



Certified Fiber Optics Technician (FOT) Competency Requirements

This Fiber Optics Technician (FOT) competency listing is the syllabus or objective of each individual subject item in which a fiber optics technician (FOT) must be knowledgeable and/or skilled to prepare for the hands-on course training and the ETA® International FOT certification knowledge examination. The competency includes concepts of fiber optics servicing, troubleshooting and repairing; diagnostically ranging from the intermediate installation up to rudimentary design knowledge.

A fiber optics technician (FOT) must hold the FOI certification as a pre-requisite and in addition to completing a special course, fee and hands-on skills exam from an ETA approved school must also be knowledgeable in the following technical areas:

1.0 PRINCIPLES OF FIBER OPTIC TRANSMISSION

- 1.1 Describe the basic parts of a fiber optic link
- 1.2 Describe the basic operation of a transmitter
 - 1.2.1 Graphically explain how Analog to Digital Conversion (A/D) is accomplished
- 1.3 Describe the basic operation of a receiver
 - 1.3.1 Graphically explain how Digital to Analog Conversion (D/A) circuitry works
- 1.4 Explain Amplitude Modulation (AM)
- 1.5 Compare Digital data transmission with Analog
- 1.6 Explain the difference between Pulse Coded Modulation (PCM) and AM
- 1.7 List the benefits of Multiplexing signals
- 1.8 Explain the purpose of decibels (dBs)
 - 1.8.1 Convert voltage and power levels to and from decibel equivalents
 - 1.8.2 Explain how to express gain or loss using dB
- 1.9 Explain how Optical Power is measured (dBm); express optical power levels in dBm's and compare power gains and losses

2.0 BASIC PRINCIPLES OF LIGHT

- 2.1 Describe the Electromagnetic Spectrum and locate light frequencies within the spectrum in relation to communications frequencies
- 2.2 Convert various wavelengths to corresponding frequencies
- 2.3 Describe how the Index of Refraction is calculated
- 2.4 Recall the phenomenon that makes fiber optic transmission possible, total internal reflection (TIR)
- 2.5 Define Fresnel Reflection Loss
- 2.6 Explain the effects of Refraction
 - 2.6.1 Explain Snell's Law

3.0 OPTICAL FIBER CONSTRUCTION AND THEORY

- 3.1 Name the materials out of which optical fiber core is manufactured
- 3.2 Discuss why the core and the cladding have different compositions of glass
- 3.3 State the materials from which the fiber optic coating is manufactured
- 3.4 Define the performance of optical fibers used in the telecommunications industry in accordance with Telecommunications Industry Association (TIA®), Telcordia, and the International Telecommunications Union (ITU®)
- 3.5 Summarize the fiber types that correspond to the referenced fiber designations OM1, OM2, OM3, OM4, OM5, OS1, and OS2 in accordance with ISO/IEC (the International Organization for Standardization/International Electrotechnical Commission) requirements
- 3.6 Describe single-mode fiber and how it differs from multimode fiber
 - 3.6.1 Explain why multimode fiber may be selected over single-mode fiber
- 3.7 List common material classifications for a fiber optic cable

- 3.8 Describe the basics of optical fiber manufacturing
- 3.9 Point out how the number of potential paths (modes) of light is one of the most important characteristics used to distinguish types of fiber
- 3.10 Distinguish the relationship and purpose between the different refractive index profiles

4.0 OPTICAL FIBER CHARACTERISTICS

- 4.1 Define dispersion in an optical fiber
- 4.2 Explain how modal dispersion causes pulses to spread out as they travel along the fiber
 - 4.2.1 List the methods for overcoming modal dispersion
- 4.3 Explain how material dispersion arises from the change in a material's refractive index with wavelength
- 4.4 Relate how waveguide dispersion is a separate effect from material dispersion, arising from the distribution of light between core and cladding
- 4.5 Explain chromatic dispersion in an optical fiber
- 4.6 Explain how polarization mode dispersion (PMD) affects the two distinct polarization mode states, referred to as differential group delay (DGD)
- 4.7 Describe how to measure fiber optic link attenuation using the referenced methods specified by TIA-526-14-B for multimode and TIA-526-7 for single-mode fiber optic cables
- 4.8 Describe how microbends can change the physical characteristics of an optical fiber
- 4.9 Describe how a macrobend changes the angle at which light hits the core-cladding boundary
- 4.10 Relate how light rays have to fall within a fiber's acceptance angle, measured by the numerical aperture (NA), in order to be guided into the core
- 4.11 Identify the cone of acceptance as used in optical fiber
- 4.12 List the ANSI/TIA-568-C.3, ISO/IEC 11801, and ITU Series G minimum overfilled modal bandwidth-length product (MHz·km) limitations for common multimode optical fiber and cable types

5.0 SAFETY

- 5.1 Explain how to safely handle and dispose of fiber optic cable
 - 5.1.1 Explain potential electrical hazards in a fiber optic environment
 - 5.1.2 Describe typical work place hazards in the fiber optic environment
- 5.2 Explain the three lines of defense to help you get through the day safely including:
 - 5.2.1 Engineering controls
 - 5.2.2 Personal protective equipment
 - 5.2.3 Good work habits
- 5.3 List the safety classifications of fiber optic light sources as described by the FDA, ANSI, OSHA, and IEC to prevent injuries from laser radiation
- 5.4 Explain the potential chemical hazards in the fiber optic environment and the purpose of the material safety data sheet (MSDS)

6.0 FIBER OPTIC CABLES

- 6.1 Draw a cross-section of a fiber optic cable and explain the purposes of each segment
- 6.2 Distinguish between the two buffer type cables:
 - 6.2.1 Loose buffer (stranded vs. central tube)
 - 6.2.2 Tight buffer (distribution vs. breakout)
- 6.3 Identify the different types of strength members used to withstand tensile forces in an optical fiber cable
- 6.4 Compare the choice of jacket materials and how they play a crucial role in determining characteristics of a cable
- 6.5 Describe the following cable types:
 - 6.5.1 Simplex cordage
 - 6.5.2 Duplex cordage

- 6.5.3 Distribution cable
- 6.5.4 Breakout cable
- 6.5.5 Armored cable
- 6.5.6 Messenger cable
- 6.5.7 Ribbon cable
- 6.5.8 Submarine cable
- 6.5.9 Aerospace cable
- 6.5.10 Stranded Loose Tube cable
- 6.5.11 Central Loose Tube cable
- 6.6 Explain what hybrid cables are and where they are ordinarily used in fiber optics in accordance with ANSI/TIA-568-C.1
- 6.7 Describe a composite cable, as defined by National Electrical Code (NEC®) Article 770.2
- 6.8 Distinguish the difference between a fanout kit (sometimes called a furcation kit) and a breakout kit
- 6.9 Explain how fibers can be blown through microducts instead of installing cables underground or in structures.
- 6.10 List the National Electrical Code (NEC®) optical fiber cable categories including:
 - 6.10.1 Abandoned optical fiber cable
 - 6.10.2 Nonconductive optical fiber cable
 - 6.10.3 Composite optical fiber cable
 - 6.10.4 Conductive optical fiber cable
- 6.11 Describe the NEC® listing requirements for:
 - 6.11.1 Optical fiber cables
 - 6.11.2 Optical fiber raceways
- 6.12 Explain where the TIA-598-C color code is used and how the colors are used to identify individual cables
- 6.13 Describe TIA-598-C premises cable jacket colors
- 6.14 Explain how cable markings are used to determine the length of a cable

7.0 TYPES OF SPLICING

7.1 Mechanical Splicing

- 7.1.1 Explain the extrinsic factors that affect splice performance
- 7.1.2 Differentiate between the attributes and tolerances for different single-mode optical fibers as defined in ITU G series G.652, G.655, G.657. ANSI/TIA-568, ANSI/TIA-758 and Telcordia standards
- 7.1.3 Summarize the correct fiber preparation scoring method using a cleaver
- 7.1.4 Discuss the mechanical splice assembly process
- 7.1.5 Explain performance characteristics of index matching gel used inside the mechanical splice
- 7.1.6 Perform ANSI/TIA-568-C.0 (Annex E.8.3) Optical Time Domain Reflectometer (OTDR) insertion loss procedures for a reflective event mechanical splice

7.2 Fusion Splicing

- 7.2.1 Describe the advantages of fusion splicing over mechanical splicing
- 7.2.2 Summarize the correct fiber preparation scoring method using a cleaver
- 7.2.3 Discuss the fusion splice assembly process and splice protection
- 7.2.4 Explain the use of the Splice Closure
- 7.2.5 Explain ANSI/TIA-568-C.0 (Annex E.8.3) Optical Time Domain Reflectometer (OTDR) insertion loss procedures for a non-reflective event fusion splice

8.0 CONNECTORS

- 8.1 Identify the wide variety of fiber optic connector types
- 8.2 Describe the three most common approaches to align the fibers including:
 - 8.2.1 Ferrule based connector
 - 8.2.2 V-groove assemblies for multiple fibers
 - 8.2.3 Expanded-Beam connector
- 8.3 Describe the ANSI/TIA-568-C.3 section 5.2.2.4 two types of array adapters
 - 8.3.1 Type-A MPO and MTP® adapters shall mate two array connectors with connector keys key-up to key-down
 - 8.3.2 Type-B MPO and MTP® adapters shall mate two array connectors with connector keys key-up to key-up
- 8.4 Describe ferrule materials used with fiber optics connectors
- 8.5 Explain both the intrinsic and extrinsic factors that affect connector performance
- 8.6 Define both physical contact (PC) and angled physical contact (APC) finish
 - 8.6.1 Explain how PC and APC finishes affect both insertion loss and back reflectance
 - 8.6.2 Differentiate ultra-physical contact (UPC) endface characteristics from APC
- 8.7 Explain how physical contact depends on connector endface geometry to include the Telcordia GR-326 three key parameters for optimal fiber contact:
 - 8.7.1 Radius of curvature
 - 8.7.2 Apex offset
 - 8.7.3 Fiber undercut and protrusion
- 8.8 Describe how and where pigtailed are used in fiber cabling
- 8.9 Summarize connector termination methods and tools
- 8.10 Compare the differences between field polishing, factory polishing, and no-epoxy/no-polish connector styles
- 8.11 Describe how to properly perform a connector endface cleaning and visual inspection in accordance with ANSI/TIA-455-57B Preparation and Examination of Optical Fiber Endface for Testing Purposes
- 8.12 Explain how to guarantee insertion loss and return loss performance in accordance with the IEC 61300-3-35 the global common set of requirements for fiber optic connector endface quality
- 8.13 Identify both multimode and single-mode connector strain relief, connector plug body, and adapter housing following ANSI/TIA-568-C.3 section 5.2.3

9.0 SOURCES

- 9.1 Describe the two primary types of light sources including the light emitting diode (LED) and semiconductor laser (also called a laser diode)
- 9.2 Explain the basic concept, operation and address launch conditions of a LED light source
- 9.3 Discuss the spontaneous emission process used by LEDs to generate light
- 9.4 Outline the differences between the surface-emitting and the edge-emitting LEDs, which are commonly used in fiber optic communication systems
- 9.5 Explain the basic concept and operation of a laser diode light source
- 9.6 Discuss the stimulated emission process used by lasers to generate light
- 9.7 List the differences between the Fabry-Perot (FP), distributed feedback (DFB), and vertical-cavity surface-emitting laser (VCSEL), which are commonly used in fiber optic communication systems
- 9.8 Recall the typical operational wavelengths for communication systems
- 9.9 Compare the performance characteristics of the LED and laser light sources to include:
 - 9.9.1 Output pattern (sometimes referred to as spot size)
 - 9.9.2 Source spectral width
 - 9.9.3 Source output power

- 9.9.4 Source modulation speed
- 9.10 Compare the transmitter performance characteristics of the LED and laser light sources on a typical specification sheet to include:
 - 9.10.1 Operating conditions
 - 9.10.2 Electrical characteristics
 - 9.10.3 Optical characteristics
 - 9.10.4 Institute of Electrical and Electronics Engineers (IEEE) 802.3 Ethernet applications
- 9.11 Identify standards and federal regulations that classify the light sources used in fiber optic transmitters
- 9.12 Explain the differences between an overfilled launch condition and a restricted mode launch (RML)

10.0 DETECTORS AND RECEIVERS

- 10.1 Explain the basic concept and operation of a PN photodiode when used in an electrical circuit
- 10.2 Explain the use for PIN photodiodes and theory of operation
- 10.3 Describe the action of an avalanche photodiode (APD)
- 10.4 Compare the factors in photodiode performance characteristics including:
 - 10.4.1 Responsivity
 - 10.4.2 Quantum efficiency
 - 10.4.3 Switching speed
- 10.5 Discuss how fiber optic receivers are typically packaged with the transmitter and how together, the receiver and transmitter form a transceiver
- 10.6 Examine a block diagram of a typical receiver that is divided into three subassemblies:
 - 10.6.1 Electrical subassembly
 - 10.6.2 Optical subassembly
 - 10.6.3 Receptacle
- 10.7 Describe the two key characteristics of a fiber optic receiver:
 - 10.7.1 Dynamic Range
 - 10.7.2 Wavelength
- 10.8 Describe the performance characteristics of a fiber optic receiver to include:
 - 10.8.1 Recommended operating conditions
 - 10.8.2 Electrical characteristics
 - 10.8.3 Optical characteristics
 - 10.8.4 IEEE 802.3 Ethernet applications

11.0 PASSIVE COMPONENTS AND MULTIPLEXERS

- 11.1 Discuss the different passive devices and the common parameters of each device:
 - 11.1.1 Optical fiber and connector types
 - 11.1.2 Center wavelength and bandwidth
 - 11.1.3 Insertion loss
 - 11.1.4 Excess loss
 - 11.1.5 Polarization-dependent loss (PDL)
 - 11.1.6 Return loss
 - 11.1.7 Crosstalk in an optical device
 - 11.1.8 Uniformity
 - 11.1.9 Power handling and operating temperature
- 11.2 Explain how optical splitters work and describe the technologies used to include:
 - 11.2.1 Tee splitter
 - 11.2.2 Reflective and transmissive star splitters
- 11.3 Compare the different types of optical switches that open or close an optical circuit
- 11.4 Explain that an optical attenuator is a passive device used to reduce an optical signal's power level

- 11.5 Explain that an optical isolator comprises elements that only permit the forward transmission of light
- 11.6 Explain how wavelength division multiplexing (WDM) combines different optical wavelengths from two or more optical fibers into just one optical fiber
- 11.7 Explain the difference between coarse wavelength division multiplexing (CWDM) and dense wavelength division multiplexing (DWDM)
- 11.8 Compare the three different techniques with which to passively amplify an optical signal:
 - 11.8.1 Erbium doped fiber amplifiers
 - 11.8.2 Semiconductor optical amplifiers
 - 11.8.3 Raman fiber amplifiers
- 11.9 Point out that an optical filter is a device that selectively permits transmission or blocks a range of wavelengths

12.0 PASSIVE OPTICAL NETWORKS (PON)

- 12.1 Define the passive and active individual optical network categories
- 12.2 Explain that the fiber to the X (FTTX) is used to describe any optical fiber network that replaces all or part of a copper network
- 12.3 Discuss the major outside plant components for a fiber to the X (FTTX) passive optical network (PON) following both the Telcordia GR-20 and GR-765 standard and International Telecommunications Union (ITU) G.983 Broadband Optical Access Systems Based on Passive Optical Networks standard
- 12.4 Compare the fundamentals of a passive optical network (PON) including fiber-to-the-home (FTTH), fiber-to-the-building (FTTB), fiber-to-the-curb (FTTC), and fiber-to-the-node (FTTN)

13.0 CABLE INSTALLATION AND HARDWARE

- 13.1 Define the physical and tensile strength requirements for optical fiber cables recognized in ANSI/TIA-568-C.3, section 4.3 to include:
 - 13.1.1 Inside plant cables
 - 13.1.2 Indoor-outdoor cables
 - 13.1.3 Outside plant cable
 - 13.1.4 Drop cables
- 13.2 Compare the bend radius and pull strength tensile ratings of the four common optical fiber cables recognized in ANSI/TIA-568-C.3, section 4.3
- 13.3 Identify some the hardware commonly used in fiber optic installation to include:
 - 13.3.1 Pulling grips, pulling tape and pulling eyes
 - 13.3.2 Pull boxes
 - 13.3.3 Splice enclosures
 - 13.3.4 Patch panels
- 13.4 Compare the variety of installation methods used to install a fiber optic cable such as:
 - 13.4.1 Tray and duct
 - 13.4.2 Conduit
 - 13.4.3 Direct burial
 - 13.4.4 Aerial
 - 13.4.5 Blown optical fiber (BOF)
- 13.5 Describe the National Electrical Code (NEC®) Article 770 and Article 250 requirements on fiber optic cables and their installation within buildings
 - 13.5.1 Fire resistance
 - 13.5.2 Grounding
- 13.6 Discuss the documentation and labeling requirements in order to follow a consistent and easily readable format as described in ANSI/TIA-606-B Administration Standard for the Commercial Telecommunications Infrastructure
- 13.7 Describe hardware management

14.0 FIBER OPTIC SYSTEM CONSIDERATIONS

- 14.1 List the considerations for a basic fiber optic system design
- 14.2 Identify the seven different performance areas within a system and evaluate performance of optical fiber to copper in the areas of:
 - 14.2.1 Bandwidth
 - 14.2.2 Attenuation
 - 14.2.3 Electromagnetic immunity
 - 14.2.4 Size
 - 14.2.5 Weight
 - 14.2.6 Security
 - 14.2.7 Safety
- 14.3 Describe the performance of a multimode fiber optic link using the following sections of the ANSI/TIA-568-C.3 Optical Cabling Components Standard
 - 14.3.1 Section 4.2 cable transmission performance
 - 14.3.2 Section 5.3 optical fiber splice
 - 14.3.3 Annex A (Normative) optical fiber connector performance specifications
- 14.4 Explain how to prepare a multimode optical link power budget as defined in IEEE 802.3 definition 1.4.217
- 14.5 Calculate a multimode optical link power budget
- 14.6 Analyze the performance of a single-mode fiber optic link using the following sections of the ANSI/TIA-568-C.3 Optical Cabling Components Standard, ANSI/TIA-758 Customer–Owned Outside Plant Telecommunications Cabling Standard, and Telcordia GR-326 Core Generic Requirements for Single-mode Optical Connectors and Jumper Assemblies
 - 14.6.1 ANSI/TIA-568-C.3 Section 4.2 cable transmission performance
 - 14.6.2 ANSI/TIA-758 Section 6.3.4.1.2 attenuation
 - 14.6.3 ANSI/TIA-568-C.3 Annex A (Normative) optical fiber connector performance specifications
- 14.7 Explain how to prepare a single-mode optical link power budget as defined in IEEE 802.3 definition 1.4.217
- 14.8 Calculate a single-mode optical link power budget

15.0 TEST EQUIPMENT AND LINK/CABLE TESTING

- 15.1 Compare and contrast the functional use of the following pieces of test equipment:
 - 15.1.1 Continuity tester
 - 15.1.2 Visual fault locator (VFL)
 - 15.1.3 Fiber identifier
 - 15.1.4 Optical return loss test set (ORL)
 - 15.1.5 Light source (FOS) and power meter (FOM)
 - 15.1.6 Optical loss test set (OLTS)
- 15.2 Explain the proper use of the following pieces of test equipment:
 - 15.2.1 Continuity tester
 - 15.2.2 Visual fault locator (VFL)
 - 15.2.3 Fiber identifier
 - 15.2.4 Optical return loss test set (ORL)
 - 15.2.5 Light source (FOS) and power meter (FOM)
 - 15.2.6 Optical loss test set (OLTS)
- 15.3 Compare the difference between an optical fiber patch cord and measurement quality test jumpers (MQJ)
- 15.4 Describe the use of a mandrel wrap or mode filter on both a multimode and single-mode source measurement quality reference jumper

- 15.5 Explain the ANSI/TIA-526-14-B Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant procedures to include:
 - 15.5.1 Method A: Two Jumper Reference
 - 15.5.2 Method B: One Jumper Reference
 - 15.5.3 Method C: Three Jumper Reference
 - 15.5.4 Encircled Flux launch conditions
 - 15.6 Describe the proper setup and cable preparation for an Optical Time Domain Reflectometer (OTDR) measurement to include:
 - 15.6.1 Measure fiber length
 - 15.6.2 Evaluate connectors and splices
 - 15.6.3 Locate faults
 - 15.6.4 Rayleigh scattering
 - 15.6.5 Fresnel reflections
 - 15.6.6 Pulse suppressor (launch fiber)
 - 15.6.7 Deadzone cabling
 - 15.6.8 Access jumpers
 - 15.6.9 Vertical and Horizontal axes on the display
- 16.0 TROUBLESHOOTING AND RESTORATION (Tier 1 and 2 Testing)**
- 16.1 Perform Fiber Optic Source (FOS) and Fiber Optic Meter (FOM) fiber optic link testing
 - 16.2 Perform Fiber Optic Source (FOS) and Fiber Optic Meter (FOM) patch cable testing
 - 16.3 Perform Optical Time Domain Reflectometer (OTDR) unit length testing
 - 16.4 Perform Optical Time Domain Reflectometer (OTDR) connector and splice evaluation
 - 16.5 Perform Optical Time Domain Reflectometer (OTDR) fault location
 - 16.6 Demonstrate and prepare acceptance testing documentation

**End of Fiber Optics Technician Competencies Listing:
(16 Major Knowledge Categories)**

Find an ETA approved school and approved test site: http://www.etai.org/test_sites.html

A successful Fiber Optic Technician FOT may also qualify for the Journeyman option Certified Electronics Technician (CET) by holding the Associate CET certification.

Suggested Study Materials and Resources for ETA® Fiber Optics Technician Certification:

- Cabling: The Complete Guide to Copper and Fiber-Optic Networking, 5E;** Andrew Oliviero, Bill Woodward; ISBN 978-1-118-80732-3; Sybex, Inc; March 2014; paperback; 1284 ppg. —Available through ETA at 800-288-3824, www.etai.org
- Troubleshooting Optical Fiber Networks: Understanding and Using Optical Time-Domain Reflectometers, 2E;** Duwayne Anderson, Larry Johnson, Florian Bell; ISBN 978-0120586615; Elsevier Academic Press; May 2004; hardcover; 437 ppg; 800-545-2522
- Fiber Optic Design for Multimode and Single-mode Optical Local Area Networks;** Corning Cable Systems LLC; FSD400-R7.M5; 2009. <http://catalog2.corning.com/CorningCableSystems/en-US/catalog/DocumentLibrary.aspx>
- Technology Series Videos and CDs;** The Light Brigade, 800-451-7128, www.lightbrigade.com
- Technicians Guide to Fiber Optics, 4E;** Donald J. Sterling; ISBN 1-4018-1270-8; Delmar Learning; Dec 2003; hardcover; 384 ppg; Available through ETA 800-288-3824, www.etai.org
- Fiber Optic Installer's Field Manual;** Bob Chomycz; ISBN 0-07-135604-5; McGraw-Hill; Jun 2000; softcover; 368 ppg; —Available through ETA at 800-288-3824, www.etai.org
- Fiber Optic Installer and Technician Guide;** Bill Woodward, Emile Husson; ISBN 978-0782143904; Sybex, Inc; July 2005; hardcover; 496 ppg; Available through ETA 800-288-3824, www.etai.org
- Understanding Fiber Optics, 5E;** Jeff Hecht; ISBN: 978-0131174290; Prentice-Hall; Apr 2005; hardcover; 800 ppg
- Understanding Laser Accidents;;** ed.by Ken Barat; ISBN 978-1138048454; CRC Press; Sept 2018; softcover; 288 ppg;
- Laser Safety: Tools and Training, 2E;;** ed.by Ken Barat; ISBN 978-1138072008; CRC Press; March 2017; softcover; 436 ppg;
- Introduction to Fiber Optics, 3E;** John Crisp, Barry Elliott; ISBN 978-0750667562; Newnes; Dec 2005; paperback; 245 ppg
- Fiber Optic Theory & Applications;** Jeffrey Dominique; 1993; FNT Publ.; paperback
- Guide Design and Implement Local and Wide Area Networks, 3E;** Michael Palmer and Bruce Sinclair, ISBN 978-0619216115; Course Technology; June 2012; paperback; 250 ppg
- Optical Networking Crash Course;** Steven Shepard; ISBN 007-1372083; McGraw-Hill Co.; July 2008; paperback; 288 ppg
- Optical Networking: A Beginner's Guide;** Robert C. Elsenpeter; ISBN 978-0072193985; McGraw-Hill Co.; Dec 2001; paperback; 544 ppg
- Optical Networking & WDM;** Walter J. Goralski; ISBN 978-0072130782; McGraw-Hill Co.; Jan 2001; paperback; 556 ppg
- Designers Guide to Fiber Optics;** AMP Corp., Harrisburg, PA 17105; ASIN B000IU64O; 1982; paperback; 209 ppg
- National Electrical Code, 2020;** National Fire Protection Assn., Sept., 2019; www.nfpa.org

Also contact ETA at www.etai.org or 1-800-288-3824 for more information, numerous links, locations for training sites, additional white papers, articles and the latest Fiber updates.

ETA certification programs are accredited through ICAC,
complying with the ISO/IEC 17024 standard.



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