ELECTRICAL PROTECTION FOR NETWORK OPERATOR-TYPE EQUIPMENT POSITIONS

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Abstract
This standard addresses electrical protection at new installations of network operator-type equipment positions, and at buildings housing such positions. Electrical disturbances may appear at network operator-type equipment positions arising either from Electrostatic Discharge (ESD), or from other sources that are internal or external to the building containing these positions, such as lightning or ac power disturbances. Measures are presented that are intended to help to control ESD in the network operator-type environment, and to provide electrical protection measures that are intended to minimize potential differences at the network operator-type equipment position.

These charges create electrostatic potentials that may exceed 15,000 volts in the absence of measures to control ESD. The intense electric fields generated at the screens of video display terminals can also induce electrostatic potentials on their users. Charge transfer occurs when a person contacts a conductive surface at a different electrostatic potential (usually zero or ground). If the electrostatic potential of the person is sufficiently high and the surface sufficiently conductive, there is a rapid discharge. This discharge is known as ESD.

Historically, the primary ESD concern was related to the reliability of electronic equipment when subjected to discharges from personnel. As a result, most equipment is now designed to withstand relatively high levels of ESD. However, in facilities where ESD is not controlled, there is also an issue of personnel comfort. While generally not considered harmful, electrostatic discharges to personnel can be annoying or even painful. Although electrostatic potentials can be very large, the low capacitance of the human body limits the charge that flows in an ESD event. Discharges to the hand are usually imperceptible below potentials of 3000 volts; for sensitive areas such as the face, the threshold of perception may be 500 volts or lower.

ESD protective measures are used commonly in locations where integrated circuits and other microelectronic devices are handled. These measures are intended to keep electrostatic potentials to very low levels (less than 10 volts). In general, the measures required to maintain ESD at levels that are comfortable for personnel can be less stringent. The control measures of clause 4 are intended to either reduce the incidence of triboelectric charging (antistatic measures) or to ensure slow charge removal (static dissipation).

There are many strategies for minimizing ESD events. The following clauses list a variety of such measures, but are by no means all-inclusive. As a rule, not all of these techniques will be either necessary or desirable to establish an ESD protected area. The appropriate ESD protection strategy should be based on the particular application and the advantages and disadvantages of each ESD protective method.

4.1 Relative humidity control

Control of the relative humidity can be an effective means for ESD mitigation because it aids static dissipation and is associated with lowered triboelectric charging. Many topical antistatics lose their effectiveness if the humidity is too low. Also, contaminants on insulative surfaces become more conductive when humidity increases, a process that often lowers the resistance to ground enough to inhibit ESD. However, because this process depends on (uncontrolled) surface contamination, it should not be relied upon to provide static dissipation.

Rooms containing network operator-type positions should be maintained within the range of 40 to 55 percent relative humidity. Below 40 percent, ESD events are more likely. Above 55 percent, electrolytic corrosion may affect equipment performance. A possible disadvantage of relative humidity control is
that improperly designed or maintained humidification systems pose the risk of microbial contamination.

4.2 Flooring

Any carpeting or floor tiles should have a resistance to ground between 10^6 and 10^{10} ohms when measured using the method of ESD-S7.1. Existing flooring that does not meet this requirement should be treated with a topical antistatic solution such as an antistatic floor wax. The effectiveness of antistatic
solutions is temporary and varies with floor material and relative humidity. Flooring resistance should be monitored every two weeks minimum to verify conformance to the above requirement.