

169.7 Environmental

169.7.1 General safety

Equipment subject to this clause shall conform to the general safety requirements in J.2. In particular, the PSE shall be classified as a Limited Power Source in accordance with Annex Q of IEC 62368-1:2018, as applicable. For automotive applications, systems described in this clause may be subject to additional requirements; refer to ISO 26262. All equipment subject to this clause may be additionally required to conform to any applicable local, state, or national standards related to safety, including national motor vehicle standards related to safety or as agreed to between the customer and supplier.

169.7.2 Network safety

This subclause sets forth a number of recommendations and guidelines related to safety concerns. The list is neither complete nor does it address all possible safety issues. The designer is urged to consult the relevant local, national, and international safety regulations to verify compliance with the appropriate requirements. LAN cabling systems described in this clause are subject to at least four direct electrical safety hazards during their installation and use. These hazards are as follows:

- a) Direct contact between LAN components and power, lighting, or communications circuits.
- b) Static charge buildup on LAN cabling and components.
- c) High-energy transients coupled onto the LAN cabling system.
- d) Voltage potential differences between safety grounds to which various LAN components are connected.

Such electrical safety hazards should be avoided or appropriately protected against for proper network installation and performance. In addition to provisions for proper handling of these conditions in an operational system, special measures should be taken to verify that the intended safety features are not negated during installation of a new network or during modification of an existing network.

169.7.3 Installation and maintenance guidelines

It is a mandatory requirement that sound installation practice, as defined by applicable local codes and regulations, be followed in every instance in which such practice is applicable. In particular, users are cautioned to be aware of the ampacity of cabling, as installed, and local codes and regulations, e.g., the National Electrical Code® (NEC®) (NFPA 70®, 2023 Edition) [B??] (*Note to editor, update reference to 2023 edition of NEC*), relevant to the maximum class supported.

It is a mandatory requirement that, during installation of the cabling plant, care be taken to verify that noninsulated network cabling conductors do not make electrical contact with unintended conductors or ground.

All cabling and equipment subject to this clause is expected to be mechanically and electrically secure in a professional manner. In automotive applications, all MPOE cabling should be routed in way to provide maximum protection by the motor vehicle sheet metal and structural components, following SAE J1292, ISO 14229, and ISO 15764.

Automotive environmental conditions are generally more severe than those found in many commercial and industrial environments. The target automotive, industrial, or commercial environment(s) require careful analysis prior to implementation.

169.7.4 Patch panel considerations

It is possible that the current carrying capability of a cabling cross-connect may be exceeded by a MPSE. The designer should consult the manufacturers' specifications to verify compliance with the appropriate requirements.

104.8.5 Telephony voltages

The use of building wiring brings with it the possibility of wiring errors that may connect telephony voltages to an MPSE or MPD. Other than voice signals, the primary voltages that may be encountered are the "battery" and ringing voltages. Although there is no universal standard, the following maximums generally apply: Battery voltage to a telephone line is generally 56 Vdc, applied to the line through a balanced 400 Ω source impedance. Ringing voltage

is a composite signal consisting of an ac component and a dc component. The ac component is up to 175 V_p at 20 Hz to 60 Hz with a 100 Ω source resistance. The dc component is 56 V_{dc} with 300 Ω to 600 Ω source resistance. Large reactive transients can occur at the start and end of each ring interval.

Application of any of the above voltages to the PI of an MPSE or an MPD in non-automotive applications shall not preclude conformance with 169.7.1 and 169.7.2.

169.7.5 Electromagnetic emissions

The MPD and MPSE powered cabling link shall comply with applicable local and national codes for the limitation of electromagnetic interference.

In addition, the system may need to comply with more stringent requirements as agreed upon between customer and supplier, for the limitation of electromagnetic interference. In automotive applications, an MPOE system shall be tested according to CISPR 25 test methods, and shall meet the following motor vehicle EMC requirements:

- a) Radiated/Conducted Emissions: CISPR 25, IEC 61967-1/4, and IEC 61000-4-21
- b) Radiated/Conducted Immunity: ISO 11452, IEC 62132-1/4, and IEC 61000-4-21
- c) Electrostatic Discharge: ISO 10605 and IEC 61000-4-2/3
- d) Electrical Disturbances: IEC 62215-3 and ISO 7637-2/3

Exact test setup and test limit values may be adapted to each specific application, subject to agreement between the customer and the supplier.

169.7.6 Temperature and humidity

The MPD and MPSE powered cabling link segment is expected to operate over a reasonable range of environmental conditions related to temperature, humidity, and physical handling. Specific requirements and values for these parameters are beyond the scope of this standard.

169.7.7 Labeling

It is recommended that the MPSE or MPD (and supporting documentation) be labeled in a manner visible to the user with at least the following parameters:

- a) Power classification and power level in terms of maximum current drain over each compatible operating voltage range both in terms of Watts, Amps, and Unit Loads, applies for MPD only
- b) Port type (e.g., 10BASE-T1M, TIA Category, or ISO Class)
- c) Any applicable safety warnings
- d) “MPSE” or “MPD” as appropriate
- e) Indicate any non-MDI connectors which are not isolated from the MDI leads
- f) System type (e.g., “Type 0” or “Type 1”)