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One of the most important elements of any fire alarm system is the cable used to power it.You know, if the fire alarm cable doesn’t do its job, the whole system doesn’t work.And there is more to fire alarm cable than you might expect. Here are some of the standards, specifications, and common questions, answered.What Is Fire Alarm Cable Used for? Does It Have Any Special Properties?No surprises here. Fire alarm cable is used to power and monitor a fire alarm system.There are two main types of fire alarm systems: conventional and addressable.Conventional fire alarm systems are the ones we all think of when we hear the word “fire alarm.” These consist of a central control panel with cables that branch out from there and power and manage the system’s other nodes, being smoke detectors, heat detectors, and alarms.On the other hand, think of an addressable fire alarm system as a “smart” system, in which each initiating device (alarms, detectors, switches) has its own unique address, making it easier to identify, diagnose, and repair issues with the system. Addressable systems require less fire alarm cable to wire, as well.Fire alarm cables are designed with special insulating plastics that produce less smoke when they burn, do not release toxins, and some are made to be self-extinguishing if they catch fire.Fire alarm cables are also usually manufactured with a red insulating jacket. This makes it easier for electricians to identify them quickly at a glance, streamlining service.What’s the Difference Between Plenum and Riser-Rated Cable?Two of the most important designations you will come across in fire alarm cable have to do with their ratings as either plenum cable or riser rated cable.Riser-rated fire alarm cable is designed to be used in riser space, which is the vertical space between the floors of a building that communicates between the different floors. Riser-rated cables are designed to produce little smoke, emit no toxins, and self-extinguish. They must satisfy UL 1424 and UL 1666 vertical riser test standards.Plenum-rated fire alarm cable is intended to be used in plenum space, which is the space beneath a raised floor or above a drop-ceiling. This is the space where HVAC ductwork is often contained. These cables can be used in areas where there is high ambient airflow and must pass UL 1424 tests and be Steiner tunnel test 910. Plenum cable is also more expensive than riser-rated cable.Like riser-rated cable, plenum-rated cable must produce little smoke when burning and self-extinguish. While plenum-rated cable can be used in riser space, it is important to remember that riser cable should not be used in plenum space.What Standards Are Applicable to Fire Alarm Cable?There are several different organizations that produce and maintain standards commonly applied to fire alarm cable.One of these is the NFPA, or National Fire Protection Association which is instrumental in producing the NEC, or National Electric Code, which prescribes standards not only for fire alarm cable but for all different sorts of electrical equipment.Other organizations involved in setting standards and developing standardized testing for fire alarm cables are ASTM International and Underwriters Laboratories (UL).What’s the Difference Between Power-Limited and Non-Power-Limited Cable?One of the fine distinctions in fire alarm cables is between power-limited and non-power-limited cable, though this is not always well understood.Power-limited, or PL cables, are intended to connect to power supplies that limit the power and voltage that can travel through the cables.Conversely, non-power-limited cables do not require a power source that is limited, and can work with voltages typically up to 600V. They are less commonly used than power-limited fire alarm cables. What Is Shielded Cable? When to Use It?One other distinction between the different types of fire alarm cable has to do with shielding.Shielded fire alarm cables are encased within a foil “shield” that blocks out electromagnetic interference, also known as EMI.EMI can arise from natural or manmade sources, but regardless of the origin, EMI can scramble an electrical system or completely incapacitate it.Therefore, shielded cables must be used wherever there is a high risk of EMI interfering with the system, such as if the cable is run along with a lot of other different power lines.Non-shielded fire alarm cables lack this protective foil shield and are more suspect to EMI.Do You Still Have Questions About Fire Alarm Cables?If this post didn’t answer one of your questions about fire alarm cables or about other types of alarm cable or wire, get in touch with us directly. You can reach us by phone at 1-800-262-1598 or by email at Sales@EWCSWire.com.We offer a wide range of electrical wire and cable including many highly-specialized electrical conductors and would be more than happy to help you find what you need. Fire alarm systems are very important for any business, school, facility, home and much more. They protect us when alerts arise and deliver notification of potential threat and harm. In previous blogs, we have discussed how fire detection systems work and the differences between conventional vs. addressable fire alarm systems. Today, we will go over the different types of fire alarm cables with both power limited and non-power limited fire alarm cables. So, let's begin… Power limited Fire Alarm Cables 1) FPL which is a power-limited fire alarm riser cable is usually the least expensive because it is the most basic type of fire alarm cable and is also recognized by the NEC (National Electric Code). FPLR cables are suitable for use in a vertical run through a shaft or from floor to floor within a building. 2) FPLR Shielded is a power-limited fire alarm shielded cable, has the same components of the standard FPLR but, includes an aluminum polyester foil shield and drain wire to protect against outside interference. 3) FPLP which is a power limited plenum cable and they are recognized by the NEC for use in air ducts and plenum spaces and any other space that is used for the flow of environmental air. These cables tend to be a little bit more expensive due to the additional engineering and protection they offer. All FPLP cables are listed as having adequate fire-resistant and low-smoke-producing characteristics as well. 4) FPLP Shielded cables are power limited plenum fire alarm cables with an aluminum polyester foil shield and drain wire to block an additional interference within a cable. Non-Power Limited Fire Alarm Cables 1) NPLF or, non-power limited fire alarm cables are recognized by the NEC and are suitable for all general fire alarm cable uses. They cannot, however, be used in riser, ducts or plenum spaces that used for environmental air flow unless they are properly installed within a conduit. 2) NPLFP are non-power limited fire alarm cables are also recognized by the NEC but these cables are suitable for installation in ducts, plenums and other spaces where environmental air flows. Check out our blog to read other articles about fire alarm cables, data sheet or see what our Product Line Managers have to say by viewing the West Penn Wire Youtube channel: According to the NEC (National Electric Code), tray cable is defined as “a factory assembly of two or more insulated conductors, with or without associated bare or covered grounding conductors under a nonmetallic sheath, for installation in cable trays, in raceways, or where supported by a messenger wire.” Tray cable is sunlight, heat, and moisture resistant and adheres to UL specifications. Both 300V and 600V tray cables are tested to meet the same flammability standards. What makes a tray-rated cable different from a standard multi-conductor? Tray cables are high-quality cables that have been tested rigorously and generally boast armor over individual conductors for superior insulation and a robust jacket that can withstand heavy abrasion. Tray cables also pass stringent impact and crush tests per UL 1569 and do not require the use of conduit. This lowers installation and maintenance costs, while also making routing during installation quicker and easier, especially when using tray-rated cables with flexible jackets, like ÖLFLEX®190 & ÖLFLEX®190CY, ÖLFLEX® AUTO-I, and more. When should you use a tray-rated cable? Tray cable is applied in many different industrial plant expansions, automotive plants, tray wiring, wind energy, machine tool, forestry equipment, oil and petrochemical equipment, cold temperature storage and packaging facilities, processing equipment, and more. Despite widespread misinterpretation in the industry, standard tray-rated cable cannot run outside of the cable tray per the National Electrical Code (NEC) Sec. 336.10(7) from 2014. If a cable must run outside of a tray for any length, a tray cable rated for “exposed-run”(ER) must be used. When should you use an exposed-run (ER) tray-rated cable? Unlike standard tray-rated cables, exposed-run tray-rated cables can be installed in applications where the cable will drop from tray to tray or from tray to equipment, like a motor. These cables can be installed outside of the cable tray for six feet at a time for up to 50 feet with proper support, like with struts. In some applications, this reduces the need to protect non-ER cable in conduit when it runs between the tray and the device since they comply with the crush and impact requirements of armored cables. This eliminates the cost of conduit and installation, additional armor, and a hefty NEC violation fee. What are the different tray ratings, what do they mean, and where are they commonly used? Type TC (Tray Cable) tray-rated cables will be the most common type you will see on the market. These are rated to 600V, and there are no length restrictions during installation. These cables are most commonly used in power and control circuits and in tray applications where flame retardant properties are required. They can be installed in raceways, cable trays, and in outdoor applications. If you intend to install a 600V tray-rated cable with slack between the tray and a piece of equipment for more than 6 feet, be sure to use a Type TC-ER (Tray Cable- Exposed Run) tray cable like ÖLFLEX® TRAY II, ÖLFLEX® Control TM/TM CY, ETHERLINE® TRAY CAT7, or ÖLFLEX® TRAY VTC. Type PLTC (Power Limited Tray Cable) cables are tray-rated cables rated to 300V per UL 13. These tray cables are commonly used by OEM’s and in non-plenum and non-riser applications. Power limited tray cables can be routed in the same tray as 600V power and control tray cables when separated by a divider. There are many sub-ratings within the category of PLTC cables, so many of these tray-rated cables are tested for multiple ratings. You will find dual ratings in many cables, like UNITRONIC® 300 STP. Type ITC (Instrumentation Tray Cable) cable is the most common type of PLTC cable that we see in the market. These cables are also rated to 300V, but are intended for use in direct burial applications and are typically used by contractors. The drop length for an ITC cable between tray and equipment cannot exceed 50 feet outside of the tray, even when supported. Browse Type ITC products like ÖLFLEX® Chain TM & ÖLFLEX® Chain TM CY, UNITRONIC® 300/300S, and UNITRONIC® 300 STP as well as our other tray-rated products to find the right fit for your application. Browse our tray cables and use our chat to talk with a sales representative today to find the best solution for your application. There are five basic types of Fire Alarm Cable that are identifiable by the areas where they are approved for use by the National Electric Code. FPL— Power Limited for general purposes. This designation indicates that this fire alarm cable is non-plenum rated, and may not be installed in risers, ducts, plenums, or other spaces used for environmental air unless first installed in conduit. Although FPL cables resist the spread of fire, they are not typically as fire-resistant as plenum and riser-rated cables. FPLR— Power Limited Suitable for the floor to floor, or "riser-rated." Risers are the spaces that run vertically from floor to floor in a building. The National Electric Code requires FPLR cable to be fire-resistant to prevent fires from spreading through multiple floors of a building. FPLP— Power Limited Suitable for use in ducts, plenums, and other spaces dedicated to air circulation because of the extra safety features incorporated into its design. This Cable is plenum-rated, fire-resistant, and produces little smoke in the case of a fire. NPLF— Non-Power Limited for general purpose. NPLFP— Non-Power Limited Suitable for use in ducts, plenums, and other spaces. What's the difference between Power Limited Cables and Non-Power Limited Cables? The main difference between power limited cables and non-power limited cables is which sections of NEC they comply with. The non-power limited cable is a fire alarm circuit powered by a source that complies with NEC sections 760-21 and 760-23. Power limited cable is a fire alarm circuit powered by a source that complies with section 760-41. How do I know what kind of Fire Alarm Cable I need? Fire alarm cables are placed into three broad categories: plenum, non-plenum, and riser. Each of these corresponds to another standardized category, and these terms reflect where the fire alarm cable can be installed safely. Plenum cable, to be used in ducts or other enclosed air spaces, is called FPLP. Non-plenum cable, to be used in applications such as surface wiring, is FPL. Riser cable, which can be used in applications that go vertically from floor to floor, is FPLR. Which standards should I consider when choosing a Fire Alarm or Security Cable? In the US, the National Fire Protection Association (NFPA) plays an important role in standards because it publishes the National Electrical Code (NEC). This document regulates the installation of electric wiring and equipment and should definitely be considered before starting a project. ASTM International and Underwriters Laboratories (UL) also design tests and standards for a wide variety of wire and cable, including those used for fire alarm and security applications. In Canada, CSA International does similar work and can help assure compliance with the Canadian Electrical Code. What are some important safety precautions to consider when choosing a Fire Alarm Cable? Any sort of required resistances should be considered when purchasing any type of wire and cable. However, there are some notable fire-related safety precautions to consider as well. First is the fire resistance of the cable – will it burn and for how long? Another is smoke propagation, or how much smoke it will emit if it comes into contact with fire. These considerations should be made when choosing any type of electrical cable, but they are especially important in the case of fire alarm cable which must function in emergency situations and under extreme conditions. Most safety concerns (including these fire-related ones) are regulated by the UL, NEC, and other standards organizations and guidelines. The NEC outlines acceptable limits for burning and smoke emissions, while the UL, and other organizations, are responsible for the development of various flame tests cables must pass in order to be considered safe for use. Inside a machine, you are really outside of the NEC world. This might affect the listing of the machine but I have never actually seen that be brought up and we altered our machines all the time. As long as you are within the voltage rating and ampacity of the cable, with the proper O/C protection, you should be fine. I would also be looking at the exposure to damage. The biggest problem we saw with cables was flexing, chafing, pinching and other casualties. A common topic for discussion in the fire alarm industry involves fire alarm wiring. This article will cover all aspects of fire alarm wiring including but not limited to separation, conduit fill, strapping, mechanical protection and marking. Did you know the 2021 International Fire Code now requires 120 VAC single and multiple station smoke alarms to produce a 520 Hz low frequency audible tone? The definition of a fire alarm circuit is as follows: "The portion of the wiring system and connected equipment powered and controlled by the fire alarm system. Fire alarm circuits are classified as either nonpower-limited or power-limited." I'm sure you have heard these two terms in the industry before so let's break them down. Non-Power Limited Fire Alarm Circuits A non-power-limited fire alarm circuit commonly referred to as NPLFA, can operate at up to 600V and the power output isn't limited. Power-Limited Fire Alarm Circuits A power-limited fire alarm circuit commonly referred to as PLFA, must have the voltage and power limited by a listed power supply that complies with NEC 760.121. Based on this section, a power source can be either (1) a listed PLFA or Class 3 transformer, (2) a listed PLFA or Class 3 power supply or (3) listed equipment marked to identify the PLFA power source. A few examples of listed equipment would be fire alarm control panels with integral power sources and circuit cards listed for use with PLFA sources. The two tables below provide the listing requirements for power-limited fire alarm circuit sources: Power Sources for Power-Limited Fire Alarm Circuits Power-Limited fire alarm equipment must be supplied by a branch circuit that supplies no other load and is NOT GFCI or AFCI protected. The branch circuit overcurrent device (breaker) must be identified in red, accessible only to qualified personnel, and identified as "FIRE ALARM CIRCUIT". The red markings cannot damage the overcurrent protective device or cover any manufacturer's markings. The lock pictured below is available from Space-Age Electronics. Equipment Marking for Power-Limited Fire Alarm Circuits The fire alarm equipment that supplies power-limited fire alarm cable circuits must be marked to indicate each circuit that is a power-limited fire alarm circuit. Per NEC article 760.30, the fire alarm circuits must be marked at terminal and junction locations. Power-limited fire alarm circuits shall be installed in accordance with NEC article 760.46 and conductors shall be solid or stranded copper. Cable splices or terminations shall be made in listed fittings, boxes, enclosures, fire alarm devices, or utilization equipment. If the circuits are installed exposed, the cables shall be adequately supported and installed in such a manner that maximum protection against physical damage is afforded by building construction. The thought here is that nails from baseboards, door frames, drywall, etc. may penetrate deep enough to damage the wire. To avoid this, make sure to install your fire alarm cables no closer than 1 1/4" from the edge or the framing. If this is not possible, use 1/16" thick steel plate for protection [NEC 760.24(A)]. Where cables are installed within 7 feet of the floor, said cables shall be fastened in an approved manner at intervals of not more than 18 inches. Power-limited fire alarm cables are NOT permitted to be strapped to the exterior of any raceway as a means of support. Exposed cables must be supported by the structural components of a building so that the cable will not be damaged by normal building use. Cables must be supported by straps, staples, hangers, cable ties, or similar fittings designed and installed in a manner that will not dame said cable. If the calves or raceways are installed above a suspended ceiling, they must be supported by independent support wires attached to the suspended ceiling. Cables passing through a wall or floor. Both Power-Limited and Non Power-Limited Fire Alarm Cables shall be installed in metal raceways or rigid nonmetallic conduit where passing through a floor or wall to a height of 7' above the floor, unless adequate protection an be afforded by building construction. Keep in mind if the cables pass through a fire barrier, you must provide fire caulking to insure the integrity of the barrier. This is a topic that a lot of designers and technicians constantly go back and forth on. To better understand the separation requirements, I believe it is important to know what the 3 different circuit classification are. Class 1 Circuits. Class 1 remote-control and signaling circuits typically operate at 120V, but the NEC permits them to operate at up to 600V [725.21(B)]. You must install these circuits within a wiring method listed in Chapter 3 of the NEC, which includes raceways, cables, and enclosures for splices and terminations [725.25]. Remote-control circuit. These circuits, which control other circuits through relays or equivalent devices, are commonly used to operate motor controllers in moving equipment, mechanical processes, elevators, and conveyors. Class 2 Circuits. Class 2 circuits typically include wiring for low-energy (100VA or less), low-voltage (under 30V) loads such as low-voltage lighting, thermostats, PLCs, security systems, and limited-energy voice, intercom, sound, and public address systems. You can also use them for twisted-pair or coaxial local area networks (LAN) [725.41(A)(4)]. Class 2 circuits protect against electrical fires by limiting the power to 100VA for circuits that operate at 30V or less, and 0.5VA for circuits between 30V and 150V. Class 3 Circuits. Class 3 circuits are used when the power demand for circuits over 30V exceeds 0.5VA, but is not more than 100VA [Chapter 9, Table 11]. We often see Class 3 signaling circuits for security systems and public address systems; voice, intercom, and sound systems; and some nurse call systems. Higher levels of voltage and current are permitted for Class 3 circuits (in contrast to Class 2 circuits). PLFA with Class 1 Circuits NEC 760.136 (A) Power-limited fire alarm circuits must not be placed in any enclosure, raceway or cable with conductors of electric light, power or class 1 circuits. NEC 760.136 (B) If the circuits are separated by a barrier, power-limited fire alarm circuits are permitted with electric power conductors. NEC 760.136 (D) Power-limited fire alarm circuits can be mixed with electric light, power and class 1 circuits in enclosures where these other conductors are introduced solely for connection to the same equipment and a minimum of 1/4" separation is maintained from the power-limited fire alarm cables. Power-limited fire alarm circuits shall be separated by not less than 2" from insulated conductors of electric light, power or Class 1 circuits. Exception: If the electric light, power, class 1 circuit or power-limited fire alarm circuits are installed in a raceway, metal-sheathed, metal-clad, nonmetallic-sheathed or underground feeders. PLFA with Class 2 and Class 3 Circuits NEC 760.139 (A) Two or more PLFA Circuits. Power-limited fire alarm circuits, communications circuits or Class 3 circuits can be installed in the same cable enclosure, cable tray, raceway or cable routing assembly. NEC 760.139 (B) PLFA and Class 2 Circuits. Power-limited fire alarm circuits and Class 2 circuits can be within the same cable, cable tray, cable routing assembly, enclosure, or raceway provided the Class 2 circuit insulation is not less than that required for the power-limited fire alarm circuits. NEC.139 (C) PLFA and Low Power Network Communication. Low-powered network powered broadband communication circuits hall be permitted in the same enclosure, raceway, cable assembly, or cable tray. NEC 760.139 (D) PLFA and Audio System Circuits. Power-limited fire alarm circuits and audio system circuits using Class 2 and Class 3 wiring methods shall not be installed in the same raceway, enclosure, cable routing assembly or cable tray. Please not this does not apply to voice evacuation and mass notification speaker circuits controlled by a fire alarm control unit or amplifier. NEC 760.154(A) The following fire alarm cable substitutions are permitted as long as the wiring requirements of NEC Article 760 Parts I and III apply. FPLP (Fire Power-Limited Plenum) ----------> CMP FPLR (Fire Power-Limited Riser) ----------> CMP, FPLP, CMR FPL (Fire Power-Limited) ----------> CMP, FPLP, CMR, FPLR, CMG, CM NEC 760.142. Conductors of 26 AWG shall be permitted only where spliced with a conductor listed as suitable for 26 AWG to 24 AWG or larger conductors that are terminated on equipment or where the 26 AWG conductors are terminated on equipment listed as suitable for 26 AWG conductors. Single conductors shall NOT be smaller than 18 AWG. Conduit fill requirements can be found in the NEC Annex Table C. This is toward the back of the book and is broken up into different sections based on the type of raceway being used. In this example, we will use table C.1 for EMT (Electrical Metallic Tubing). Take a look at the table below and try to locate the maximum number of 14 AWG THHN conductors permitted in 2 1/2" EMT raceway. The answer is 241. NEC (National Electrical Code) Article 725 covers remote-control, signaling, and power-limited circuits that are not integral to a device, appliance, or utilization equipment. These are control circuits. Possible circuits include burglar alarms, access control, and computer systems. Circuits covered in NEC 725 are Class 2 and Class 3 power-limited circuits. Class 1 circuits have been moved to NEC article 724 as they are no longer considered power-limited as of the 2023 edition of the National Electric Code. Here is what you need to know about everything covered in this Article, including cables: Class 2 and Class 3 Power-Limited and Remote-Control Circuits Class 2 Circuits: Class 2 circuits operate at up to 30 volts and a power limit of 100 VA. Their goal is to protect from electric shock. Typical applications include thermostats, intercoms, automated lighting, and control circuits where power demands are minimal. Due to their low power and voltage levels, these circuits pose minimal risk for shock or fire hazards, so NEC permits more relaxed installation methods, like running cables directly along structural elements without the need for extensive conduit protection. Class 3 Circuits: Class 3 circuits share similarities with Class 2 but allow slightly higher voltage and current levels. Class 3 circuits are allowed to operate up to 150 volts. They are used in more demanding control applications like HVAC or specific industrial settings. These circuits require more robust insulation and need additional containment if installed in high-traffic or mechanically vulnerable locations (public corridors, rooms with industrial equipment, etc). In these cases, metal conduits, raceways, or cable trays can be used. Cable types, ratings, and markings CL2 (Class 2 Cable): Primarily used for low-voltage general control circuits in building automation, residential controls, and intercoms. The voltage is up to 30 volts. CL3 (Class 3 Cable): Designed for applications requiring slightly higher power than Class 2 circuits, commonly seen in commercial and industrial environments for HVAC controls, security systems, and lighting controls. The voltage is up to 300 volts. Specialized Cable Types Power-Limited Tray Cable (PLTC): A robust, durable cable type suited for industrial settings requiring tray installations. PLTC cables offer flexibility for direct burial or open installation, with appropriate additional ratings. ITC cables are not used in power-limited circuits; they are limited to instrumentation circuits. Fire Alarm and Security System Cables (FPL, PLFA): Used for power-limited fire alarm systems and signaling applications, these cables are designed to remain operational under fire conditions, ensuring safety-critical systems continue functioning. CMP (Plenum-Rated) and CL2P: In applications where cables run through plenums or air-handling spaces, plenum-rated cables like CMP or CL2P are required to reduce smoke and toxic emissions during a fire. Markings and ratings: Cables must be marked with specific voltage, temperature, and environmental ratings. This marking ensures they suit the intended installation environment (e.g., indoor, outdoor, damp locations). Temperature ratings indicate the maximum operating conditions the cable insulation can handle, which is especially relevant for installations with high ambient temperatures. Wiring methods and installation practices Conduit and raceway requirements: In many cases, PLTC and CL2/CL3 cables can be run outside of the conduit as long as they are supported and protected. However, the NEC mandates conduit or raceway installation in environments where cables could be subject to mechanical damage, such as in high-traffic areas or industrial sites. When installed in plenums (air handling spaces), cables must have a plenum rating (marked CMP or CL2P) to comply with fire safety standards. If installed in a raceway, the BICSI Cabling Installation Manual recommends: Limiting raceway runs to 100 feet. Allowing no more than two 90-degree bends Ensuring a maximum pull force of 25 pounds for Category 5 cable and 100 pounds for optical fiber. Separation requirements: To prevent interference and potential hazards, NEC Article 725 requires that power-limited circuits remain separate from higher-voltage circuits unless they are in separate conduits or have a grounded barrier. Separation is critical in cases where electrical noise could interfere with signal transmission, such as in data and communication systems that often share pathways with control circuits. Grounding: Unlike higher-power circuits, Class 2 and Class 3 circuits do not require a dedicated grounding conductor due to lower voltage. In environments with high electromagnetic interference (EMI), such as industrial facilities, grounding is recommended to reduce noise and improve signal quality. Shielded cables, if used, should be grounded at one end to avoid creating ground loops that could introduce noise. Special Provisions for Applications Fire Alarm Systems: Class 2 and Class 3 circuits used in fire alarm and safety signaling applications must meet specific insulation and installation requirements to ensure continued functionality during emergencies. For fire-resistant installations, Fire Alarm (FPL) and Power-Limited Fire Alarm (PLFA) cables are recommended, especially when circuits connect smoke detectors, alarms, or other critical equipment. These cables are designed to withstand heat and maintain integrity in fire conditions. Installation Conditions and Environmental Concerns Hazardous locations: For installations in hazardous environments (e.g., areas with flammable gases, vapors, or dust), Article 725 mandates using cables rated for such locations, such as UL-rated cables for Hazardous locations. Proper enclosures or explosion-proof fittings are required to prevent ignition sources from interacting with hazardous materials, reducing the risk of fire or explosion. Outdoor and damp locations: When installed outdoors or in damp locations, Class 2 and Class 3 power-limited circuits must use cables with moisture-resistant insulation and UV protection if exposed to sunlight. NEC specifies that outdoor installations should use conduits or raceways for mechanical protection or to secure the cable along building structures, especially in environments where physical damage or exposure to the elements is likely. NNC offers several cables allowed in the NEC 725 Article, including CM/CL2, CM/CL3, PLTC, fire alarm cables, and others. NNC Supplies Critical Infrastructure to xAI’s Supercomputer Facility Overview In July 2024, Nassa... At Nassau National Cable we work to give you the best quality services at competitive prices. As part of our efforts, we are constantly working to make it easier for you to choose, purchase, and handle cables according to your specific needs. this is the goal of value-added services, which help to sculpt cables according to your needs, identify and protect them. By itself, wiring does not show if a circuit is power limited or non-power limited. If the power source is power limited, the circuit is non-power Limited. The wiring has to be good enough for the type of circuit.Does the wiring practice determine the power supply, or does the power supply determe the wiring practice? By Douglas Krantz It's the power supply, not the wiring, which determines whether it is a Class I, II, or III wiring system. Class I goes to wall plugs, lighting systems, HVAC motors, industrial power systems, etc. The electricity comes directly from the power station. Able to supply enough voltage or current to electrocute or start a fire, power from Class I power supplies is not limited. Class II and Class III is "low voltage" wiring commonly used to furnish power to fire alarm systems, security systems, overhead paging systems, computer networking, etc. The electricity has a buffer power supply the stands between the Class I wiring system and the Class II or Class II wiring system. Not supplying enough voltage or current to electrocute or start a fire, power from Class II and Class III power supplies is limited. Wiring shortcuts in Class I wiring is a bad thing - there are no limits to the electrical power. Electrical shorts at the end of the line can heat up the wire causing a fire, and electrical contact can easily electrocute a person. On the other hand, when the power is limited, wiring isn't as critical. Smaller diameter wire, less insulation, and less protected routes through a building aren't dangerous when power is limited. It's the cross-powering through wire with damaged insulation that's dangerous. Power limited wiring should never come in contact with non-power limited wiring because once in a while the insulation breaks down. Even inside electrical boxes and conduit, insulation breakdown can happen. No matter how good the insulation looks on a new installation, after a period time, if the wires contact each other, there is a potential for the wires to cross power with each other. The power limited wiring, if there is this cross-powering, will then receive power from a non-power limited source. Not good. To prevent this cross-powering between the classes of wiring: The wires can be permanently separated in such a way that even momentarily they cannot come together There can be an insulated barrier, like the outer sheath of Romex, the outer sheath of an extension cord, or plastic or grounded metal conduit around the Class I wires There can be a grounded metal barrier preventing the power limited wiring from possibly coming into contact with the power un-limited wires So no contact between power limited and non-power limited systems can happen, now or in the future, keep wiring systems separated when routing wires. In previous blog posts, we have looked at the difference between Addressable vs. Conventional Fire Alarm Systems. Conventional fire alarm cables are designed based upon the AWG of the cable and can be broken into two categories: Power limited and Non-Power Limited cables. In the article below we will be looking at some distinct differences between the two: Power Limited Fire Alarm Cables: Power-Limited Fire Alarm cables (FPL) are listed by the NEC (National Electric Code) as being suitable for general purpose fire alarm use. This listing excludes installation in riser, ducts, plenums and other space used for environmental air unless the cable is installed in conduit. Note: All FPL cables are listed as being resistant to the spread of fire and must pass both UL test 1424 and the vertical flame test UL 1581. Power-Limited Fire Alarm Riser cables (FPLR) are listed as being suitable for use in a vertical run in a shaft or from floor-to-floor installations. Note: All FPLR cables are listed as having fire-resistant characteristics capable of preventing a fire from traveling. Riser cables must pass both UL test 1424 and the Vertical riser test UL 1666. Power-Limited Fire Alarm Plenum cables (FPLP) are listed by the NEC as being suitable for use in ducts, plenums and other space used for environmental air. Note: All FPLP cables are listed as having adequate fire-resistant and low-smoke-producing characteristics and must pass both UL test 1424 and UL Steiner tunnel test 910. Non-Power Limited Fire Alarm Cables: Non-Power-Limited Fire Alarm cables (NPLF) are listed by the NEC as being suitable for general purpose fire alarm use. This listing excludes installation in riser, ducts, plenums and other space used for environmental air unless the cable is installed in conduit. Note: All NFPL cables are listed as being resistant to the spread of fire and must pass both UL test 1424 and the vertical flame test UL 1581. Non-Power-Limited Fire Alarm cables (NPLFP) are listed by the NEC as being suitable for use in ducts, plenums and other space used for environmental air. Note: All NPLFP cables are listed as having adequate fire-resistant and low-smoke producing characteristics and must pass both UL test 1424 and UL Steiner tunnel test 910. See what our Product Line Managers have to say by viewing the West Penn Wire Youtube channel. Want to see a Fire Alarm System in action? Watch our animated version: Topics: fire alarm cables, fire alarm, fire alarm systems, fire detection systems MilSpec ► MIL-Spec Aerospace ► MIL-Spec Braid & Buss ► MIL-Spec Coaxial ► MIL-Spec Hook-Up Wire ► MIL-Spec Misc. ► MIL-Spec Shipboard ► MIL-Spec Wire & Cable ► View all in Category Introduction In the event of a fire, every second counts. A properly functioning fire alarm system can provide critical early warning, allowing occupants to evacuate safely and emergency responders to arrive promptly. Power-limited fire alarm cables play a crucial role in ensuring that these systems operate reliably and effectively. What Are Power-Limited Fire Alarm Cables? Power-limited fire alarm cables are specially designed cables that carry low-voltage electrical signals within fire alarm systems. They are known as “power-limited” because they are designed to limit the amount of electrical current that can flow through them, which reduces the risk of electrical fires. How Do They Improve Fire Safety? Power-limited fire alarm cables enhance fire safety in several ways: Reduce Arcing Faults: Electrical arcing can occur when high-voltage electricity jumps across an open circuit. In a fire alarm system, arcing faults can damage cables and components, potentially disabling the system. Power-limited cables reduce the risk of arcing faults by limiting the voltage and current available. Prevent Short Circuits: Short circuits occur when a live wire makes contact with a neutral wire or ground. This can cause a surge of electricity that can damage cables and components. Power-limited cables are designed to withstand short circuits without causing a fire or explosion. Maintain Integrity in High Temperatures: Power-limited fire alarm cables are made from high-temperature materials that can withstand the intense heat of a fire. This ensures that the cables will continue to function even when exposed to flames, allowing the fire alarm system to operate reliably. Code Compliance Power-limited fire alarm cables are required by building codes in many jurisdictions. These codes specify the type of cable that can be used in fire alarm systems, its installation requirements, and its maximum allowable voltage and current. By using power-limited cables that meet code requirements, building owners and managers can ensure that their fire alarm systems comply with legal standards and provide the highest level of fire protection. Selecting the Right Cable Choosing the right power-limited fire alarm cable is essential for ensuring optimal system performance and reliability. Factors to consider include: Voltage and Current Requirements: The cable must be rated for the voltage and current requirements of the fire alarm system. Environmental Conditions: The cable must be able to withstand the temperature, humidity, and corrosive conditions present in the installation environment. Installation Considerations: The cable must be flexible and easy to install in accordance with code requirements. Power-limited fire alarm cables are essential components of fire safety systems. By limiting electrical current, preventing short circuits, and maintaining integrity in high temperatures, they ensure that fire alarm systems operate reliably and effectively, providing critical early warning in the event of a fire. Building owners and managers should prioritize the use of power-limited fire alarm cables that meet code requirements to safeguard their occupants and comply with legal standards.