

Rethinking Construction



**Installing Modular Electrical Wiring, Telecommunications Cabling and
Air Distribution Devices beneath a Raised Access Floor without a Fire
Suppression System**

August 1, 2003

We are pleased to provide the following joint statement by CII, Tate, York, and Tyco Electronics which addresses the topic of fire suppression systems beneath raised floors as a means of controlling a potential fire risk presented by the existence of CII's modular wiring system, and/or a plenum rated Type CMP telecommunications cabling network, and/or York air distribution devices.

It is directed primarily at code enforcement officials who are relatively unfamiliar with the use of modular electrical wiring systems, telecommunications cabling, and air distribution devices in the space below a raised floor. We hope that it provides specific responses to frequently asked question about the codes and convinces officials that fire suppression systems are not required due to the presence of these devices under a raised floor.

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July 28, 2003

Re: Installing Modular Electrical Wiring, Telecommunications Cabling and Air Distribution Devices beneath a Raised Access Floor without a Fire Suppression System

Dear Sir/Madame:

CII, Tate, York, and Tyco Electronics have joined together to comment to the industry concerning the use of power, voice and data cabling, and air distribution devices located in "air spaces" either below a raised floor or above the ceiling. The application of our products in these spaces may involve building enforcement officials who are relatively unfamiliar with these systems and the unique issues that they present. We hope that the following discussions will provide specific responses to frequently asked question about the codes.

We are offering this letter as a means of addressing the concern of installing CII's modular electrical wiring system, and/or industry standard Type CMP plenum rated telecommunications cabling, and/or York air distribution devices beneath a raised access floor that is being used to transport environmentally conditioned air. Specifically, we will explain why it is not necessary to install a fire suppression system beneath a raised access floor as a means of controlling a potential fire risk presented by the existence of CII's modular wiring system, and/or a of plenum rated Type CMP telecommunications cabling network, and/or York air distribution devices.

This issue has been occasionally raised on projects we have been involved with throughout the United States. To date, every local jurisdiction has allowed CII's modular wiring system, plenum rated telecom cabling, and York air distribution devices to be installed beneath raised access floors, and never have they required the addition of a fire suppression system.

This is because Underwriters Laboratories has listed CII's modular wiring system, and plenum rated, Type CMP telecommunications cabling, as suitable for use in environmental air handling spaces. And York's air distribution devices are suitable for these same spaces based on their compliance with NFPA 90A, *Standard for the Installation of Air Conditioning and Ventilating Systems*.

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Modular Wiring and Cabling

Further to the modular wiring and cabling question, UL has also deemed CII's modular wiring system to be non-flammable; Neither sprinklers nor any other type of fire suppression system has ever been required to be installed based on a perceived potential threat of combustion introduced into the environment by CII's Manufactured Wiring System. To our knowledge there is one local jurisdiction, Las Vegas, which requires Type CMP plenum rated telecommunications cabling to be installed in conduit, however they do not require the introduction of a fire suppression system for the purpose of controlling the potential risk of fire introduced into the environment by a "conducted" electrical or telecom cabling system.

Despite the fact that the spaces used to transport environmental air below an access floor or above a suspended ceiling are often commonly referred to as air plenums, they are actually classified as air-handling spaces by the National Electrical Code. The NEC 2002 National Electrical Code Handbook makes a clear distinction between air-handling spaces and plenums. A clarification note to Article 300-22(c) in the 2002 NEC Handbook states, "Section 300-22(c) applies to other spaces used to transport environmental air that are not specifically manufactured as ducts or plenums, such as the space or cavity between a structural floor or roof and a suspended (hung) ceiling. Many spaces above suspended ceilings are intended to transport return air. Some are also used for supply air, but these are not nearly so common as those used for return air." Additionally, the 2002 NEC Handbook clarifies the NEC's concept of what a plenum is, or is not, by stating, "The definition of *plenum* is not intended to apply to the space above a suspended ceiling that is used for environmental air referred to in Section 300-22(c)".

Raised access floors are not specifically manufactured as plenums; they are manufactured as floors. The primary function of a raised access floor, other than being a floor, is that of providing a convenient means of distributing communications, electrical, and mechanical systems within an office environment. As with the space above a suspended ceiling, the space below a raised access floor can also be used to transport conditioned environmental air. The space beneath a raised access floor performs the same functions relating to the distribution of utility services and environmental air as does the space above a suspended ceiling. In further clarifying what is to be considered a plenum, the 2002 NEC Handbook states in a clarification note to Article 300-22(b), "Paragraph (b) applies to ducts and plenums such as sheet metal ducts, specifically constructed to transport environmental air. Equipment and devices such as lighting fixtures and motors are not normally permitted in ducts or plenums . . ."

CII's Whips and Power Distribution Modules are approved by Underwriters Laboratories for use in environmental air handling spaces, as defined by Article 300-22(c) of the National Electrical Code; as are Type CMP plenum rated telecom cables, and therefore meet the National Electrical Code criteria for wiring systems used in environmental air handling spaces other than ducts or plenums. Article 300-22(c)(1) of the NEC limits the wiring methods in environmental air handling spaces to totally enclosed non-ventilated raceways,



standard rigid conduit, Type MC or AC cable, and listed manufactured wiring systems without nonmetallic sheaths, (CII Power Cables).

Article 604 of the NEC governs the use of manufactured wiring systems. Section 4 of the article permits the use of manufactured wiring systems in spaces used for environmental air handling, provided they are listed for such applications. Since CII PowerMate Cables and Power Distribution Modules are listed by UL as a manufactured wiring system approved for use in environmental air handling spaces, as far as the National Electrical Code is concerned, there is no problem installing CII's modular wiring system within any drop ceiling space or beneath any raised access floor, whether or not they may be commonly referred to as plenums.

While it is clear that the CII modular wiring system and plenum rated telecom cabling may be installed in the space beneath a raised access floor system, the question of flammability at times does come into question. One local code authority referred us to the 2000 International Mechanical Code (IMC):

1. Section 602.2.1.1 of the 2000 IMC requires a flame spread not greater than 5 feet when tested in accordance with UL Standard for Safety 910.

According to Mr. Allen G. Weber, Senior Engineering Associate at Underwriters Laboratories' Northbrook IL facility, UL 910 is a withdrawn standard, not applicable to Manufactured Wiring Systems. Mr. Weber says that the flame spread test was used to test the flammability characteristics of the plastic and other combustible materials used in the manufacture of optical fiber raceways. It was never used to test the flammability characteristics of the flexible steel conduit and other noncombustible components used in the manufacture of Manufactured Wiring Systems.

2. Section 602.2.1.4 of the 2000 IMC states "Combustible electrical equipment exposed within a plenum shall have a peak rate of heat release not greater than 100 kilowatts, a peak optical density not greater than 0.50, and an average optical density not greater than 0.15 when tested in accordance with UL 2043."

CII's Manufactured Wiring System and any Type CMP plenum rated telecom cabling are UL listed and approved for use in Environmental Air Handling spaces. To obtain this rating CII's products have been tested to and found compliant with UL Standard for Safety 2043. The results of CII's product testing, while in direct contact with UL's 60 kW burner for 10 minutes, fell well below the maximum allowable heat release and the maximum allowable peak and average optical density criteria required by UL and by the IMC. As for Type CMP plenum rated telecom cabling, a clarification note pertaining to Art. 800.51(A) of the NEC states:

One method of defining low smoke-producing (telecommunications) cables is by establishing an acceptable value of the smoke produced when tested in accordance with NFPA 262-1999, *Standard Method of Test for Flame Travel and Smoke of Wire and Cables for Use in Air-Handling Spaces*, to a maximum peak optical density of 0.50 and a maximum average optical density of 0.15. Similarly, one method of



defining fire-resistant cables is by establishing a maximum allowable flame travel distance of 1.52 m (5 ft) when tested in accordance with the same test.

Air Distribution Devices

Concerns regarding code compliance of the materials used in the construction of underfloor (or overhead) air distribution systems are addressed by NFPA 90A, *Standard for the Installation of Air Conditioning and Ventilating Systems*. The specific NFPA 90A reference that addresses air outlet construction in section 2-3.6.2 states: “Air outlets shall be constructed of non-combustible material or a material that has a maximum flame spread index of 25 and a maximum smoke developed index of 50.” All components of the York FlexSys system, including the floor grilles, chassis, controls and cabling comply with NFPA 90A without exception.

NFPA 90A specifies two additional air outlet construction elements that allow air outlets to be installed in a raised floor: “Where provisions have been made to prevent dirt and dust accumulations from entering the system” (section 2-3.6.3.1) and “Outlet openings shall be protected by a grille or screen having openings through which a ½-in. sphere cannot pass” (section 2-3.6.3.2). The York MIT chassis is designed to prevent dirt and dust accumulations from entering the system and its grille openings meet the dimensional requirements. A more comprehensive discussion of all system codes and industry standards that apply to underfloor air distribution systems is contained in the York Applications manual, available from any York sales office.

Conclusion

Section 300-22(c) of the NEC allows Manufactured Wiring Systems that are approved by UL for use in environmental air handling spaces, compliant with the optical density and heat release standards of UL 2043, to be used in spaces that transport conditioned environmental return and supply air, that are not specifically manufactured as ducts or plenums without the requirement of a fire suppression system. Similarly, Art. 800-51 of the NEC allows for the installation of plenum rated telecommunications cabling in the environmental air handling space beneath a raised access floor, that has been found compliant with the same optical density and heat release criteria as listed in NFPA 262-1999. Again, because of the low optical density and heat release characteristics of plenum rated cable, there is no requirement for a fire suppression system.

The NEC is also clear that, for the purpose of electrical and telecommunications distribution conforming to UL standards, the space beneath a raised access floor is considered an air-handling space, suitable for CII’s Manufactured Wiring System and industry standard plenum rated type CMP telecommunications cabling. Given that, and the fact that the flame spread limitation of UL 910 referenced in the 2000 IMC is not applicable to non-combustible Manufactured Wiring Systems, and type CMP plenum rated telecom cable has been certified to a flame spread limit of only 5 feet, there is no reason why CII’s modular wiring system and type CMP plenum rated telecom cabling should not be installed beneath a raised access floor. We also conclude that the introduction of a fire suppression system to

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protect against the potential fire hazard of a virtual noncombustible modular wiring system is not necessary.

NFPA 90A provides the parameters for allowing the use of air outlets in a raised floor. It specifies: air outlet construction materials must be non-combustible (or have maximum flame spread and smoke developed indexes of 25 and 50 respectively); outlets must have provisions to prevent dust and dirt accumulation in the system; the grille openings must prevent passage of objects defined by the size of a ½-inch sphere. The York MIT grilles, chassis and controls comply with all of the NFPA 90A requirements for air outlets in a raised floor.

Contact Information for Further Discussion:

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York International: Joe Halza (717 – 771 – 6804)

Tyco Electronics: Lane Moncourtois (336 – 727 – 5173)

Tate Access Floors, Inc.: Technical Services (1 – 800 – 231 – 7788)