

Cabling Safety in Multi-Story Structures

By: John J. Michlovic, PE, National Marketing & Technical Manager
CENTRIA H. H. Robertson Floor Systems
www.centria.com

Several aspects related to cabling safety are typically overlooked by the telecom industry and the building design team. These issues are principally related to the hazards of smoke and/or toxic gases from heat decomposition and/or burning cables in supply and return air plenums. A plenum is a space used to circulate environmental air, either supply air or return air. The two principal locations for plenums are the spaces above ceilings and the space below raised floors or access floors that are used for air delivery.

Under heated conditions, exposed combustible thermoplastic insulated and jacketed cables in these plenums can produce highly toxic gases and smoke, which can convert to powerful acids that can incapacitate the building occupants in an emergency situation. The clear gases or thick smoke can incapacitate and represent a real life safety hazard to building occupants. This dangerous scenario happens often. According to the National Fire Protection Association, there are an average of 16 office fires every day in the USA.

Plenum rated cables are fire retardant. They are tested for flame spread and smoke generation to meet the code requirements (prior to manufacture), and are not re-tested for continued compliance after installation. Plenum cables are required to comply with the test provisions of NFPA 262, which does not regulate the time or temperature of cable ignition; it regulates only the progression of the flame after the cables are burning; and the "color" of the smoke produced. Clear toxic gases are not measured at all.

This may sound like a formula for disaster in a fire event but nobody said its actually safe . . . its only "Code Approved" and thus legal to use in most cities.

All thermoplastic materials can decompose. The effects of cable aging on flame spread and smoke generation are not reported. Can telecom cables that are aged 5 or 10 years in a ceiling plenum under high temperatures and humidity conditions still pass NFPA 262 criteria? Nobody checks this and no data is available from cable manufactures on cracked, damaged, or aged cables. Sampling at the factory is not required and cable producers may submit their own samples to a test lab rather than a random sampling conducted by an independent lab.

Sustainability of test results is therefore an open issue that is rarely discussed but critical to fire safety. "Safe Today - Useless Tomorrow" is a frightening concept, yet current and proposed code requirements leave this loophole open to disaster. On this website (wireville.com) you have learned of the serious questions about the lead content of most plenum rated cables. Now the NEC 2002 requires the removal of abandoned communications cable. There is an estimated 45 billion feet of abandoned

cable containing lead (a hazmat material) that will enter the waste stream and cannot be cost-effectively recycled. There is an exception: The National Electrical Code (NFPA-70) allows tagging for future use so the cable does not have to be removed. Under the current National Electric Code there is no "fill limit" for the cable in the return air plenum spaces. This additional loophole is another invitation to disaster, because there is no limit to the fuel load accumulation.

Cables made with thermoplastic materials comprise the major "fire and smoke" threat in return air plenum spaces. The code which first allowed in 1975 communication cables to be used in return air plenums (under an exemption), has since been expanded to allow a raft of other plastic devices to flow through the broken dam.

Consider that today the following additional combustible plastic items are permitted in unlimited quantities in plenums:

- A. Pneumatic tubing for control systems
- B. Fire sprinkler piping (plastic pipe)
- C. Communications raceways (plastic cable raceways)
- D. Loudspeakers and recessed lighting fixtures and all their accessories

These items must comply with the same weak Standard (NFPA 262) that applies to plenum cables. The intent of the code may have been compromised.

Now that the life safety problem has been outlined, are there any safe distribution systems for telecom and power cabling? Yes, there are two. The first "safer" method is the use of EMT conduit for all cables and wires. The conduit will not protect cable insulation from melting but will limit smoke and gases generated by heat decomposition from entering the plenum and re-circulating throughout the structure.

Another safe solution is the use of a Cellular Floor System.

Large cellular deck cells used to support the wet load of concrete and to replace slab, reinforcing can later be used as wire and cable raceways. This Structural/Electrical System has been used in tens of thousands of office structures since the 1930's.

Fed by a trench header from the power and telecom closets the cells deliver wire and cables to outlet boxes set on a pre-selected pattern along the length of the cells. Each box can deliver 3 services; telephone, power, and data to each activated workstation anywhere on the floor.

Buried within the concrete slab and fireproofed on the underside the steel cells and trench header protect wire and cable against burning in a fire event. Other benefits are:

- EMI protection for all cables
- Non-plenum cable rated is safe to use
- Easy activation of outlets without core drilling
- Best grounding of any raceway system

- Lowest cost when all factors are considered
- High capacity and flexibility

So there you have it, an excellent solution to your new construction cabling requirements . . . a SAFE in-floor cellular raceway system - possibly the best choice of an informed specifier.

About H.H. Robertson Floor Systems

H.H. Robertson Floor Systems introduced cellular floor systems to the office market in 1931 and has supplied continually improved systems since that time in over one billion square feet of office space. Innovations such as the bottomless trench header, preset outlet boxes and the three service system were all developed and tested in our research labs.

Many cellular floor systems providers have come and gone during the past 70 years but H.H. Robertson has always been and remains today the cellular floor leader.

Contact us at 450 19th Street Ambridge PA, phone: 412-299-8070 or visit our website : www.hhrobertson.com