

1 - STANDARDS AND REGULATIONS TO BE FOLLOWED

The installations will be designed in accordance with the following regulations and standards.

- NFC 17-102: “Lightning protection of structures and open spaces using Active Lightning Rods”
- UNE 21-186: “Lightning protection of structures and open spaces using Active Lightning Rods”
- TS 13709: “Lightning Protection - Active Lightning Rods” (May 2016)
- Ministry of Energy and Natural Resources: “Grounding Regulation in Electricity Facilities” (21.08.2001 Official Gazette)
- TS EN 62561-1: “Lightning Protection Components (YKB) Part 1: Rules for connection components” (June 2013)
- TS EN 62561-2: “Lightning Protection Components (YKB) Part 2: Rules for conductors and earth electrodes (June 2013)

2 - FEATURES OF PIEZOELECTRIC CRYSTAL ACTIVE LIGHTNING LIGHTNING HEADS

Piezoelectric Crystal Active Lightning Rod will have the following features.

- Made of stainless steel material, not subject to chemical corrosion; from rain and bad weather It will be closed and useful without being affected.
- It will have an early flow stimulation (ESE) operating system.
- It will be of European origin.
- It will not contain any electrical and electronic circuits.
- It will have an arrangement that will ensure that the active part is less affected during lightning discharge.
- There will be a model that does not need testing and does not have a test point.
- It will be produced in accordance with NFC 17-102 French Standards.
- It will have test documents from BAZET and LCIE laboratories.
- There will be a test laboratory report showing compliance with NFC 17-102 Standards. It will have the ΔL value measured in this report.
- There will be product information and special hologram showing the year of manufacture, type and serial number on its body.
- Manufacturer or distributor company will have ISO 9001, 14001, OHSAS 18001 and TS EN 62561-1 and TS EN 62561-2 certificates.
- It will have a 25 (twenty five) year working principle guarantee.

3 - LIGHTNING POLE

The lightning rod pole will have the following features.

It will carry the lightning rod safely, with a diameter of 2" and a length of 6 meters; it will be durable and robust against all weather conditions and external factors.

- It will be installed at the highest possible place on the structure.
- If it is higher than 6 meters, it will be fixed with tension wires at least three points.
- The roof pole fixing clamps will be of sufficient thickness and galvanized steel according to the roof type.
- Lightning rod head will be connected to the pole with a suitable connection unit.
- The pole height should not fall below the minimum pole height value determined in TS 13709 and NFC 17-102 standards.

4 - DOWN CONDUCTOR

Down conductor shall have the following features.

- There should be a minimum of 2 side-by-side down conductors in structures up to 60 meters high, and 4 down-conductors side-by-side in structures higher than 60 meters.
- $2 \times 50 \text{mm}^2$ or $30 \times 3 \text{mm}$ electrolytic filled copper or galvanized material.

- All metal installations (railing iron, antenna pole, etc.) near the down conductor will be connected to the lightning rod down conductor. Connections with down conductor will be of the same material.
- The down conductor will be lowered to the ground in the shortest possible way and sharp bends will not be made on the conductor.
- Conductive; When laid on vertical and horizontal surfaces at intervals of 100 cm, when laid horizontally on vertical surfaces, at 50 cm intervals.
- shall be fixed to the surface with copper or galvanized conductor clasps at intervals.
- The down conductor must be seamless. If it is necessary to make a joint, the joints are made by thermowelding, mechanical or electrical.
- will be ensured to be safe.
- In case the down conductor must be insulated; Flat or same test with 150 kA test certificate and 35 mm² cross-section specially produced for this purpose
- A round insulated conductor with a cross section of 50 mm² will be used.

5 - LIGHTNING COUNTER

Lightning counter will have the following features.

- It will be of analog or digital type.
- The test will be certified by LCIE or METU.
- It will be produced according to IP65 protection class.
- Analog devices will have a counting capacity of at least 2 digits (00–99).
- It shall have the feature of making connections without cutting the down conductor.
- It will be connected 10 cm above the test terminal.

6 - TEST TERMINAL

Test terminal will have the following features.

- The test terminal shall be made of copper or galvanized material in a way that it will not corrode with the down conductors.
- It will be located just above the casing pipe.
- All bolts, nuts and washers will be made of stainless material.
- It will be contained in a plastic protector.

7 - CASE PIPE

The casing pipe shall have the following characteristics.

- In order to protect the conductor from physical impacts where the down conductor descends to the ground, it shall be made of internally insulated galvanized pipe.
- It will be 3 meters in length and 5/4" in diameter, with 250cm of it being used above ground and 50cm of it being used underground.

8 - GROUNDING ELECTRODE

The ground electrode shall have the following features.

- One or more of the vertical, horizontal or network type grounding electrodes will be used.
- If a vertical grounding electrode is to be used, the distance between the ground electrodes shall be at least twice the length of the electrode.
- If the required grounding resistance cannot be achieved, additional electrodes and grounding resistance reducing material are used to make the necessary resistance value will be provided.
- The upper end of the conductor and electrodes will be installed at least 50 cm below ground.
- In case a copper-coated steel rod is used as the grounding electrode, the copper coating will be a minimum of 250 microns and TS EN 62561-2
- will have test certificate. Copper coated rods shall not be used by pipe insertion and plastering method.

9 – THERMO WELDING MATERIALS

The materials to be used in the thermowelding process will have the following properties.

—All connection points under the ground (connections of grounding electrodes and down conductors, etc.) with thermowelding method

will be carried out.

—The ignition of the welding powder will be done by electronic methods (with an electronic crucible lighter) from a certain distance in accordance with occupational health and safety.

—Thermowelding products will have a domestic product certificate.

10 – GROUNDING RESISTANCE REDUCER MATERIAL (TDM)

If the desired resistance cannot be achieved, the resistance reducing material to be used shall have the following properties.

—It will not contain compounds such as coal and salt that reduce the life of the conductor, and it will not contain chemicals that will pollute the soil in any way.

—Galvanic corrosion with electrodes will not give acidic reaction like salt.

—TAEK (Turkish Atomic Energy Agency) certificate is preferred.

11 – GROUND TRANSITION RESISTANCE

The value, measurement and reporting of the grounding resistance to be obtained at the end of the work will be as follows.

—As a result of the grounding process, a ground resistance of less than 10 ohms will be obtained.

—The measurement in question will be measured with a pre-calibrated grounding measuring device by a qualified personnel, with the approval of the authorized engineer.

will be reported accordingly.

—The engineer who will approve will have a certificate of expertise in grounding from the "Chamber of Electrical Engineers" and this certificate will be given at the end of the work.

It will be delivered together with the grounding test report.

12 – INSTALLATION CONDITIONS

The documents and qualifications required by the installer will be as follows.

—While assembling and disassembling, attention will be paid to weather conditions in terms of worker health and safety, and it will not be worked in discharged weather.

—Materials to be used other than lightning rod, TS EN 62561-1 (Lightning Protection Components: Part 1 / June 2013) and TS EN 62561-2 (Lightning Protection Components: Part 2 / June 2013) will be manufactured in accordance with the standards.

—The installation company will have ISO 9001 Quality Management System and ISO 14001 Environmental Management System certificates.

—It is preferable that the installer has OHSAS 18001 Certificate.