

## National Electrical Code (NEC) Article 645.5

### 645.5 Supply, Circuits and Interconnecting Cables

**A—Branch-Circuit Conductors:** The branch-circuit conductors supplying one or more units of information technology equipment shall have an ampacity not less than 125 percent of the total connected load.

**B—Power-Supply Cords:** Information technology equipment shall be permitted to be connected to a branch-circuit by a power-supply cord.

1. Power-supply cords shall not exceed 4.5 m (15 ft).

2. Power cords shall be listed and a type permitted for use on listed information technology equipment or shall be constructed of listed flexible cord and listed attachment plugs and cord connectors of a type permitted for information technology equipment.

**C—Interconnecting Cables:** Separate information technology equipment units shall be permitted to be interconnected by means of listed cables and cable assemblies. The 4.5 m (15 ft) limitation in 645.5(B)(1) shall not apply to interconnecting cables.

**D—Physical Protection:** Where exposed to physical damage, supply circuits and interconnecting cables shall be protected.

**E—Under Raised Floors:** Power cables, communications cables, connecting cables, interconnecting cables, cord-and-plug connections, 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 approved 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 nonmetallic conduit, intermediate metal conduit, electrical metallic tubing, electrical nonmetallic tubing, metal wireway, nonmetallic wireway, 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, and associated metallic and nonmetallic boxes or enclosures. These supply conductors shall be installed in accordance with the requirements of 300.11.

**Note:** Branch-circuit conductors installed under the raised floor of an ITE room using any of the wiring methods listed in 645.5(E)(2) are required to conform to the specific article for the wiring method used. In addition, Article 300 applies, except where modified by Article 645.5. 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. Supply cords of listed information technology equipment in accordance with 645.5(B).

**Note:** Supply cords of ITE equipment are permitted to be run through holes in a raised floor to connect to receptacles located below the raised floor. Openings in a raised floor through which cords and cables are run must be made so the cords and cables are not subject to abrasion. This provision allowing cords through openings in a raised floor is a 90.3 amendment to the general prohibition of this practice found in 400.8.

4. Ventilation in the underfloor 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 underfloor space, the circulation of air will cease.

**Note:** The underfloor area of an ITE room is required to be provided with smoke detection device(s). Upon detection of smoke, the circulation of air in the underfloor 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 underfloor area, the smoke detectors may provide other fire protection functions as part of a complete building fire alarm system. A ventilation system can serve the underfloor 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 underfloor 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) with 645.4(2).

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## National Electrical Code (NEC) Article 645.5 (continued)

5. Openings in raised floors for cords and cables protect cords and cables against abrasion and minimize the entrance of debris beneath the floor.

**Note:** Interconnecting cables used under raised floors (other than branch-circuit conductors) are required by 645.5(E)(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 of 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 cables 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. This requirement does not apply to supply cords of ITE equipment that are installed beneath the raised floor in accordance with 645.5(B) and (E)(3).

6. Cables, other than those covered in (E)(2) and (E)(3), and those complying with (E)(6)(a), (D)(6)(b), or (E)(6)(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.

- a. Interconnecting cables enclosed in a raceway.
- b. Cable type designations shown in Table 645.5 shall be permitted. 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.

**Note:** One method of defining fire resistance is by establishing that the cables do not spread fire to the top of the tray in the "UL Flame Exposure, Vertical Tray Flame Test" in UL 1685-2000, Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable.

Another method of defining fire resistance is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA "Vertical Flame Test — Cables in Cable Trays," as de-

scribed in CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.

**F—Securing in Place:** Power cables; communications 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.

**G—Abandoned Supply Circuits and Interconnecting Cables:** The accessible portion of abandoned supply circuits and interconnecting cables shall be removed unless contained in a raceway.

**H—Installed Supply Circuits and Interconnecting Cables Identified for Future Use.**

1. Supply circuits and interconnecting cables identified for future use shall be marked with a tag of sufficient durability to withstand the environment involved.

2. Supply circuit tags and interconnecting cable tags shall have

the following information:

- a. Date identified for future use
- b. Date of intended use
- c. Information relating to the intended future use

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**Cable Types Permitted Under Raised Floor**

Article	Plenum	Riser	General Purpose
336			TC
725	CL2P & CL3P	CL2R & CL3R	CL2, CL3 & PLTC
727			ITC
760	NPLFP & FPLP	NPLFR & FPLR	NPLF & FPL
770	OFNP & OFCP	OFNR & OFCR	OFN & OFC
800	CMP	CMR	CM & CMG
820	CATVP	CATVR	CATV

Source: 2011 Edition—National Electrical Code

Note, this represents only a small portion of the overall National Electrical Code, other NEC Articles may modify Article 645.5. If you have any questions about this or any other NEC Articles please see the National Fire Protection Agency (NFPA), [www.nfpa.org](http://www.nfpa.org).

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