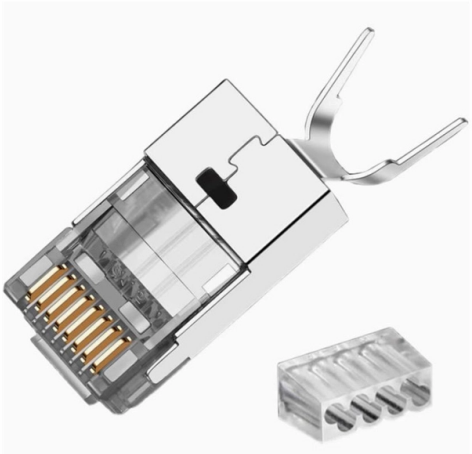
# Hollow-core optical fiber performance testing standards



## Overview

Introduction This paper explains the recommended guidelines for testing an installed fiber optic system.

## Key Takeaways

There is currently no formal industry standard for hollow-core fiber (HCF) testing, but reliable performance characterization is achieved using adapted conventional fiber test methods and specialized instrumentation.Current Status of HCF Testing Standards

At present, no dedicated international standard exists specifically for hollow-core fiber. Testing relies on adapting established single-mode fiber (SMF) principles to account for HCF's unique properties, such as air-guided cores, lower Rayleigh backscatter, and surface scattering from microstructured silica walls . Standards organizations are evaluating HCF, but until formal specifications are published, field-proven methods and validated instrumentation are the primary reference for performance verification .

Key Testing Parameters

HCF performance testing focuses on several critical parameters:

•

© 2026 ALFA PRO COMMUNICATION SYSTEMS (Pty) Ltd - All rights reserved

Optical Time-Domain Reflectometry (OTDR): OTDR testing remains central for verifying continuity, measuring loss, locating events, and characterizing splices. HCF requires high-dynamic-range OTDRs due to backscatter levels approximately 15 dB lower than SMF . Testing is typically performed at 1550 nm and 1625 nm, as standard 1310 nm OTDR measurements are not relevant for HCF .

•

Bidirectional Analysis: To accurately measure attenuation and splice loss, bidirectional OTDR traces are aligned and analyzed using the formula (AB-BA)/2. This compensates for directional variations and ensures precise loss profiling .

•

Attenuation Profile (AP): Measurement of fiber loss along the link is essential to confirm installation quality and long-term performance .

•

Chromatic Dispersion (CD) and Polarization Mode Dispersion (PMD): These parameters are measured using specialized non-OTDR instruments to ensure signal integrity in high-speed networks .

•

Optical Return Loss (ORL) and Reflectivity: Dedicated HCF analysis software allows accurate measurement of ORL and splice reflectivity, which are critical for low-latency applications .

Specialized Tools and Methodologies

HCF testing requires adapted or purpose-built tools:

• High-power OTDRs with extended dynamic range for long-distance characterization .

• Uni- and bi-directional analysis software to extract key fiber parameters and evaluate splice quality .

• Automated fiber inspection to ensure connector integrity and prevent contamination .

• Integrated dispersion measurement platforms for simultaneous PMD, CD, and AP characterization .

Best Practices

• Perform bidirectional OTDR testing and analysis to obtain accurate loss profiles.

• Use multiple wavelengths (1550 nm and 1625 nm) for comprehensive characterization.

*© 2026 ALFA PRO COMMUNICATION SYSTEMS (Pty) Ltd - All rights reserved*

• Validate attenuation, dispersion, and polarization parameters to ensure the fiber meets performance requirements from day one.

• Employ field-proven instrumentation and software adapted to HCF's unique optical properties to avoid misinterpretation of results .
Summary

While formal HCF testing standards are not yet established, reliable performance verification is achieved through adapted SMF testing principles, bidirectional OTDR analysis, and specialized measurement tools. Accurate characterization of attenuation, dispersion, and splice quality is essential to ensure low-latency, high-performance operation in data center interconnects and next-generation optical networks .

## Article Content

What is Hollow Core Fiber (HCF) Testing? | VIAVI Solutions Inc.

To learn more about selecting the right HCF test equipment, OTDR setup, testing procedure, and result processing and analysis,

Hollow Core Fiber (HCF) Deployment and Testing

Technical guide on the deployment and testing of hollow-core fiber (HCF) optical fibers. Learn about their advantages,

Hollow Core Fiber (HCF) Testing | VIAVI Solutions Inc.

Accurate certification of HCF links requires specialized OTDR configuration and performance, with different bidirectional analysis

Hollow-Core Fiber OTDR Test Kit | High-Precision HCF Analysis | EXFO

Test hollow-core fiber with EXFO''s high-dynamic range OTDR kit. Accurately measure loss, ORL, splice, and reflectivity with

Hollow-core fiber (HCF) testing explained: questions

As interest in HCF grows, so do misconceptions around how it should—or shouldn''t—be

Testing and Certifying Hollow Core Fiber: From Novel Physics to

To learn about how to correctly spec an OTDR for HCF test and how to perform the bidirectional testing, results

Hollow core fiber''s big test

© 2026 ALFA PRO COMMUNICATION SYSTEMS (Pty) Ltd - All rights reserved

Standardization is critical: Industry standards bodies are actively working on specifications

Viavi unveils testing and certification platform as hollow core fiber ...

The test and measurement company this week unveiled an all-in-one test platform — ostensibly the first of its kind —

Fiber Testing Standards 2025 Guide for IEC and TIA Compliance

Stay compliant in 2025 with updated fiber testing standards for IEC and TIA. Learn key procedures, documentation

Testing Hollow Core Fiber

Accurate validation of HCF links requires specialized OTDR configuration and performance, with different

Standards Updates for Optical Fiber: What You Need to Know

In this blog CommScope discusses how industry standards for optical fiber cables components systems and

Hollow-core breakthrough

A hollow-core optical fibre which surpasses silica fibre''s long-standing limits and provides an attenuation below 0.1

Fiber Optic Performance Testing Services

Understanding the variety of fiber optic testing standards Manufacturers of fiber optic products must demonstrate compliance to

Hollow core fiber cable technologies

Hollow core fibers (HCF) are innovative optical fibers having the potential to break the limits of conventional optical

Fiber Optic System Testing Tutorial

When a fiber optic system is successfully tested and determined to meet the customer''s specific requirements and relevant industry

Guidelines Corning Recommended Fiber Optic Test

Introduction This paper explains the recommended guidelines for testing an installed fiber optic system. Fiber optic testing of a newly

Studies for Practical Applications of the Hollow Core Fiber

*© 2026 ALFA PRO COMMUNICATION SYSTEMS (Pty) Ltd - All rights reserved*

The Hollow Core Fiber (HCF) has attracted the attention as an innovative optical fiber that has the potential to break through

Hollow Core Fiber (HCF) Testing Solutions | EXFO

Hollow core fiber (HCF) gives operators, hyperscalers, data center teams, and fiber manufacturers a path to lower-latency, high

Hollow-Core Fiber OTDR Test Kit | High-Precision HCF

Test hollow-core fiber with EXFO''s high-dynamic range OTDR kit. Accurately measure loss, ORL, splice,

Hollow core fiber (HCF) testing explained: questions and misconceptions

Hollow-core fiber (HCF) is moving rapidly particularly for data center interconnects (DCI), high-performance

Hollow core fiber occasions a paradigm shift in testing

With optical testing and certification equipment from Viavi, the trio tested AccuCore HCF, Lightera''s hollow core fiber

Hollow Core Fiber (HCF) Testing | VIAVI Solutions Inc.

Unlike conventional solid-core fiber, hollow core design introduces unique characteristics. Its air-guided design reduces latency and

Basics of Hollow Core Fiber: The Future of Ultra-Low Latency Optical ...

The implications of hollow core fiber technology extend far beyond incremental improvements. Recent breakthroughs

FOA Fiber U Quickstart Guide: Fiber Optic Testing With OTDRs

Fiber Optic Testing With Optical Time Domain Reflectometers - OTDRs This is your "QuickStart" guide to testing fiber optic cable

Low-Loss and Stable Light Transmission in Nano-Core Plus Node

Anti-resonant hollow-core fibers (AR-HCFs) are emerging as highly promising candidates for high-power laser

Ultralow thermal sensitivity of phase and propagation delay in

Here we show through two independent experiments that hollow-core photonic bandgap fibres have a significantly smaller sensitivity

An RFS Guide to Hollow Core Fiber [Updated August 2026]

Fiber is at the core of modern communication technology, with virtually every

*© 2026 ALFA PRO COMMUNICATION SYSTEMS (Pty) Ltd - All rights reserved*

Hollow-Core Optical Fiber: Faster, Low-Latency Networks

Telecommunications standards bodies will need to define specifications for hollow-core fiber performance, testing

Hollow Core Fiber: Fundamentals, Advantages, and the Road Ahead

Hollow Core Fiber: Fundamentals, Advantages, and the Road Ahead A comprehensive guide to Hollow Core Fiber

Testing Hollow Core Fiber

Discover how hollow core fiber (HCF) is transforming optical networks with ultra-low latency, low loss, and high-speed

Standards Updates for Optical Fiber: What You Need to Know

In this blog CommScope discusses how industry standards for optical fiber cables components systems and

Hollow-core breakthrough

A hollow-core optical fibre which surpasses silica fibre''s long-standing limits and provides an attenuation below 0.1

Fiber Optic Performance Testing Services

Understanding the variety of fiber optic testing standards Manufacturers of fiber optic products must demonstrate compliance to

Hollow core fiber cable technologies

Hollow core fibers (HCF) are innovative optical fibers having the potential to break the limits of conventional optical

Fiber Optic System Testing Tutorial

When a fiber optic system is successfully tested and determined to meet the customer''s specific requirements and relevant industry

Guidelines Corning Recommended Fiber Optic Test

Introduction This paper explains the recommended guidelines for testing an installed fiber optic system. Fiber optic testing of a newly

Elevate Fiber Installation and Testing for Hollow Core Fiber

Build and Characterize High-Quality Hollow Core Fiber (HCF) Links with Speed, Accuracy, and Confidence OTDR, Fiber

Hollow-Core Fibers (HCF): The Next Frontier in Optical

*© 2026 ALFA PRO COMMUNICATION SYSTEMS (Pty) Ltd - All rights reserved*

This shift marks the emergence of hollow-core fiber as a transformative technology and invites a deeper

The FOA Reference For Fiber Optics

Calibrating fiber optic power measurement equipment requires setting up a reference standard traceable to a national standards lab

Verification of Optical Fiber and Cable Reliability

These tests were performed in accordance to industry standard requirements. Testing results showed that there exists no significant

Studies for Practical Applications of the Hollow Core Fiber

The Hollow Core Fiber (HCF) has attracted the attention as an innovative optical fiber that has the potential to break through

Hollow Core Fiber (HCF) Testing Solutions | EXFO

Hollow core fiber (HCF) gives operators, hyperscalers, data center teams, and fiber manufacturers a path to lower-latency, high

Hollow-Core Fiber OTDR Test Kit | High-Precision HCF Analysis | EXFO

Test hollow-core fiber with EXFO''s high-dynamic range OTDR kit. Accurately measure loss, ORL, splice, and reflectivity with

Hollow core fiber (HCF) testing explained: questions and misconceptions

Hollow-core fiber (HCF) is moving rapidly particularly for data center interconnects (DCI), high-performance

What is Hollow Core Fiber (HCF) Testing? | VIAVI Solutions Inc.

To learn more about selecting the right HCF test equipment, OTDR setup, testing procedure, and result processing and analysis,

Hollow Core Fiber (HCF) Deployment and Testing

Technical guide on the deployment and testing of hollow-core fiber (HCF) optical fibers. Learn about their advantages,

Hollow Core Fiber (HCF) Testing | VIAVI Solutions Inc.

Accurate certification of HCF links requires specialized OTDR configuration and performance, with different bidirectional analysis

Hollow-Core Fiber OTDR Test Kit | High-Precision HCF Analysis | EXFO

*© 2026 ALFA PRO COMMUNICATION SYSTEMS (Pty) Ltd - All rights reserved*

Test hollow-core fiber with EXFO''s high-dynamic range OTDR kit. Accurately measure loss, ORL, splice, and reflectivity with

Hollow-core fiber (HCF) testing explained: questions

As interest in HCF grows, so do misconceptions around how it should—or shouldn''t—be

Testing and Certifying Hollow Core Fiber: From Novel Physics to

To learn about how to correctly spec an OTDR for HCF test and how to perform the bidirectional testing, results

Hollow core fiber''s big test

Standardization is critical: Industry standards bodies are actively working on specifications

Viavi unveils testing and certification platform as hollow core fiber ...

The test and measurement company this week unveiled an all-in-one test platform — ostensibly the first of its kind —

Fiber Testing Standards 2025 Guide for IEC and TIA Compliance

Stay compliant in 2025 with updated fiber testing standards for IEC and TIA. Learn key procedures, documentation

Testing Hollow Core Fiber

Accurate validation of HCF links requires specialized OTDR configuration and performance, with different

What is Hollow Core Fiber (HCF) Testing? | VIAVI Solutions Inc.

To learn more about selecting the right HCF test equipment, OTDR setup, testing procedure, and result processing and analysis,

Hollow Core Fiber (HCF) Deployment and Testing

Technical guide on the deployment and testing of hollow-core fiber (HCF) optical fibers. Learn about their advantages,

Hollow Core Fiber (HCF) Testing | VIAVI Solutions Inc.

Accurate certification of HCF links requires specialized OTDR configuration and performance, with different bidirectional analysis

Hollow-Core Fiber OTDR Test Kit | High-Precision HCF Analysis | EXFO

*© 2026 ALFA PRO COMMUNICATION SYSTEMS (Pty) Ltd - All rights reserved*

Test hollow-core fiber with EXFO''s high-dynamic range OTDR kit. Accurately measure loss, ORL, splice, and reflectivity with

Hollow-core fiber (HCF) testing explained: questions

As interest in HCF grows, so do misconceptions around how it should—or shouldn''t—be

Testing and Certifying Hollow Core Fiber: From Novel Physics to

To learn about how to correctly spec an OTDR for HCF test and how to perform the bidirectional testing, results

Related Video Reference

This video was associated with the source search result. Verify technical details against current product documentation and project requirements.

## Contact Us

Continue your research online:

Website: https://alfa-pro.co.za
Technical inquiry: https://alfa-pro.co.za/contact.html

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

*© 2026 ALFA PRO COMMUNICATION SYSTEMS (Pty) Ltd - All rights reserved*