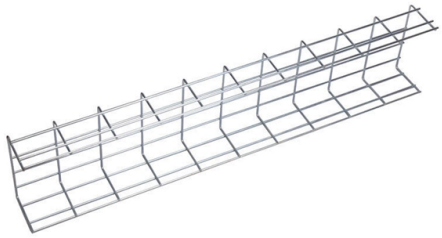
Fiber optic cable inside the well



Overview

Permanent fiber-optic cable Permanent downhole fiber-optic cables are critical infrastructure in wellbore monitoring systems, ensuring reliable transmissio.

Key Takeaways

Fiber optic cables in wells enable real-time, distributed monitoring of temperature, pressure, strain, and acoustic signals, enhancing well productivity and safety.

Purpose and Applications

Fiber optic cables are installed along the wellbore to provide continuous, real-time monitoring of downhole conditions. They support technologies such as Distributed Temperature Sensing (DTS), Distributed Acoustic Sensing (DAS), and Distributed Strain Sensing (DSS), which allow operators to track temperature, pressure waves, microseismic events, and strain along the entire length of the well. This data helps optimize production, detect anomalies like water or gas ingress, and improve reservoir management.

Types of Fiber Optic Cables

Permanent Fiber Optic Cables: Designed for long-term deployment, these cables use a fiber-in-metal tube (FIMT) configuration with protective layers to withstand high pressure, temperature, and corrosive fluids. They can operate in extreme conditions, such as SAGD thermal recovery wells, with temperatures up to 572°F (300°C) and hydrogen exposure. Disposable Fiber Cables: Services like ExpressFiber provide low-cost, single-use fiber cables for temporary monitoring, such as cross-well fracture tracking.



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These can be deployed quickly without interrupting operations and degrade after use. Distributed Fiber Optic Sensing (DFOS)DFOS leverages light scattering phenomena within the fiber to measure physical changes along its length: Rayleigh scattering (DAS): Detects micro-vibrations and pressure changes. Raman scattering (DTS): Measures temperature variations.

Brillouin scattering (DSS/DTS): Sensitive to both strain and temperature. A single fiber can provide temperature measurements every 0. 5 meters, with spatial resolution under 1 meter and sensing ranges up to 50 km per channel.

This enables detailed 3D, time-lapse monitoring of well activity.

Benefits

Enhanced Production: Real-time insights allow operators to adjust injection strategies, optimize cluster spacing, and reduce non-productive time, potentially increasing production by up to 30%. Early Detection of Issues: Strain and acoustic monitoring can identify casing deformation, leaks, or steam channeling, allowing proactive remediation. Operational Safety: Continuous monitoring reduces environmental and operational risks by detecting anomalies before they escalate.

Versatility: Fiber optic cables can be installed in land, offshore, subsea, casing-mounted, or tubing-mounted wells, and are compatible with various supervisory systems.

Conclusion

Fiber optic cables in wells transform traditional reservoir management by providing continuous, high-resolution data that enhances decision-making, improves production efficiency, and ensures well integrity. Both permanent and disposable fiber solutions offer tailored options depending on the monitoring duration, well conditions, and project requirements.

Article Content

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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Each of the at least one fiber optic spool can comprising one or more fiber optic lines. Each of the one or more fiber optic lines can be coupled to a bridge plug at a first end and...

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In this study, we installed two fiber optic cables with different designs into a new well, a soft-flat cable and a stainless-steel cable, for distributed fiber optic sensing in cementing and water

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Fiber Optic Cable Types: Single-Mode, Multimode, and

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Fiber optic color standard is crucial to anyone who works manipulating Fiber installation with singlemode and multimode cable. Questions?

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