

Article Overview

Fiber optic cables in communication wells can be reserved and deployed using either permanent downhole cables or disposable fiber solutions, depending on monitoring needs and operational constraints.

Types of Fiber Optic Cables for Wells

Permanent fiber-optic cables are designed for long-term well monitoring and communication. They typically use a fiber-in-metal-tube (FIMT) design, where optical fibers are hermetically sealed in stainless steel or INCONEL tubes, providing protection against high pressure, temperature, and corrosive fluids. These cables can support distributed sensing for temperature, acoustic, and strain measurements (DTS, DAS, DSS) and are fully customizable in fiber type, encapsulation, and armor materials to ensure long-term reliability in harsh downhole conditions. Disposable fiber optic cables, such as Halliburton's ExpressFiber(TM), are single-use fibers that can be pumped downhole in offset wells for temporary monitoring. They are low-cost, lightweight, and can be deployed quickly without halting operations. These fibers are ideal for cross-well monitoring, fracture mapping, and microseismic measurements. If damaged, they can be replaced easily, making them suitable for short-term or experimental monitoring without impacting ongoing operations.

Installation and Reservation Considerations

- o Well Planning: Before deployment, the well design must account for fiber routing, space allocation, and protection from mechanical stress. Permanent cables require careful planning to ensure long-term survivability, while disposable fibers can be deployed opportunistically during stimulation or monitoring operations.
- o Cable Protection: Permanent cables use multiple layers, including polymer buffers and outer encapsulation, to prevent microbending and chemical ingress. Disposable fibers are bare and more sensitive, so they are typically used in controlled conditions or for short-term monitoring.
- o Deployment Methods: Permanent cables are installed during well completion and integrated with control lines. Disposable fibers can be pumped downhole at any time before or during fracturing operations, allowing flexible monitoring of already drilled wells.
- o Standards and Best Practices: Following fiber optic installation standards, such as those from the Fiber Optic Association (FOA), ensures proper handling, training, and safety during deployment. This includes selecting appropriate fiber types, connectors, and installation techniques for the specific well environment.

Summary

Reserving fiber optic cable space in a communication well involves choosing between permanent, robust cables for long-term monitoring or disposable fibers for temporary, flexible measurements. Proper planning, protection, and adherence to installation standards are critical to ensure reliable data transmission and



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operational safety. Both approaches enable distributed sensing and communication in wells, supporting applications such as temperature, acoustic, and strain monitoring, as well as cross-well fracture analysis .

Halliburton has launched ExpressFiber, a single-use fibre optic cable that offers accurate, direct subsurface measurements, including

UNIT I general Optical Fiber communication system, advantages of optical fiber communications. Optical fiber wave guides-

The use of fiber-optic-sensing technology for the evaluation of completion efficiency, primary cement sheath integrity,

The ExpressFiber disposable fiber cable is an economic, low-risk fiber solution for cross-well monitoring that provides direct

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An optical fiber, or optical fibre, is a flexible glass or plastic fiber that can transmit light from one end to

What is fiber optics? Fiber optics, or optical fiber, refers to the technology that transmits information as light



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pulses

Overview 163 describes criteria for the installation of optical fibre cables defined in Recommendation ITU-T L. (FOA) was founded in

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