Standard Dimensions of High-Temperature Temperature Measuring Optical Cables

Overview

Inside the asset (ex. transformer tank) What do you need to build up the right fiber optic system for continuous and accurate direct temperature monitoring?

Key Takeaways

High-temperature optical cables typically use fibers with diameters of 200 µm or more, coated with polyimide, metal, or sapphire, and assembled in protective sheaths designed for extreme environments.

Fiber Core and Coating

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For high-temperature applications, the fiber core diameter is commonly 200 µm, although smaller or larger diameters can be customized depending on the sensing system and measurement accuracy requirements. The coating material is critical for temperature resistance: Polyimide coatings: Suitable for temperatures up to ~300°CMetal coatings (aluminum or copper): Extend temperature tolerance to ~400–500°CSapphire fibers: Can withstand temperatures up to 1000°C and are used in extreme environments Cable ConstructionHigh-temperature optical cables are often constructed with multiple layers to ensure mechanical protection and thermal stability: Inner fiber: Single or multi-mode fiber, typically 200 µmBuffering: Optional polymer or metal buffer to protect the fiberSheathing: Metal tubing, stainless steel armor, or high-temperature polymers like PTFE or PE for environmental protection Connector type: ST or customized ferrules for high-temperature feedthroughs Standard Dimensions and LengthsFiber diameter: 200 µm (standard for high-temperature measurement)Cable outer diameter: Varies depending on protective layers; typical ranges from 2 mm to 6 mm for metal-free or armored cables Minimum bending radius: Short-term ~120 mm, long-term ~100 mm to prevent fiber damage Standard lengths: 2 m up to 20 m, extendable to 30 m with additional protective sheathing Environmental and Mechanical ConsiderationsHigh-temperature optical cables are designed to withstand: Operating temperatures: From -40°C to +800°C (silica fiber) or up to +1000°C (sapphire fiber)Mechanical loads: Short-term up to 1200 N, long-term up to 1000 NProtection against chemicals and abrasion: Metal or high-temperature polymer sheaths prevent degradation of the fiber and maintain optical performance CustomizationMany manufacturers offer custom dimensions for high-temperature optical cables, including: Fiber diameter adjustmentsCable outer diameter and sheathing materialsConnector types and feedthroughs for integration into industrial systems In summary, the standard high-temperature optical cable uses a 200 µm fiber with polyimide or metal coating, an outer diameter of 2–6 mm, and lengths from 2 to 20 m, with construction tailored to withstand extreme temperatures and mechanical stress.

Article Content

TECCA DE Fiber optic temperature measurement systems

Inside the asset (ex. transformer tank) What do you need to build up the right fiber optic system for continuous and accurate direct temperature monitoring?

Temperature Measurement Using Optical Fiber

The paper deals with the overview of fiber optic methods suitable for temperature measurement and monitoring. The aim is to evaluate the current

Optical Fiber Sensors for High-Temperature Monitoring: A Review

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This paper reviews the sensing principle, structural design, and temperature measurement performance of fiber-optic high-temperature sensors, as well as recent significant

DTSX3000 Distributed Temperature Sensor

DTSX measures temperature distribution over the length of an optical fiber cable using the fiber itself as the sensing element and it is ideal for temperature monitoring over long distances and wide areas.

Internal temperature measurement and conductor temperature

The conductor temperatures were calculated using the temperatures measured by the fibers at the insulation shield surface and waterproof compound center, and the differences between

Distributed temperature sensing

Distributed temperature sensing systems (DTS) are optoelectronic devices which measure temperatures by means of optical fibres functioning as linear sensors. Temperatures are recorded along the optical

Discover Strain and Temperature Risks in Fiber Cables

As in the example on the right, having a temperature greater than 90°C over 15 meters of cable is outside the standard use environment for optical cables. This drastically reduces its lifespan.

NVIDIA Mellanox MFS1S50-H010E AOC Active Optical Cable

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DTSX200 Distributed Temperature Sensor

What Is Distributed Temperature Sensing? Distributed temperature sensing (DTS) measures temperature distribution over the length of an optical fiber cable using the fiber itself as the sensing

Overview of optical fibres standardization

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Temperature cycle test Dry heat test Damp heat test Water immersion test Temperature cycle test Dry heat test Damp heat test Water immersion test 1 : Core diameter and core non circularity are not

Optical Fibre Cable Technical Specification

3.4 Dimensions and Descriptions The standard optical cable structure is shown in the following table, other structure and fibre count are also available according to customer requirements.

Discover Strain and Temperature Risks in Fiber Cables

Advances in Fiber Optic Cable Characterization Help Network Operators Protect Their Networks VIAVI OTDRs allow technicians all over the world to characterize optical cables by measuring the optical

Temperature Measurement Using Optical Fiber

Optical fiber sensors can be used in cases where standard electrical measurement methods cannot be used. These may be areas with high electrical

Fiber Optic Sensor Cables for Advanced Monitoring | AP Sensing

Fiber optic sensor cables are the key enabler for real-time monitoring of temperature, strain, and acoustic signals across diverse and challenging environments. Depending on the application and the

Fiber Optics Temperature Measurement

High Speed Temperature Detectors The OS4000 series high speed industrial fiber optic infrared transmitters measure temperature ranges from 200 to 1600ºC (392 to 2912°F) using three standard

Optical fiber assemblies for high temperature environments

For this type of application, we offer silica/sapphire assemblies for parts located in your high-temperature environment, as well as the use of sapphire windows at the end of your assembly to protect the

CORNING OPTICAL COMMUNICATIONS GENERIC

1.2 Plenum Applications - Applicable Flame Test: NFPA 262. Cables shall be listed OFNP. 1.3 Finished cables shall conform to the applicable performance requirements of the Insulated Cable Engineers

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