High-Temperature Well Logging Optical Cable Technology



Overview

The High-Temperature Resistant Well Logging Optical CableResistant to high temperatures. Prevents loss of hydrogen in the optical cable. Excellent mechanic.

Key Takeaways

High-temperature well logging optical cables are engineered to transmit data reliably in extreme downhole conditions, withstanding temperatures above 300 °C, high pressures, and corrosive fluids. Cable Design and MaterialsHigh-temperature optical cables for well logging are designed to survive harsh subsurface environments, including oil, gas, geothermal, and coal wells. Key design features include: Fiber-in-Metal Tube (FIMT): Optical fibers are hermetically sealed in stainless steel or INCONEL® tubes, providing protection against chemical ingress and microbending.

Tube-in-

Tube Construction: The FIMT is supported within an outer tube by an extruded polymer layer, which centralizes the fiber and provides mechanical buffering. Mechanical Reinforcement: Cables may include corrugated steel tape, steel wire, or foamed thermoplastic elastomer to resist tensile loads, drum winding, and sheave contact during deployment.

High-

Temperature Insulation: Advanced insulation materials, such as glass braid or Teflon alternatives, allow operation above 300 °C, preventing shorts and maintaining signal integrity.

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Operational Capabilities

These cables are engineered for long-term deployment in extreme conditions: Temperature Resistance: Capable of continuous operation at temperatures exceeding 300 °C. Pressure Tolerance: Metal tubing and outer encapsulation provide high-pressure seals, enabling operation at pressures up to 5,000 psi. Chemical and Mechanical Durability: Resistant to well fluids, corrosive environments, and mechanical stress from repeated logging runs.

Data Transmission: Supports distributed sensing technologies such as Distributed Temperature Sensing (DTS), Distributed Acoustic Sensing (DAS), and Distributed Strain Sensing (DSS), enabling real-time monitoring of temperature, pressure, and strain along the wellbore. ApplicationsHigh-temperature optical cables are critical for: Geothermal Wells: Long-term monitoring of temperature and pressure in supercritical reservoirs. Oil and Gas Wells: Formation evaluation, well integrity logging, and production optimization.

Permanent Installations: Fiber-optic cables can be installed behind casing for continuous monitoring over the life of the well.

Advantages

Extended Operational Life: Eliminates the need for grease seals and reduces the risk of electrical shorts, allowing months of continuous operation. High Data Fidelity: Maintains stable optical performance under extreme conditions, ensuring accurate measurements for reservoir characterization and well management. Customizable Design: Fiber type, number of fibers, encapsulation, and armor materials can be tailored to specific well conditions and sensing requirements.

High-temperature well logging optical cables represent a robust, reliable solution for modern subsurface monitoring, combining advanced materials, mechanical reinforcement, and fiber-optic sensing to operate in some of the most challenging environments in the energy sector.

Article Content

The High-Temperature Resistant Well Logging Optical Cable

Resistant to high temperatures. Prevents loss of hydrogen in the optical cable. Excellent mechanical operation. Suitable for oil wells, gas wells, coal mines or under high temperature conditions.

Permanent fiber-optic cable

Permanent downhole fiber-optic cables are critical infrastructure in wellbore monitoring systems, ensuring reliable transmission of data for applications such as distributed temperature, acoustic, and

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New methods in geophysical exploration and monitoring with DTS and

We show that fiber-optic sensing opens up new possibilities for geophysical measurements with a broad range of applications in well logging and seismic exploration and monitoring.

Long-term High Temperature High Pressure Cable for Geothermal

This technology is critical for effectively evaluating enhanced geothermal systems where logging tools must operate continuously at elevated temperatures. It will enable the industry to measure

Optical fiber logging cable Special cable

Optical fiber logging cables are also designed to withstand high temperatures and pressures, making them suitable for use in deep and high

Principle of High-Temperature Well Logging Optical Cables in Australia

This study presents a comparative analysis between these conventional approaches and the latest distributed fiber-optic sensing (DFOS) technologies. Specifically, we highlight the diagnostic power of

Research on the Data Interpretation Model of Optical Fiber Profile ...

Fiber optic cables have the advantages of high temperature resistance, high pressure resistance, corrosion resistance, and high accuracy in measuring temperature DTS data. They are widely used

Downhole Logging

Rochester Cable has supplied wireline cables to logging service providers for more than 60 years. Our designs combine mechanical strength, thermal performance,

Optoelectric permanent downhole cable

At the same time, the optical fibers enable distributed temperature, acoustic, and strain sensing (DTS, DAS, and DSS)—all with one 1/4-in control line. The combination helps improve well productivity by

Research on Key Technologies of 260 °C/210 MPa Ultra-Deep Logging

This paper introduces the key technologies of ultra-deep measurement logging equipment, including high-strength mechanical structure, pressure-sealing capabilities, low-power

SPECIALTY AND HARSH ENVIRONMENT FIBER OPTIC CABLE

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Specialty Fiber Optic Cable Customers around the world benefit from using AFL fiber optic cable and components for downhole sensing and subsea umbilicals. With its patented stainless steel tube

A High Data Rate Fiber Optic Well Logging Cable

This development has led to a new logging cable with superior mechanical properties, containing eight electrical wires and three optical fibers with a data rate of at least 10 Mbitsl second each. This fiber

New methods in geophysical exploration and monitoring with DTS and

Here we outline some new technologies in this context within case studies from different research projects including permanent installation of fiber-optic sensor cables behind casing, monitoring of

Downhole Logging

Wireline cables for downhole logging applications, delivering reliable power and data in high-pressure, high-temperature wells.

Design and Experimental Research of a Fiber-Optic ...

We design a fiber-optic communication system under high temperatures for well logging applications. It consists of high-temperature laser diode, high-temperature photodetector with

Application of Coiled Tubing Distributed Optical Fiber Temperature ...

In recent years, distributed optical fiber sensing (DTS) technology has been widely used in oil and gas well production due to its advantages of high measurement accuracy, no

SUBSEA FIBER OPTIC SYSTEMS MEET THE CHALLENGES OF

Despite the advantages of fiber optics technology in information-carrying capacity and sensing, adoption has not been as rapid in subsea oil production as in other industries. Optical fibers are seen as

The Optic Oil Field: Deployment and Application of Permanent In-well ...

In-well fiber optic sensors are now being developed and deployed in the field for measuring temperature, pressure, flow rate, fluid phase fraction, and seismic response.

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