRODE



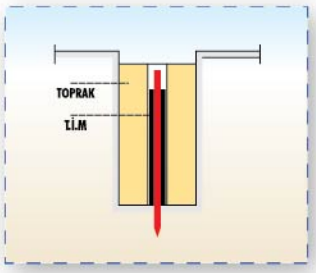
▶ It is necessary to dig a hole of 70-80 cm. in height and 30-40 cm. in width, where earthing electrode will be applied.



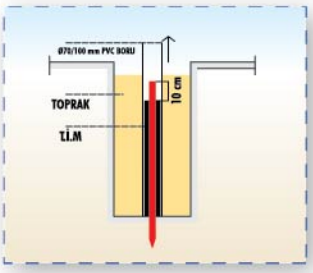
▶ The electrode is nailed 10 cm. below the surface and the rod should be covered by a PVC pipe with a diameter of 70 to 100 mm.



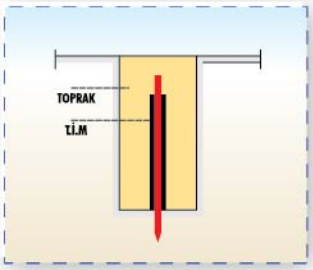
▶ The electrode should be placed right in the middle of the pipe and then the pipe should be filled with SCM, leaving the upper 10 cm part of the electrode open.



▶ The area outside the PVC pipe (electrode hole) is filled and closed by soil.



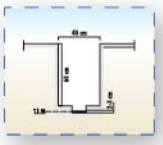
▶ The PVC pipe surrounding the electrode is pulled up and displaced.



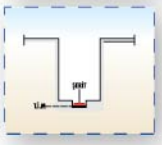
▶ The soil inside the hole is compressed so that the contact of SCM around the electrode and the soil intensifies.

NOTE: After implementation, measure the local earthing resistance with earthing measuring device. If the earthing resistance is high, the same operation can be repeated with additional electrodes with 5 m. distance. The operation can continue until the necessary earthing resistance is attained

IMPLEMENTATION WITH TAPE CONDUCTOR



A channel of 70-80 cm in depth and 30-40 cm in width should be opened when earthing conductor or tape will be used. SCM of 10 cm wide and 2-3 cm thick should be laid on the ground of the channel.



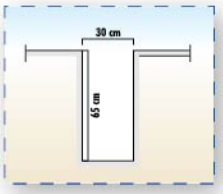
The bare earthing conductor or tape is spread on the SCM.

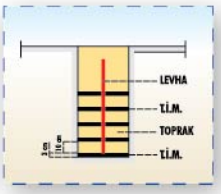
The conductor spread is then covered by the SCM of 10 cm wide and 2-3 cm

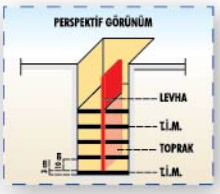
After all, the SCM is covered by soil completely. (Avoid using sand.)

NOTE: Local earthing resistance of the earthing conductor spread on the ground should be measured by earthing measurement device. If the earthing resistance is high, the length of the channel can be enlarged or another earthing system can be installed after 5 meters with a new channel. This practice can go on until the appropriate earthing resistance is found.

IMPLEMENTATION WITH THE PLATE







It is necessary to dig a hole of 60-70 cm. deep and 30-40 cm. wide, where earthing conductor or tape will be applied. The SCM of 3-4 cm thick is laid on the ground of the channel. The conductive plate is placed on the SCM vertically. The SCM on the ground is covered by 10 cm thick soil. Then again, the SCM is spread on the soil for 3-4 cm. This operation of spreading 3-4 cm SCM and 10. cm soil continues for 4 or 5 times. Then, the local earthing resistance of the earthing conductor laid on the ground is measured by earthing measurement device. If the earth resistance is still high, then the same operation may continue upwards throughout the plate. In accordance with the resistance of the earth, enhancing the surface of application and using more SCM would reduce the earth resistance. When the desired resistance value is attained the hole is covered by soil completely. (Avoid using sand).

NOTE: LIVA Earth Conductivity Material can also be mixed with water in the form of cement mortar and applied that way. At the end of the application the PVC pipe should definitely be removed.

THERMO WELDING APPLICATIONS

is a technology used for joints that should be electrically connected, and for jointing metals easily and without problem. It occurs when the melted copper, that results from the reaction of joint aluminium copper oxide material with heat, constitutes the joint. The melted copper is connected at molecular level to the conductors to be jointed; so, an uncut conductive path is constituted with the conductors, whose joint parts will be connected. Therefore, the contact points face no corrosive effect with regards to conduction.

The Advantages of Thermo Welding Connection

It does not require external heat source.

The material can be on-site connected in a few seconds. What is required is just a melting pot of 15-20 cm. large and welding powder. The welding connection takes place on molecular basis.

Therefore;

- Contrary to the mechanical connection, thermo welding does not lead to voltage drop at the welding point.
- Its capacity to carry over current is at least as much as the welding conductor.
- It does not lead to slackening in time or corrosion contrary to the mechanical connections.

DO NOT FORGET!!!

Fastening with mechanical connections have disadvantages due to the influence of corrosion in time. The most effective method for modern and trouble-free solution is the thermo welding. It is an independent and easy method of constituting high-quality electrical connection without a need for external heat resource.

The connections are made by using the reaction of powder copper oxide and aluminium with high temperature. Many Furseweld connections have an area of at least two times more than those of the conductors; their carrying capacity is either equal or more than those of the conductors. Its resistance to rusting is quite high because it includes high proportion of copper.

Thermo Welding Material Selection

For the selectiin of necessary material for thermo welding operation, thermo source connection type should be selected from the next page. Under each connection type, you can find the page number where there is the table of necessary material for that connection. The necessary material can easily be selected from the relevant table.

Implementation of Thermo Welding

1 - Make sure that the melding pot is dry and clean. Place the conductors, whose surfaces had been cleaned, in the pot and combine the melding pot with the pliers.

2- Place the metal handling disc on the base of the melting pot. Pour its powder into the tank and splash some powder for starting. Close the cap of the pot. Inflame the initiation powder with its special lighter. This operation leads to exothermic reaction and turns the tape powder into melted copper alloy.

3- The melted copper alloy melts the metal holding disc and flows into the welding pot where the conductors had partially melted. The reaction takes place in the pot safely.

4- The melted copper alloy is kept in the pot until it gets cold. The melting pot appropriate to the conductors to be connected should be selected.

5- After the thermo welding operation is finished, the pot is emptied and it is cleaned with a brush.

The ideal melting pot should be chosen in accordance with the conductors to be connected.

It is necessary to use separate welding powder for each connection. (Thermo welding powder should be protected from moisture and dampness.)

Thermowelding pliers is used to immobilize the melting pot.
Thermowelding pliers can be used for any kind of melting pot. (except for mini pots)

Mini welding pot and mini pliers should be used for the connection of edged conductors, which are smaller than 16 mm².

Do not approach with inflammable and explosive material while making thermo welding joint. If thermo welding has to be done close to inflammable or explosive material, necessary security measures should be taken.

Use special lighter to ignite the mixture. Donot touch the mixture before it gets cold enough.

Approximately 75 thermo welding connection can be made with a melding pot.

Connect the thermoweld mould with thermoweld-ing plier

Insert the copper wire to inside of the thermowelding mold and put the earthing electrod to down side of the mould

Connect the another copper wires into the thermo welding mould

Press and lock the plier of the mould

To prepare for heating inside of the mould

Take the thermoweld powder box

Open the lid of the thermowelding box

Take the igniter powder and metal plate from inside of the box.

Insert the metal plate hole of the mould.

Discharge the thermoweld powder into the mould.

Thermoweld powder discharged.

Discharge the igniter powder on the thermoweld powder.

Thermoweld system is ready for fire.

Fire the thermoweld igniter by the ingiter gun.

Igniter gun fired.

Ignire gun gived spark.

Thermoweld powder fired.

It has passed to reaction with high temperature.

Thermoweld continues

Thermowelding has finished

It is cooling still

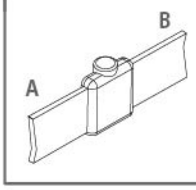
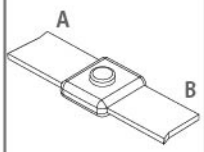
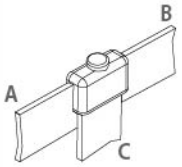
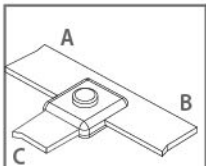
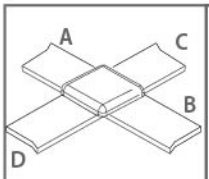
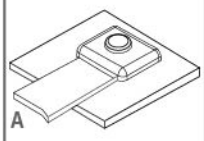
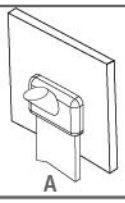
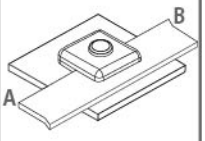
Open after the cool

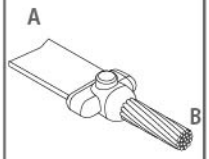
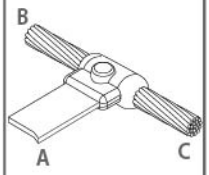
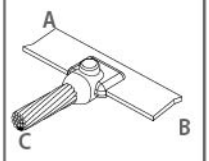
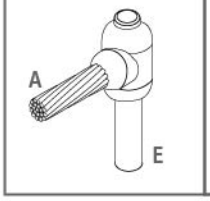
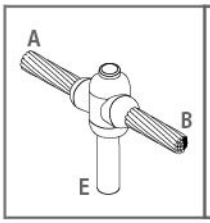
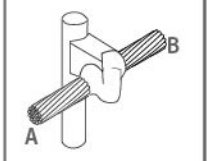
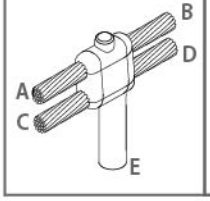
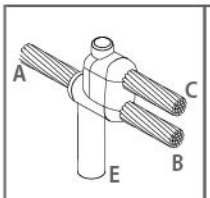
Take out to mould from conducdors

Clean the mould for new application

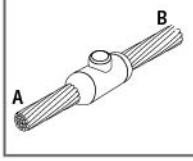
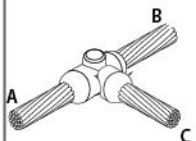
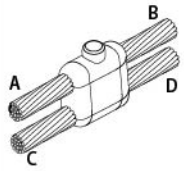
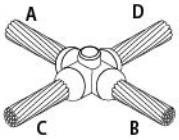
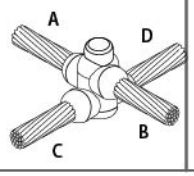
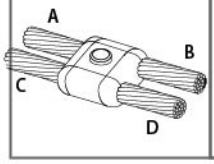
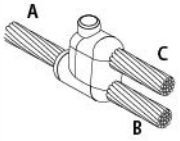
Welded earthing conductors and earthing electrod.

THERMO WELDING JOINT AND MOULD TYPES

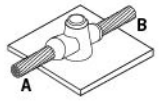
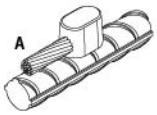
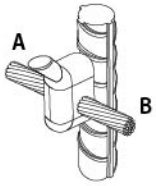
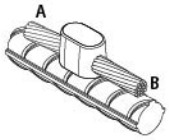
Joint Types	Product Code	Pot Type	A	B	C	D	E	Thermoweld Powder (Gr.)
	LG-4L-1001	L-BB1	20x2	20x2				90
			30x1,5	30x1,5				
			30x3	30x3				
			30x3,5	30x3,5				
			40x2	40x2				
			40x3	40x3				
	LG-4L-1002	L-BB2	20x2	20x2				90
			30x1,5	30x1,5				
			30x3	30x3				
			30x3,5	30x3,5				
			40x2	40x2				
			40x3	40x3				
	LG-4L-1003	L-BB3	20x2	20x2	20x2			115
			30x1,5	30x1,5	30x1,5			
			30x3	30x3	30x3			
			30x3,5	30x3,5	30x3,5			
			40x2	40x2	40x2			
			40x3	40x3	40x3			
	LG-4L-1004	L-BB4	20x2	20x2	20x2			115
			30x1,5	30x1,5	30x1,5			
			30x3	30x3	30x3			
			30x3,5	30x3,5	30x3,5			
			40x2	40x2	40x2			
			40x3	40x3	40x3			
	LG-4L-1005	L-BB5	20x2	20x2	20x2	20x2		150
			30x1,5	30x1,5	30x1,5	30x1,5		
			30x3	30x3	30x3	30x3		
			30x3,5	30x3,5	30x3,5	30x3,5		
			40x2	40x2	40x2	40x2		
			40x3	40x3	40x3	40x3		
	LG-4L-1011	L-BY1	20x2					90
			30x1,5					
			30x3					
			30x3,5					
			40x2					
			40x3					
	LG-4L-1012	L-BY2	20x2					90
			30x1,5					
			30x3					
			30x3,5					
			40x2					
			40x3					
	LG-4L-1013	L-BY3	20x2	20x2				115
			30x1,5	30x1,5				
			30x3	30x3				
			30x3,5	30x3,5				
			40x2	40x2				
			40x3	40x3				

Joint Types	Product Code	Pot Type	A	B	C	D	E	Thermoweld Powder (Gr.)
	LG-4L-1021	L-KB1	20x2	25				90
			30x1,5	35				
			30x3	50				
			30x3,5	50-D				
			40x2	70				
			40x3	95				
				120				
	LG-4L-1022	L-KB2	20x2	25	25			115
			30x1,5	35	35			
			30x3	50	50			
			30x3,5	50-D	50-D			
			40x2	70	70			
			40x3	95	95			
				120	120			
	LG-4L-1023	L-KB3	20x2	20x2	25			115
			30x1,5	30x1,5	35			
			30x3	30x3	50			
			30x3,5	30x3,5	50-D			
			40x2	40x2	70			
			40x3	40x3	95			
					120			
	LG-4L-1031	L-KE1	25				Q14	90
			35				Q16	
			50				Q18	
			50-D				Q20	
			70					
			95					
			120					
	LG-4L-1032	L-KE2	25	25			Q14	115
			35	35			Q16	
			50	50			Q18	
			50-D	50-D			Q20	
			70	70				
			95	95				
			120	120				
	LG-4L-1033	L-KE3	25	25			Q14	115
			35	35			Q16	
			50	50			Q18	
			50-D	50-D			Q20	
			70	70				
			95	95				
			120	120				
	LG-4L-1034	L-KE4	25	25	25	25	Q14	115
			35	35	35	35	Q16	
			50	50	50	50	Q18	
			50-D	50-D	50-D	50-D	Q20	
			70	70	70	70		
			95	95	95	95		
			120	120	120	120		
	LG-4L-1035	L-KE5	25	25	25		Q14	115
			35	35	35		Q16	
			50	50	50		Q18	
			50-D	50-D	50-D		Q20	
			70	70	70			
			95	95	95			
			120	120	120			

THERMO WELDING JOINT AND MOULD TYPES

Joint Types	Product Code	Pot Type	A	B	C	D	E	Thermoweld Powder (Gr.)
	LG-4L-1041	L-KK1	25	25				65
			35	35				
			50	50				
			50-D	50-D				
			70	70				
			95	95				
			120	120				
	LG-4L-1042	L-KK2	25	25	25			90
			35	35	35			
			50	50	50			
			50-D	50-D	50-D			
			70	70	70			
			95	95	95			
			120	120	120			
	LG-4L-1043	L-KK3	25	25	25	25		90
			35	35	35	35		
			50	50	50	50		
			50-D	50-D	50-D	50-D		
			70	70	70	70		
			95	95	95	95		
			120	120	120	120		
	LG-4L-1044	L-KK4	25	25	25	25		115
			35	35	35	35		
			50	50	50	50		
			50-D	50-D	50-D	50-D		
			70	70	70	70		
			95	95	95	95		
			120	120	120	120		
	LG-4L-1045	L-KK5	25	25	25	25		115
			35	35	35	35		
			50	50	50	50		
			50-D	50-D	50-D	50-D		
			70	70	70	70		
			95	95	95	95		
			120	120	120	120		
	LG-4L-1046	L-KK6	25	25	25	25		115
			35	35	35	35		
			50	50	50	50		
			50-D	50-D	50-D	50-D		
			70	70	70	70		
			95	95	95	95		
			120	120	120	120		
	LG-4L-1047	L-KK7	25	25	25			115
			35	35	35			
			50	50	50			
			50-D	50-D	50-D			
			70	70	70			
			95	95	95			
			120	120	120			

THERMO WELDING JOINT AND MOULD TYPES

Joint Types	Product Code	Pot Type	A	B	C	D	E	Thermoweld Powder (Gr.)
	LG-4L-1051	L-KY1	25					65
			35					
			50					
			50-D					
			70					
			95					
			120					
	LG-4L-1052	L-KY2	25	25				115
			35	35				
			50	50				
			50-D	50-D				
			70	70				
			95	95				
			120	120				
	LG-4L-1053	L-KY3	25					65
			35					
			50					
			50-D					
			70					
			95					
			120					
	LG-4L-1054	L-KY4	25					65
			35					
			50					
			50-D					
			70					
			95					
			120					
	LG-4L-1061	L-KD1	25					65
			35					
			50					
			50-D					
			70					
			95					
			120					
	LG-4L-1062	L-KD2	25	25				90
			35	35				
			50	50				
			50-D	50-D				
			70	70				
			95	95				
			120	120				
	LG-4L-1063	L-KD3	25	25				90
			35	35				
			50	50				
			50-D	50-D				
			70	70				
			95	95				
			120	120				

THERMO WELD POWDERS AND MOULDS

Liva Thermo Weld Powders

Order Code	Technical Information	
	Weight Gr.	Units in the Package
LG-4L-0301	65 gr	20 Units
LG-4L-0302	90 gr	20 Units
LG-4L-0303	115 gr	10 Units
LG-4L-0304	150 gr	10 Units

Thermo weld Mould

Liva Thermo Weld Moulds and Joints

Order Code	Technical Infomation		
	Conductors	Image of Application	Thermo Weld Powder
LG-4L-0101	Conductor to Conductor		90 gr
LG-4L-0102	Conductor to Conductor + Electrod		115 gr
LG-4L-0103	Conductor to Conductor		65 gr
LG-4L-0104	Conductor to Conductor + Electrod		90 gr
LG-4L-0105	Tape to Tape		90 gr
LG-4L-0106	Tape to Tape + Electrod		115 gr
LG-4L-0107	Conductor to Tape		115 gr
LG-4L-0108	Tape to Tape		150 gr
LG-4L-0109	Conductor to Conductor		115 gr

THERMO WELD MATERIALS / ACCESSORIES

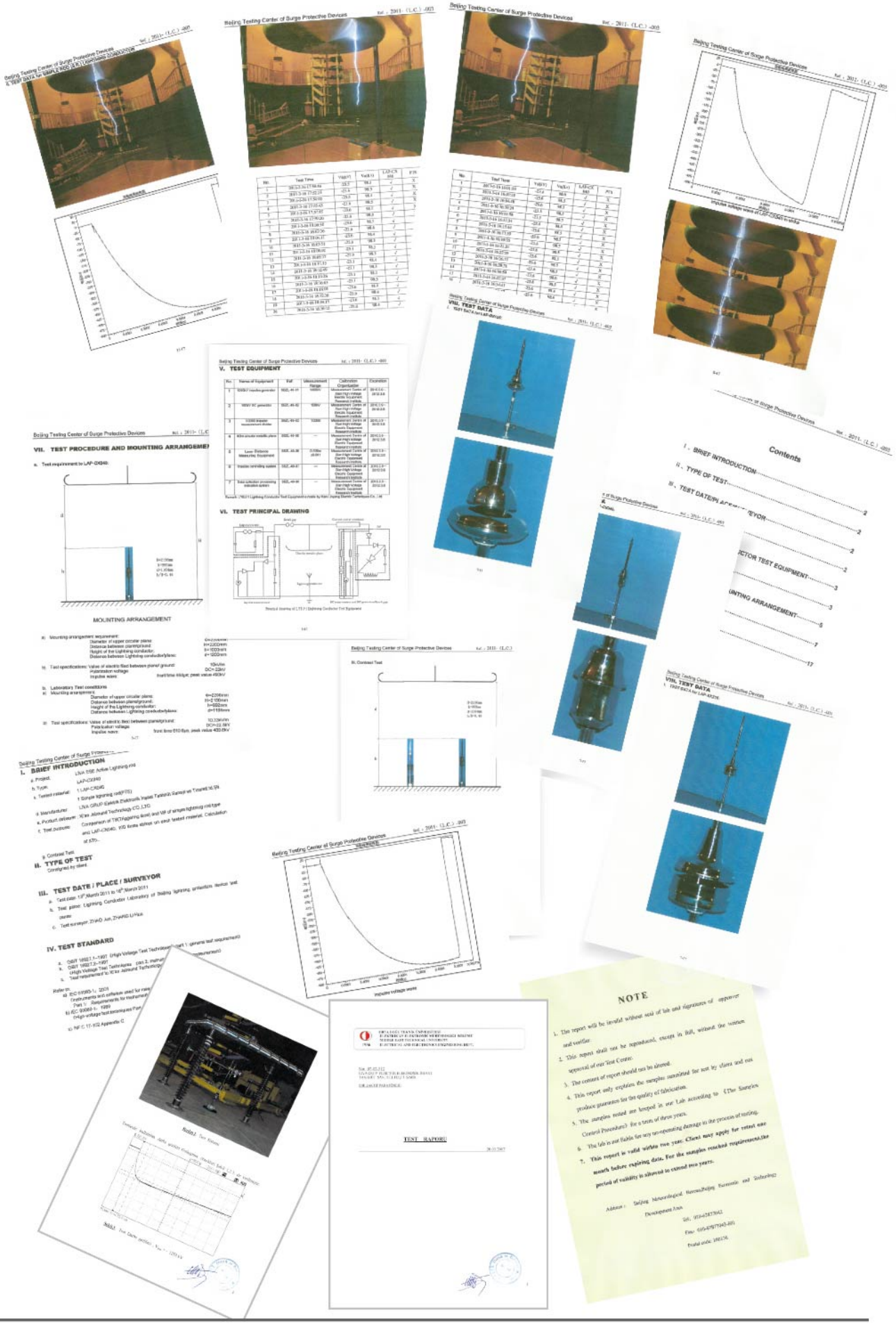
ORDER CODE	PRODUCT NAME
LG-4H-0416	Thermo source Pot Shovel
LG-4H-0414	Thermo source Pot Brush

ORDER CODE	PRODUCT NAME
LG-4H-0411	Thermo source Pot Pliers

ORDER CODE	PRODUCT NAME
LG-4H-0410	Thermo Source Sparking Lighter

CERTIFICATES & DOCUMENTS

TEST CERTIFICATES&DOCUMENTS



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