

GLOSSARY OF TERMS

Surge and Lightning Protection ERICO Inc.

Air Termination - shall mean that part of a lightning protection system designed to capture the lightning strike. Normally is mounted on the roof of the structure and is bonded to the down conductor.

Alternating Discharge Current - the alternating discharge current is the r.m.s. value of the almost sinusoidal power-frequency current that flows through the surge voltage limiter.

Amperage - IEEE has developed waveform guidelines for testing. In this guideline, discharge currents (surge currents) are given as 200A, 500A, and 3000A. These values, when combined with the appropriate transient waveshape represent possible transient activity according to ANSI/IEEE C62.41.

Arc Combustion Voltage - the arc combustion voltage (V_{bo}) is the instantaneous value of the voltage on the discharge path while an arc discharge is being arrested.

Bond (bonding) - shall mean a conductor intended to provide electrical connection between a lightning protection system and other metalwork and between various metal parts of a structure or between earthing systems.

Burst - this pulse is repeated at certain time intervals.

Captive Coupling - formed by the strength of the voltage field surrounding a conductor. The voltage field causes a current to flow in an adjoining conductor to an area of lower field strength. Proportional to voltage or conductor.

Clamping Voltage - shall mean the voltage at which the surge arrester starts to conduct. Units typically in RMS Voltage.

Common Mode Voltage - the common mode voltage is the voltage that occurs in the case of interference between active conductors and ground.

Continuous Operating Voltage - the continuous operating voltage (V_c) is the highest r.m.s. power-frequency voltage that may be constantly applied to the arrester terminal blocks.

Coupling - interaction between circuits, during which energy is transmitted from one circuit to the other.

Direct Coupling - a physical connection of two or more electrical conductors.

Disconnect Device (Fuse, Breaker) - this is a device that disconnects an arrester from the system when it fails so that fire hazard is prevented and the defective arrester is indicated. Note: the disconnect device is not responsible for providing protection against electric shock by indirect contact.

Down conductor - shall mean a conductor which connects an earth termination to the (a) System 3000 Dynasphere Terminal or (b) Copper/Stainless Steel air Termination Tape or Finials which are intended to capture lightning discharges and form part of a lightning protection system. In the case of the System 3000, the down conductor will be ERICORE.

Dynamic Test - test conducted with normal operating voltage applied.

Dynasphere - is an air terminal designed to capture a lightning strike with the use of Controlled Streamer Emission (CSE) Technology.

Earth Termination (earth termination network) - shall mean that part of an earthing system that makes contact with, and is intended to discharge currents to the general mass of earth. In the case of a lightning protection system, this includes all parts below any test link.

Earth Conductor - shall mean the conductor making the final connection to the earth rod or electrode.

Earthing Electrodes - shall mean those portions of the earth termination, which make direct low resistance / impedance electrical contact with the earth.

Earthing Resistance/Impedance - shall mean the resistance/impedance of the earthing system to the general mass of earth, as measured from a test point.

Earthing System - shall mean and include all conductors, piping, electrodes, clamps and other connections and earthing compounds whereby installations are earthed.

Electrical Engineering Consultant - shall mean an eminent expert in a sub-discipline of Electrical Engineering.

Electromagnetic Compatibility (EMC) - EMC is the ability of a device to function satisfactorily in its electromagnetic environment, without producing interference which cannot be tolerated in this environment or by other devices.

Electromagnetic Interference - Electromagnetic interference is the loss of performance, malfunctions or failure of an electrical or electronic device caused by electromagnetic interference.

Energy - maximum allowable energy for a single impulse on a 10/1000 μ S current waveform. Indicative of the maximum amount of energy that the suppressor can dissipate. This energy is transitory and is dependent upon three (3) variables: 1) voltage, 2) current, and 3) time. Any variation of the three will effect this figure.

Equipment to be Protected - all devices of a structural system or a range which require surge voltage protection or lightning protection.

Equipotential Bonding - this is the elimination of differences in potential between conductive parts, whereby all points take on approximately the same potential. A distinction is made between functional equipotential bonding and protective equipotential bonding.

Equipotential Bonding System - this refers to all the interconnected equipotential bonding conductors, including the conductive parts such as housings or extraneous conductive parts, which work in the same way. The equipotential bonding system can also be a grounding system or part of a grounding system.

Equipotential Conductor - these are electrically conductive connections which serve to produce the equipotential bonding.

Filter Frequency Range - the range of frequency in which a filter operates. This is usually dictated by the ± 3 db points on the low and high ends of the frequency scale.

Follow-Through Current - this is the current which follows the leakage current under the influence of the operating voltage. It is given as a peak value. Note: with some arrester types (e.g. Metal-Oxide-Varistors) the follow-through current is very small (<1 mA).

Frequency (Noise) Attenuation - the range of attenuation for a given frequency range. A larger negative number indicates a greater attenuation.

Gas Filled Surge Arrester - the gas filled surge arrester is a discharge path that is filled with another gas than air, generally an inert gas.

Ground - this expression refers to the soil and the ground.

Grounding - grounding describes all methods and measures utilized.

Grounding Busbar - this is the rail which is used to connect equipment grounding conductors, equipotential bonding conductors and, if necessary, functional grounding conductors with the ground conductor and the ground electrodes.

Ground Conductor - this is a conductor that connects a device to be grounded with a ground electrode. This is only relevant when the ground conductor is not embedded in the ground.

Ground Electrode - this is a conductor that is embedded in the ground and is conductivity connected to it. Parts of feed lines that are in the ground but are not insulated are regarded as parts of the ground electrode.

Ground Flash (Earth Discharge) - means a lightning flash in which at least one discharge channel reaches the ground.

Ground Resistance - this is the resistance between the grounding system and the reference ground. The amount of ground resistance results from the combined effect of the individual ground electrodes and soil conditions.

Inductive Coupling - formed by the magnetic field surrounding a conductor with a changing current flowing through it. When the magnetic flux lines are cut by another conductor, a voltage is developed on that conductor. The greater the rate of change of the flux lines, the greater the voltage developed.

Impulse Withstand Voltage - the peak value of the highest impulse voltage (V_{st}) with a preset form and polarity, which will not lead to a disruptive charge under the given test conditions. Note: the surge voltage is equal to or greater than the rated surge voltage.

Input Power Frequency - frequency range in which the suppressor operates without causing damage to suppressor or equipment, or interference with the power signal. Applicable to AC circuits.

Intrinsically Safe Circuit - a circuit protected against sparks and ignition and thermal effects (as specified in the DIN VDE 0170/0171 standard which applies to normal operation and specific conditions) which could cause an ignition in an explosive atmosphere.

Joint - shall mean a mechanical and electrical junction between two or more portions of a lightning protection system.

Lead Length - the length of leads, whether integral to the unit or added to effect field connection, extending from the suppression device enclosure on a hard wire panel unit. This is an important factor in testing, as specifications should reflect actual installation application.

Leakage Current - the minuscule current flowing through insulators, electronic components which are in a non-conductive state, or any two points which are insulated between each other. A rising leakage current can be a warning of impending insulation or component failure.

Let-through Voltage - shall mean the voltage appearing on the equipment side of a surge arrester when an impulse voltage-current, with the voltage exceeding the clamping voltage is applied to the input. Surge arresters have non-linear V-I characteristics, and the let-through voltage increases significantly depending on the peak current in the surge.

Lightning Flash (lightning discharge) - shall mean an electrical discharge in the atmosphere involving one or more electrically charged regions, and shall include flashes that do or do not reach the ground.

Lightning Protection System - shall mean a System designed to reduce the injurious and damaging effects of lightning by providing a safe path for capture and conducting lightning energy to ground.

Lightning Strike - is the term used to describe a lightning flash when the attention is centered on the effects of the flash at the point where it connects to the ground or a structure.

Lightning Stroke - is the term used to describe an individual current impulse in a complete ground flash.

Listings - statement of independent laboratory testing, for safety and/or performance.

Location Categories - shall mean the categories for the placement of protective equipment as per ANSI C62.41.

Maximum Continuous Operating Voltage (MCOV) (of a surge arrester) - shall mean the maximum RMS voltage that can be applied continuously between the terminals of a surge arrester without inhibiting its correct operation.

Metallic Sheath (of a cable) - shall include any conductive sheath, armor or screen.

MOVTEC™ - shall be a protective device which is basically a shunt diverter and limits surge voltage by diverting the surge current to earth when a given voltage is exceeded. It is a Multipulse™ rated device with built in redundancy.

Nominal Voltage - normal operating voltage or average voltage at which equipment operates.

Normal Mode Voltage - normal mode voltage is voltage interference between two conductors of a circuit. (Line to Line)

Peak Surge Current - maximum current allowed for a single $8 \times 20 \mu\text{s}$ impulse waveform with continuous voltage applied. The higher the number, the stronger the unit.

Phase Angle - the point on the sine wave at which a transient occurs. IEEE states that transients can occur at any phase angle. It is important to be able to see suppression device response to transients at varying phase angles.

Physical Dimensions - the length, width and height or depth of the suppression device. When considering space constraints in any application, this specification affords quick determination of acceptability.

Positive or Negative Polarity - indicates direction in which the surge occurs.

Power - shall mean electrical power, (e.g., power apparatus refers to electrical power apparatus.)

Power-Frequency Withstand Voltage - this is the r.m.s. value of the highest sinusoidal voltage with system frequency that will not lead to a disruptive charge under the given test conditions.

Pressure Relief Device - relieves the arrester of internal over-pressure in the case of overload.

Protection Modes - protection mode indicates suppressor's ability to protect different paths of transient activity. Normal mode = line to neutral and/or line to line. Common mode = line to ground and/or neutral to ground.

Rated Voltage - rated voltage is the desired normal continuous operating voltage at which surge components are specified.

Residual Voltage - the rated peak voltage reached while surge current is flowing through the surge arrester.

Response Time - the time in which a suppression device responds to a transient.

Side Flash - shall mean a discharge occurring between nearby metallic objects or from such objects to a lightning protection system or to earth.

Sparkover Voltage - the voltage at which a surge arrester becomes conductive.

Stage (of protection) - describes the configuration of circuit elements of a surge protective device. Each phase or line of a typical protective device might be composed of the following elements:

Stage	Power Circuits	Communication and Signal Circuits
1	Metal Oxide Varistors (MOV), TDS, TDP or MOVTEC™	Gas discharge tube
2	Series Low Pass Filter SRF or TDF	Series Impedance, MOV's and/or Tranzorbs Diodes
3	Proline™ or TDF	Gas discharge tube, Series Impedance, MOV's, Tranzorb Diodes

Static Test - test conducted with no normal operating voltage applied.

Structure - shall mean any building or construction, process plant, storage tank, tree, or similar, on or in the ground.

Surge Arrester (Shunt Diverter) - shall mean a protective device, usually connected between any conductor of a system and earth, tested IEC1643 and ANSI C62.1, which limits surge voltages by diverting surge current to earth when a given voltage is exceeded. The let-through voltage must be within a certain tolerance acceptable to the equipment being protected.

Surge Arresting Capacity - this is the rated maximum current a surge arrester is capable of shunting to ground.

Surge Arrestors - consist mainly of voltage dependent resistors and/or discharges. The two elements are connected either in series or in parallel, but each can also be used on its own. Arresters are used to protect other electrical equipment and electrical systems against inadmissible surge voltages.

Surge Current - the surge current is the current flowing through the arrester after it has sparked over. It is given as a peak value.

Surge Current Rating - shall mean the peak value of a standard one-shot 8/20 microsecond impulse current wave that a surge arrester can absorb without damage.

Surge Reduction Filter™ (SRF™) - shall be an in-line series filter designed to remove all surges and transients to an acceptable level produced by a lightning strike.

Surge Voltage - the surge voltage is the permanent or temporary voltage between conductors or between conductor and ground in functioning systems (also in switched off systems) which can endanger people and have damaging effects on cables and connected devices.

Surge Voltage Arrester - this is a device for limiting the surge voltage between two parts within the volume to be protected, e.g. spark gaps, valve arresters or semiconductors.

Surge Voltage Category - allocation of an electrical device to the expected surge voltage.

Surge Voltage Limiter - Surge voltage limiters are components and protective circuits, which limit surge voltages in systems or devices to permissible values.

Surge Voltage Protection Appliances - surge voltage protection appliances are surge voltage limiters together with all the appliances in telecommunications systems including the cables for surge voltage protection.

Surge Voltage Protection Arrangement - this is an element, a group or an appliance that limits the expected surge voltage.

Switching Surge Voltage - this is surge voltage caused by a switching operation.

To Ground - to ground means to connect an electrically conductive component (e.g. the lightning protection system) with the ground via a grounding system.

Transient - these are irregular and relatively short positive and/or negative voltage or current changes between two stationary states.

Test Link - shall mean a joint designed and situated so as to allow resistance/impedance or continuity measurements to be made.

Thunderday - shall mean a calendar day during which thunder is heard at a given location. The international definition of lightning activity is given as the number of thunderdays per year (also called isokeraunic level)

Transient Earth Clamp (TEC) - shall mean a device placed in the bond between the lightning earth and the MEN earth to equalize potentials during a lightning strike.

ERICORE - shall mean a single specially designed down conductor utilized in the System 3000 connecting between the Dynasphere and earth which encapsulates and conducts the lightning energy to earth.

Varistors - the varistor is a bipolar non-linear resistor with a symmetrical voltage/current characteristic curve whose resistance value decreases as the voltage increases.

Voltage - the peak transient voltage which is applied to unit under test according to ANSI/IEEE C62.41 1980, section 4.1: "...This 6 KV level, therefore, can be selected as a typical cutoff for the occurrence of surges in indoor power systems."

Weight - weight of suppression device. Useful in determining application and installation requirements.