

3. Terms and definitions

For the purpose of this standard, the following definitions apply:

3.1 Lightning flash to earth

Electrical discharge of atmospheric origin between cloud and earth consisting of one or **more strokes.**

3.2 Downward flash

Lightning flash initiated by a downward leader from cloud to earth. A downward flash consists of a first short stroke, which can be followed by subsequent short strokes. One or more short strokes may be followed by a long stroke.

3.3 Upward flash

Lightning flash initiated by an upward leader from an earthed structure to cloud. An upward flash consists of a first long stroke with or without multiple superimposed short strokes. One or more short strokes may be followed by a long stroke.

3.4 Lightning stroke

Single electrical discharge in a lightning flash to earth.

3.5 Short stroke

Part of the lightning flash which corresponds to an impulse current. This current has a time to the half value T_2 typically less than 2 ms (see Figure A.1).

3.6 Long stroke

Part of the lightning flash which corresponds to a continuing current. The duration time T_{long} (time from the 10% value on the front to the 10% value on the tail) of this continuing current is typically more than 2 ms and less than 1 s (see Figure A.2).

3.7 Multiple strokes

Lightning flash consisting on average of 3-4 strokes, with typical time interval between them of about 50 ms (events having up to a few tens of strokes with intervals between them ranging from 10 ms to 250 ms have been reported).

3.8 Point of strike

Point where a lightning flash strikes the earth, or a superstanding object (e.g. structure, LPS, service, tree, etc.)

NOTE - A lightning flash may have more than one point of strike.

3.9 Lightning current (i)

Current flowing at the point of strike.

3.10 Peak value (I)

Maximum value of the lightning current.

3.11 Average steepness of the short stroke current

Average rate of change of current within a time interval t_2-t_1 . It is expressed by the difference $i(t_2) - i(t_1)$ of the values of the current at the start and at the end of this interval, divided by t_2-t_1 (see Figure A.1).

3.12 Front time of short stroke current (T_1)

Virtual parameter defined as 1,25 times the time interval between the instants when the 10% and 90% of the peak value are reached (see Figure A.1).

3.13 Virtual origin of short stroke current (O_1)

Point of intersection with time axis of a straight line drawn through the 10% and the 90% reference points on the stroke current front (see Figure A.1); it precedes by $0.1T_1$ that instant at which the current attains 10% of its peak value.

3.14 Time to half value of short stroke current (T_2)

Virtual parameter defined as the time interval between the virtual origin O_1 and the instant at which the current has decreased to half the peak value (see Figure A.1).

3.15 Flash duration (T)

Time for which the lightning current flows at the point of strike.

3.16 Duration of long stroke current (T_{long})

Time duration during which the current in a long stroke is between the 10% of the peak value during the increase of the continuing current and 10% of the peak value during the decrease of the continuing current (see Figure A.2).

3.17 Flash charge (Q_{flash})

Time integral of the lightning current for the entire lightning flash duration.

3.18 Short stroke charge (Q_{short})

Time integral of the lightning current in a short stroke.

3.19 Long stroke charge (Q_{long})

Time integral of the lightning current in a long stroke.

3.20 Specific energy (W/R)

Time integral of the square of the lightning current for the entire flash duration; it represents the energy dissipated by the lightning current in a unit resistance.

3.21 Specific energy of short stroke current

Time integral of the square of the lightning current for the duration of the short stroke.

NOTE - The specific energy in a long stroke current is negligible

3.22 Object to be protected

Structure or service to be protected against the effects of lightning.

3.23 Structure to be protected

Structure for which protection is required against the effects of lightning in accordance with this standard.

NOTE - A structure to be protected may be a part of a larger structure.

3.24 Service to be protected

A service entering a structure for which protection is required against the effects of lightning in accordance with this standard.

NOTE – Electrical and telecommunication lines are the services most affected by lightning.

3.25 Lightning to an object

Lightning flash striking an object to be protected.

3.26 Lightning flash near an object

Lightning flash striking in the vicinity of an object to be protected able to damage electrical and electronic systems.

3.27 Electrical system

A system incorporating low voltage power supply components and possibly also electronic components.

3.28 Electronic system

A system incorporating sensitive electronic components such as communication equipment, computer, control and instrumentation systems, radio systems, power electronic installations.

3.29 Internal system

Electrical and electronic systems within a structure.

3.30 Physical damage

Damage to structure or to its contents due to mechanical, thermal, chemical and explosive effects of lightning.

3.31 Injuries of living beings

Injuries, including loss of life, to people or to animals due to touch and step voltages caused by lightning.

3.32 Failure of electrical and electronic system

Permanent damage of electrical and electronic system due to electromagnetic effects of lightning.

3.33 Lightning electromagnetic impulse (LEMP)

Electromagnetic effects of lightning current.

NOTE – It includes conducted surges to equipment of electrical and electronic system as well as direct magnetic field effects on equipment itself.

3.34 Lightning Protection Zone (LPZ)

A zone where the lightning electromagnetic environment is defined.

NOTE – In a LPZ electromagnetic effects of lightning current may be mitigated.

3.35 Risk

Probable annual loss (humans and goods) due to lightning, relative to the value(humans and goods)of the object to be protected.

3.36 Tolerable risk (R_T)

Maximum value of the risk which can be tolerated for the object to be protected.

3.37 Lightning protection level (LPL)

A set of lightning current parameters values which defines lightning as source of damage.

NOTE - Lightning protection level is used to design protection measures according to the relevant set of lightning current parameters.

3.38 Protection measures

Measures to be adopted in the object to be protected to reduce the risk.

3.39 Lightning Protection System (LPS)

Complete system used to reduce physical damages due to lightning flashes to a structure. It consists of both external and internal lightning protection systems.

3.40 External lightning protection system

The part of the LPS consisting of an air-termination system, a down-conductor system and an earth-termination system.

NOTE – Typically these parts are outside the structure.

3.41 Internal lightning protection system

The part of the LPS consisting of lightning equipotential bonding and compliance with the separation distance within the structure to be protected.

3.42 Air-termination system

Part of an external LPS using metallic elements such as rods, mesh conductors or catenary wires which is intended to intercept lightning flashes.

3.43 Down-conductor system

Part of an external LPS which is intended to conduct lightning current from the air termination system to the earth-termination system.

3.44 Earth-termination system

Part of an external LPS which is intended to conduct and disperse lightning current into the earth.

3.45 External conductive parts

Extended metal items entering or leaving the structure to be protected such as pipe works, cable metallic elements, metal ducts, etc. which may carry a part of the lightning current.

3.46 Lightning equipotential bonding

Bonding to LPS of separated metallic parts, by direct conductive connections or via surge protective devices , to reduce potential differences caused by lightning current.

3.47 Shielding wire

Metallic wire used to reduce physical damages due to lightning flashes to a service.

3.48 Magnetic shield

Closed metallic grid-like or continuous screen envelopping the object to be protected, or part of it, to reduce failures of electrical and electronic systems.

3.49 Surge protective device (SPD)

Device that is intended to limit transient overvoltages and divert surge currents. It contains at least one non linear component.

[definition 3.1 of IEC 61643-1]

3.50 Surge protective devices system (SPD system)

A co-ordinated set of SPD properly selected and erected to reduce failures of electrical and electronic systems.

3.51 Rated impulse withstand voltage

An impulse withstand voltage assigned by the manufacturer to the equipment or to a part of it, characterizing the specified withstand capability of its insulation against overvoltages.

[definition 1.3.9.2 of IEC 60664-1]