

# NEC Article 645.5

This article covers equipment, power-supply wiring, equipment interconnecting wiring, and grounding of information technology equipment and systems, including terminal units, in an information technology equipment room.

The term *information technology equipment* (ITE) replaced other terms that describe computer-based business, personal, and industrial equipment. This terminology is also used by **UL 60950-1, *Safety of Information Technology, Part I: General Requirements***, as well as international standards, as a more inclusive term for the equipment addressed by Article 645.

## 645.5 Supply Circuits and Interconnecting Cables

- A *Branch-Circuit Conductors:*** The branch-circuit conductors supplying one or more units of a data processing system shall have an ampacity not less than 125 percent of the total connected load.
- B *Cord-and-Plug Connections:*** The data processing system shall be permitted to be connected to a branch-circuit by any of the following listed means:
1. Flexible cord and attachment plug cap not to exceed 4.5 m (15 ft.).
  2. Cord set assembly. Where run on the surface of the floor, they shall be protected against physical damage.
- C *Interconnecting Cables:*** Separate data processing units shall be permitted to be interconnected by means of listed cables and cable assemblies. Where exposed to physical damage, the installation shall be protected by approved means.
- D *Under Raised Floors:*** Power cables, communications cables, connecting cables, interconnecting cables, and receptacles associated with the information technology equipment shall be permitted under a raised floor, provided the following conditions are met:
1. The raised floor is of suitable construction, and the area under the floor is accessible.
  2. The branch-circuit supply conductors to receptacles or field-wired equipment are in rigid metal conduit, rigid non-metallic conduit, intermediate metal conduit, electrical metallic tubing, electrical nonmetallic tubing, metal wire way, nonmetallic wire way, surface metal raceway with metal cover, nonmetallic surface raceway, flexible metal conduit, liquidtight flexible metal conduit, or liquidtight flexible nonmetallic conduit. Type MI cable, Type MC cable, or Type AC cable. These supply conductors shall be installed in accordance with the requirements of 300.11.

Branch-circuit conductors installed under the raised floor of an ITE room using any of the wiring methods listed in 645.5(D)(2) are required to conform to the specific article for the wiring method used. In addition, Article 300 applies, except where modified by article 645. For example, 300.11 requires raceways, cables, and boxes to be securely fastened in place, even though they are installed below a raised floor.

3. Ventilation in the under floor area is used for the information technology equipment room only, except as provided in 645.4(2). The ventilation system shall be so arranged, with approved smoke detection devices, that upon the detection of fire or products of combustion in the under floor space the circulation of air will cease.

The under floor area of the ITE room is required to be provided with smoke detection device(s). Upon detection of smoke, the circulation of air in the under floor area must be interrupted. The most common method of interrupting air circulation is to open the circuit that supplies power to the air circulation fan. In addition to causing cessation of air circulation in the under floor area, the smoke detectors may provide other fire protection functions as part of a complete building fire alarm system.

A revision to 645.5(D)(3) for the 2005 Code recognizes that a ventilation system can serve the under floor areas of an ITE room as well as other areas of a building, if the ventilation system is equipped with the requisite smoke and fire dampers at the ITE room boundaries. These fire protection features isolate

the under floor area from other areas served by the ventilation system upon detection of smoke or activation of the ITE room disconnecting means. This revision correlates 645.5(D)(3) and 645.4(2).

4. Openings in raised floors for cables protect cables against abrasions and minimize the entrance of debris beneath the floor.
5. Cables, other than those covered in (D)(2) and those complying with (D)(5)(a), (D)(5)(b), or (D)(5)(c), shall be listed as Type DP cable having adequate fire-resistant characteristics suitable for use under raised floors of an information technology equipment room.
  1. Interconnecting cables enclosed in a raceway.
  2. Interconnecting cables listed with equipment manufactured prior to July 1, 1994, being installed with that equipment.
  3. Cable type designations Type TC (Article 336); Types CL2, CL3, and PLTC (Article 725); Type ITC (Article 727); Types NPLF and FPL (Article 760); Types OFC and OFN (Article 770); Type CM (Article 800); and Type CATV (Article 820). These designations shall be permitted to have an additional letter P or R or G. Green, or green with one or more yellow stripes, insulated single conductor cables, 4 AWG and larger, marked "for use in cable trays" or "for CT use" shall be permitted for equipment grounding.

**FPN:** One method of defining fire resistance is by establishing that the cables do not spread fire to the top of the tray in the "Vertical Tray Flame Test" referenced in ANSI/UL 1581-2001, *Standard for Electrical Wires, Cables, and Flexible Cords*. Another method of defining fire resistance is for the damage (char length) not to exceed 1.5m (4 ft. 11 in.) when performing the CSA "Vertical Flame Test - Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-2001, *Test Methods for Electrical Wires and Cables*.

Interconnecting cables used under raised floors (other than branch-circuit conductors) are required by 645.5(D)(5) to be listed as Type DP cables. Cables listed as part of equipment manufactured before the effective date of July 1, 1994, were not required to be listed. Cables in raceways are also exempt. Cables that pass the Vertical Tray Flame Test referenced in ANSI/UL 1581-2001, *Standard for Electrical Wires, Cables, and Flexible Cords*, or the Vertical Flame Test - Cables in Cable Trays as described in CSA C22.2, No. 0.3-M-2001, *Test Method for Electrical Wires and Cables* (where not more than 4 ft. 11 in. of cable is damaged during the CSA test), are permitted to be installed under raised floors of computer rooms. Type DP cables that satisfy these tests are also permitted under raised floors.

4. Abandoned cables shall be removed unless contained in metal raceways.

**E** **Securing in Place: Power cables; communications cables; connecting cables; interconnecting cables; and associated boxes, connectors, plugs, and receptacles that are listed as part of, or for, information technology equipment shall not be required to be secured in place.**