

Low-noise alternative to fiber optic cables for relay protection corrugated ducts



Overview

The Airguard™ product range includes solutions for Medium Voltage, Low Voltage, Instrumentation and Control cable applications.

Key Takeaways

Metallic pilot wires with proper shielding, power line carrier (PLC), and radio channels are viable low-noise alternatives to fiber optic cables for relay protection applications.

Metallic Pilot Wires

Shielded metallic pilot wires can be used as an alternative to fiber optics for short to medium distances. When installed with proper insulation and shielding, they can reduce electromagnetic interference (EMI) and maintain signal integrity for differential and line protection relays. Metallic pilot wires are particularly effective when laid in corrugated ducts alongside power cables, as they can be grounded and twisted to minimize induced voltages from nearby high-voltage lines.

However, care must be taken to avoid longitudinal induction and ground potential rise (GPR), which can introduce noise if not properly mitigated. Power Line Carrier (PLC) Power line carrier communication uses the existing high-voltage lines to transmit protection signals.

PL

C systems operate in the 300 Hz to 3400 Hz band and are robust against electrical noise, providing a low-loss path fully controlled by the utility. They are cost-effective for medium to long distances and eliminate the need for additional cabling. High-voltage capacitors and line traps are used to inject and extract the carrier signal while minimizing interference with the power frequency.

Radio Channels

Microwave or radio frequency channels can serve as a wireless alternative for relay protection. Operating in the 0.2–10 GHz range, radio channels can provide high data rates with directional antennas, reducing susceptibility to EMI from nearby power lines.

Multiplexing techniques allow multiple protection channels to share the same radio link, making it suitable for substations where physical cabling is difficult or expensive.

Considerations

Distance and latency: Metallic pilot wires are suitable for shorter distances, while PLC and radio channels can cover longer spans. Noise immunity: Fiber optics remain superior in EMI immunity, but shielded metallic wires and PLC can achieve acceptable performance with proper design. Installation: Corrugated ducts provide mechanical protection and can help reduce noise coupling for metallic wires.

Cost and maintenance: PLC and radio channels reduce the need for physical cabling, potentially lowering installation costs, but may require specialized equipment for signal injection and reception. In summary, shielded metallic pilot wires, power line carrier, and radio channels are practical low-noise alternatives to fiber optic cables for relay protection in corrugated ducts, each with trade-offs in distance, installation complexity, and noise immunity.

Article Content

Airguard™ cable solutions | Prysmian

The Airguard™ product range includes solutions for Medium Voltage, Low Voltage, Instrumentation and Control cable applications. Therefore, it is an effective

Protective Pipes and Sleeves for Powerlines | Pipelife

Our one-stop-shop cable protection solutions ensure uninterrupted power transmission and protection for electrical, telecommunication and data cables,

Multi Loose Tube, Corrugated Steel Tape Armor, Fire

Applications: • Indoor and duct type applications; low smoke, zero halogen. • In heavy duty environments. • In network systems, MAN, WAN, LAN applications.. •

Rugged Active Optical Cables: A Viable Alternative to Copper and

Rugged active optical cable (RAOC) solutions combine the best of both worlds: the familiarity, ruggedness, and ease of use of copper connectors with the bandwidth and distance

DIGITAL COMMUNICATIONS FOR RELAY PROTECTION

Arrangement F shows an optical fiber and optical fiber interface (OFIF) option that may be useful for lengthy relay to communications equipment runs. This option will reduce interference and ground

COMPARISON OF HDPE CONDUIT AND FABRIC DIVIDER

The purpose of this technical note is to provide a practical comparison of HDPE innerduct and fabric divider technologies for conduit, and to assist specifiers, contractors and others with useful selection

GeoDuct™ HDPE Cable Ducting & Conduit Pipes | Geosynthetics Africa

GeoDuct™ is a double-walled HDPE (High-Density Polyethylene) corrugated cable ducting and conduit system engineered for the safe, efficient and long-term protection of underground electrical,

Why Low Noise Cables? | New England Wire Technologies

We offer several low noise options (including our proprietary NEWtral® Low Noise Cable) for small signal applications that undergo mechanical shock, vibration or repeated flexing.

SPECIAL CONSIDERATIONS IN APPLYING POWER LINE

The intent of this paper is to document important issues that should be considered when applying a PLC channel to a protective relay system.

Polyethylene Corrugated Duct Solutions | PDF | Pipe (Fluid ...

This document provides information on Polyethylene Corrugated Ducts (COD) produced by NEPROPLAST for fiber optic and electrical cabling installations. COD is a multiple channel duct

Cable Protection Pipe Systems | Pipelife

Fiber Optic Cable Protection In cooperation with telecommunication service providers, we provide a wide range of fiber optic cable ducts, which include

HVAC Duct Insulation—Making Sound Choices

Generally, when the words duct insulation and acoustics appear in the same sentence, I usually think duct liner and sound absorption. If I am having a more cerebral moment, I may think

Fiber Optic Cable Protection: Multi-Channel PECD

Premium PECD ducts for telecom cable protection in Saudi Arabia. ADCOPIPES offers corrugated sub-ducts, 3 Subducts, 4 Subducts & 5 Subducts for fiber optic

Fiber Optic Cable Duct

Conclusion Fiber optic cable duct solutions play a critical role in ensuring the security, organization and longevity of your network infrastructure. With

Corrugated Innerduct, Riser/ Plenum – Fiber Savvy

Fiber optic cables, the arteries of modern telecommunications, often reside within the protective confines of corrugated innerducts. These innerducts, constructed from lightweight and durable materials such

Outdoor Duct Cables | Corning

Ducts provide a highly protective environment for fibre optic cables. They are typically buried and then the cables are blown, jetted, pulled or pushed into the

Telecommunication Pipes

Neproplast Telecommunication Pipes are high-quality conduit solutions for modern fiber optic networks, designed to provide efficient cable management, protection,

LSZH™ Loose Tube, Gel-Free, Corrugated Armored Cable

Corning LSZH™ loose tube gel-free cables are flame-retardant, indoor/outdoor, suitable for installation in interbuilding and intrabuilding applications. The loose

Contact Us

Continue your research online:

Website: <https://ensaa.es>

Technical inquiry: <https://ensaa.es/contact.html>

This document is for preliminary research. Verify specifications against current standards, product documentation and project requirements.

