

ISOLATED EARTH FOR LIGHTNING PROTECTION SYSTEM

It is quite often when lightning strikes the conventional lightning protection of a building, the building itself may not suffer any damage but equipment inside the building may face severe damage. Hence if lightning does not discharge to the building or the conventional lightning protection system, there will no equipment damage.

Generally conventional lightning protection system uses copper tape or structure steel as down conductor to convey the lightning current to earth. As copper tape cannot isolate the lightning current from the protected structure (as the concrete of a building is also conductive at high voltage), the lightning current will therefore flow through the entire structure and finally inject into the common earth which is a combination of power, building, lightning and equipment earth to achieve equip-potential. As lightning current is a fast transient impulse wave, hence when all metals or earth of electrical appliances are connected together, it is still difficult to achieve equip-potential. This is due to the traveling wave of lightning current and induced voltage caused by magnetic field.

Statistic has shown that a moderate lightning peak current is around 20kA to 50kA. Now let us assume that the common earth resistance is 1 ohm and the lightning peak current is 30kA. Hence the potential of the common earth will be 30kV. Since the equipment body must be connected to the power earth, therefore potential of the equipment body is also 30kV. As the equipment requires power supply while the communication cable is connected to the I/O port of the equipment for networking operation, this is equivalent to 30kV potential difference between equipment body and its power port and/or I/O port. This voltage is actually a voltage surge and is sufficient to cause insulation breakdown and finally damage the equipment. Adding Surge Protective Device (SPD) during these occasions may not be sufficient as the SPD could also be damaged together with the equipment due to such high surge amplitude. This is illustrated in Figure 1

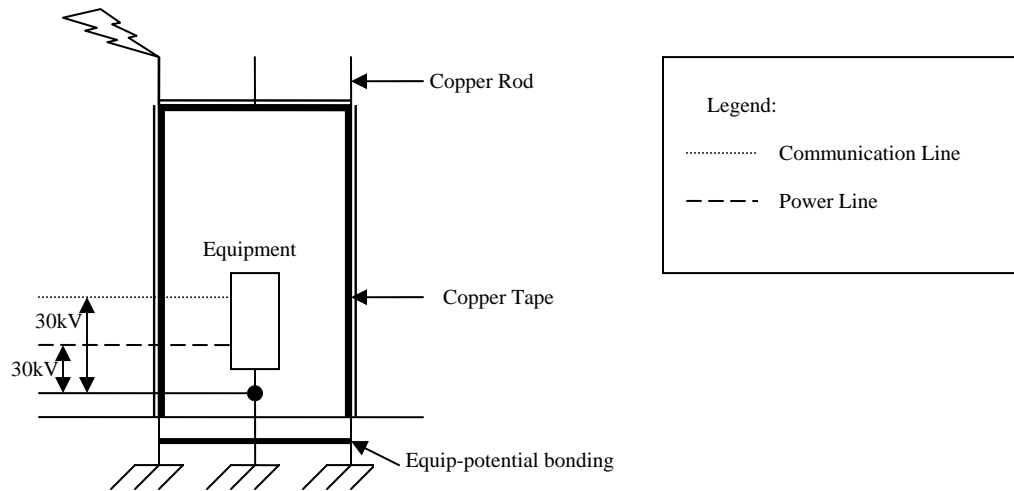


Figure 1

The E.F. Carrier System of Lightning Protection is very unique and completely different from ordinary lightning protection system to cater for today's microelectronic environment. The E.F. Carrier System of Lightning Protection is designed to electrically isolate the lightning current from the protected structure and hence eliminating electrification of structure. An independent earth far away from structure or any other earth system will minimize the impulse interruption. A minimum distance of 5 meters or more is recommended for building in city centre. However, SPD are still necessary to provide protection for remote lightning discharges but its lifespan will be prolonged for separate earth compared to common earth due to less transient impact. This is illustrated in Figure 2.

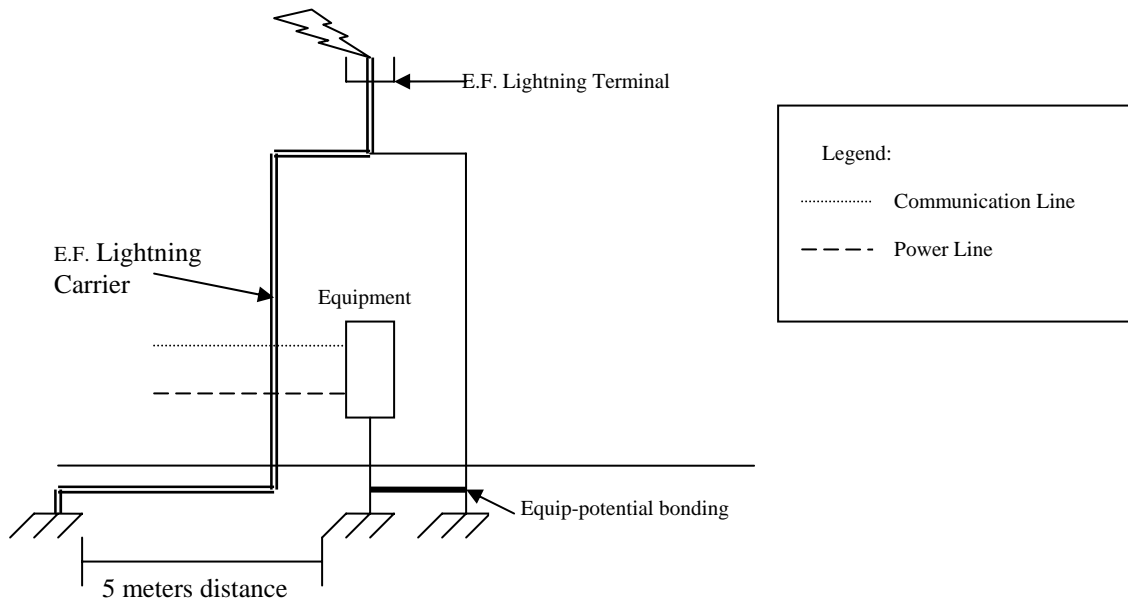


Figure 2

It is also recommended that the earth should be located at a place that is not easily accessible to avoid the danger of step potential. In order to reduce the magnitude of earth potential, the earth resistance should be kept as low as possible, in general should not exceed 10 ohms.

Where necessary to eliminate step potential, an Isolated Earth can be constructed. As the E.F. Lightning Cable is the only cable that can conceal lightning current, hence it can be terminated to the earth rod 6 meters below ground level. This makes the ground area perfectly safe.

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