



TECHNICAL REQUIREMENTS

ELECTRICAL

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PROTECTION OF DIRECT AND INDIRECT LIGHTNING EFFECT

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1. SCOPE

The present document is intended to define the technical requirements of the protection of direct and indirect lightning effect.

2. REFERENCES

The following standards, acts of law and other documents are referenced in the standards:

Statybos techninis reglamentas STR 2.01.06:2009 „Statinių apsauga nuo žaibo. Išorinė statinių apsauga nuo žaibo“, patvirtintas aplinkos ministro 2009 m. lapkričio 17 d. įsakymu Nr. D1-693 (Žin. 2009, Nr. 138-6095)

Elektros įrenginių įrengimo bendrosios taisyklės, patvirtintos energetikos ministro 2012 m. vasario 3 d. įsakymu Nr. 1-22 (Žin., 2012, Nr. 18-816)

Skirstyklų ir pastočių elektros įrenginių įrengimo taisyklės, patvirtintos energetikos ministro 2011 m. gruodžio 15 d. įsakymu Nr. 1-303 (Žin., 2011, Nr. 165-7886)

Specialiųjų patalpų ir technologinių procesų elektros įrenginių įrengimo taisyklės

LST EN 62305-1 *Apsauga nuo žaibo. 1 dalis. Bendrieji principai*

LST EN 62305-2 *Apsauga nuo žaibo. 2 dalis. Rizikos valdymas*

LST EN 62305-3 *Apsauga nuo žaibo. 3 dalis. Fizinė žala statiniams ir pavojus gyvybei*

LST EN 62305-4 *Apsauga nuo žaibo. 4 dalis. Elektrinės ir elektroninės sistemos statiniuose*

OL-TR-GR-000 *General Requirements*

OL-TR-ER-000 *Electrical. General*

3. TERMS AND DEFINITIONS

For terms and definition see:

OL-TR-ER-000 *Electrical. General*

4. GENERAL

4.1 The installation of protection devices for columns, structures, buildings, tanks, etc. against the lightning shall be performed according to the rules of Lithuania STR 2.01.06:2009. Buildings protection against lightning. The external buildings protection against lightning.

4.2 0,4 kV feeders to Control Rooms, UPS systems, direct current rectifiers, illumination of operating and alarm signaling, programmable logic control devices (PLC) and to other

sensitive devices to voltage jumps should have protections with arresters and overvoltage limiters as stated in LST EN 62305-1, 2, 3, 4.

- 4.3** Lightning - the atmosphere is electric discharge between the different parts of the charged clouds or between a cloud and the ground. Lightning effects can be twofold: lightning can damage buildings and equipment directly - such as a direct violation of a lightning strike (initial impact). It can also lead to secondary effects of lightning and electrostatic and electromagnetic induction from the high potential transmission through the surface and underground metal constructions. A direct lightning strike is accompanied by a high rate of heat release, which can cause damage to building structures, fire, explosion, and injury to people or cause them to die.
- 4.4** In case of a lightning strike and 100 m from the discharge site of the potential differences that can reach tens of kV and cause sparks in the air. Sparks can cause an explosion device containing explosive flammable gases, vapors or dust mixtures.
- 4.5** Lightning strike at the space around it appears the electromagnetic field, which induces an electric current in the structure circuits which consist of a variety of metallic structures (pipelines, cables, etc.). High voltage transmission structures as well as possible the rails of the rack, multi-purpose air lines, underground conduits, cables and other communications with long metal and can be accompanied by powerful electric discharges. High voltage transmission structures of these designs can be not only a direct lightning strike to the case, but when this communication is close lightning elements.
- 4.6** Subjects in which an explosive atmosphere in the building must be equipped with an external lightning protection.
- 4.7** Active Lightning intakes should not be used.
- 4.8** Lightning conductor to the grounding probe arrestors should be switching over dismountable connection directly to the electrode.
- 4.9** Freestanding interception grounding rods used in reinforced concrete structures:
- a) One (or more) of at least 2 m long concrete block, or one (or more) of reinforced concrete pole with a length of less than 5 m;
 - b) Dug into the ground, not less than 5 m reinforced concrete pillars stand, with a diameter of not less than 0.25 m;
 - c) Freeform concrete foundation, the ground contact area of not less than 10 m².
- 4.10** Buildings or structures used for volleyball lightning protection probe (consisting of wire mesh) step must be no larger than 10x10 m. If the building or structure is adjacent to or contains an explosive area - wire mesh step cannot be larger than 5x5 m. Volleyball conductor elements to be connected by welding or elements provided by the manufacturer of special mechanical connectors. Protruding above the roof of the building metal structures (pipes, ducts, etc.) must be connected to a network of lightning probe and non-metallic structures - lightning in separate probes, which can also be connected to a network of lightning probe. Mesh type lightning arrestors to probe the perimeter of the building connected by intermediate according to protection class (I-10m, 15m-II, III-20m, 25m-IV), and make sure the corners of the building.
- 4.11** **The lightning protection of story building.** From 15 to 50 m high metal stacks (towers, chimneys, etc.) must have a Lightning rod, which shall not be less than 1 m above them. From 50 to 150 meters high - Lightning rod two probes connected in the top of the stack. Above 150 m high stacks on top must have at least three lightning rod's 0.2-0.5m height, interconnected in ring t or shall be affixed to a steel ring, the

cross-sectional area of it not less than 160 mm². For chimney up to 50 m high can be one (1) grounding conductor, and over 50 meters high - the grounding conductors must be at least every 25 m to the perimeter of the stack, but at least two. Grounding conductors can be used for metal stairs or other vertical metal structures, which includes the entire length of the continuous chain. Separate earthing resistance must not be greater than 30 Ω. Metal chimneys, towers, etc. if its diameter is above 2.5 m the ground to the device must be connected to at least two places. Lightning rod and a ground conductors functions can perform the metal case, if the steel wall thickness over 4 mm, copper over 5 mm and aluminum over 7 mm.

- 4.12** To protect against electrical potential transfer, technological pipelines must be grounded to the inlet of the object (the production section of the technological boundaries of the installation, a building), or to the nearest supports the introduction to the object. Such ground impedance device - no more than 10 Ω.
- 4.13** Electricity supply circuits, for which the secondary effects of lightning or switching surges may occur, must be protected with lightning arresters and, if necessary, surge arresters.