The Association of Communications & Electronics Schools International Inc.

Competency Requirements For:

Certified Professional Fiber Optics Installer™ - CPFOI

Professional Fiber Optics Installers are expected to acquire knowledge of basic electronics and photonics concepts and principles, as well as acquire “hands on” skills which are then applied to all of the normal functions and procedures required to safely and completely install, maintain and repair fiber optics cabling. Upon obtaining this basic knowledge and “hands on” skills, a CPFOI will be able to enter employment in positions of the information technology (IT) and telecommunications fields. Additional minimal training in areas unique to the special requirements of individual products, designs or systems will allow a Certified Professional Fiber Optics Installer to become an efficient and profitable part of the workforce.

Professional Fiber Optics Installers must be knowledgeable and have sufficient “hands on” skills in the following technical and related areas:

1.0 Fiber Optic Transmission

1.1 Describe light wave characteristics and behaviors
1.2 Describe light wave propagation through various mediums
1.3 Demonstrate the ability to differentiate between light wavelengths used in fiber optic applications
1.4 Explain the bandwidth characteristics associated with singlemode and multimode optical fibers
1.5 Explain the importance of the 0 dB reference (1 mW) to loss measurements in optical fibers
1.6 Explain the terms attenuation and optical power
1.7 Describe the effects of EMI (electro magnetic interference) & RFI (radio frequency interference) on copper based vs. fiber optic based signals
1.8 Explain the position of commonly used fiber optic light sources on the electromagnetic spectrum
1.9 Describe commonly used multimode fiber optic wavelengths vs. singlemode fiber optic wavelengths

2.0 Optical Fiber Construction

2.1 Describe basic fiber construction to include bare fiber, the core, cladding, acrylate coating, Kevlar, strength members, armored fiber and jacketing
2.2 Demonstrate the ability to differentiate between the core, cladding and coating of a fiber optic cable in a cross-sectional view
2.3 Identify the physical differences between multimode fiber and singlemode fiber
2.4 Explain the terms reflection & refraction to include the concept of total internal reflection as they relate to optical fiber
2.5 Describe step & graded index fibers
2.6 Explain core/diameter relationships to include the North American Standard
2.7 Explain and define the acronyms OFNP, OFCP, OFNR, OFCR, OFN and OFC

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(N.E.C. Classifications of Fiber Optic Cable) and explain when and how each is used in fiber optic cable installation

2.8 List the Fiber Optic Cable Color Code

2.9 Define tight buffered & loose tube gel filled cable and describe where and why it is used

2.10 Define breakout and distribution style cable and describe where and why it is used

3.0 Connectors and Components

3.1 Identify the connector types listed in the TIA/EIA-B.3 Standard

3.2 Recognize the physical characteristics of the SC, ST, FDDI, Biconic and SMA type connectors

3.3 Explain termination methods required for an epoxy type (1st Generation) connector

3.4 Explain termination methods required for a pre-loaded adhesive type (2nd Generation) connector

3.5 Explain termination methods required for a crimp type (3rd Generation) connector

3.6 Explain termination methods required for a chemical type (4th Generation) connector

3.7 Explain termination methods required for a UV curable (5th Generation) connector

3.8 Explain the functions and recognize fiber optic connector components to include the boot, ferrule, housing and end face

3.9 Explain and differentiate between intrinsic and extrinsic factors relating to optical fiber connector performance

3.10 Define the purpose and method(s) used to produce a PC (physical contact) fiber end finish

3.11 Define the purpose and method(s) used to produce an APC (angled physical contact) fiber end finish

3.12 Describe the proper methods of handling and maintaining fiber optic connectors in a workspace environment

3.13 Define the term “pigtails” in relation to fiber optic cabling and explain their origin and applications where they are used

3.14 Describe all steps necessary to ensure a complete visual inspection of fiber optic connectors

4.0 Splicing and Optical Fiber Cable End Preparation

4.1 Describe proper fiber optic cable end preparation procedures

4.2 Describe the proper method of fiber identification

4.3 Describe the procedures necessary to perform a mechanical splice to current Industry Standards

4.4 Describe the procedures necessary to perform a fusion splice to current Industry Standards

4.5 Describe the procedures to perform optical fiber cleaving

4.6 Describe the procedures, tools and techniques necessary to perform fiber end hand polishing

4.7 Describe the operating procedures of an optical fiber inspection scope

4.8 Describe the operating procedures of an optical talk set

5.0 Fiber Optic Test Equipment Operations

5.1 Identify and explain the necessity of using measurement quality jumpers with optical fiber test equipment

5.2 Describe the operating procedures necessary to perform an acceptance test using a light source and power meter

5.3 Describe the operating procedures necessary to perform an end to end test using a light source and power meter

5.4 Describe the operating procedures necessary to perform a loop back test using a light source and power meter

5.5 Describe the operating procedures necessary to identify dead zone/recovery area using an OTDR

5.6 Describe the operating procedures necessary to identify mechanical/fusion splices using an OTDR

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5.7 Describe the operating procedures necessary to identify ghosting/echoes using an OTDR
5.8 Describe the operating procedures necessary to identify fiber breaks using an OTDR
5.9 Describe the operating procedures necessary to identify fiber ends using an OTDR
5.10 Describe the operating procedures necessary to perform a 2-point measurement: splice/end to end using an OTDR

6.0 Fiber Optic Light Sources

6.1 Identify the two basic light sources used in fiber optic transmission
6.2 Identify the fiber optic light source commonly used with multimode fiber
6.3 Identify the fiber optic light source commonly used with singlemode fiber
6.4 List the classifications of laser light sources used in fiber optic transmissions and explain the safety considerations associated with each classification
6.5 Identify the common wavelengths used with multimode fiber optic light sources
6.6 Identify the common wavelengths used with singlemode fiber optic light sources
6.7 Compare the advantages/disadvantages of singlemode fiber optic light sources versus the advantages/disadvantages of multimode fiber optic light sources and the network applications where each is best suited

7.0 "Hands On" Skills – Fiber Optics Connectorization, Splicing & Testing

7.1 Demonstrate proficiency in the use of an Inspection Scope (minimum 200 X)
7.2 Demonstrate proficiency in the use of Fiber Stripping Tools (Both No-Niks & Miller)
7.3 Demonstrate proficiency in the use of a fiber optic Cleaver
7.4 Demonstrate the ability to perform a Fusion Splice to current Industry Standards
7.5 Demonstrate proficiency in the use of an OTDR with Test Fiber
7.6 Demonstrate proficiency in the use of a Power Meter & Light Source with associated adapters (ST/SC) & reference patch cords
7.7 Demonstrate the ability to perform a Mechanical Splice to current Industry Standards
7.8 Identify and demonstrate proficiency in the use of ST & SC Connectors and associated tools
7.9 Demonstrate the ability to perform a ST connectorization to current Industry Standards
7.10 Demonstrate the ability to perform a SC connectorization to current Industry Standards
7.11 Demonstrate the ability to perform an epoxyless (3rd Generation) connectorization to current Industry Standards
7.12 Demonstrate the ability to perform an epoxy (1st, 2nd, 4th or 5th Generation) connectorization to current Industry Standards
7.13 Demonstrate the proper use of Safety Goggles
7.14 Demonstrate proficiency in the use of Polishing Pucks, Pads & Lapping Film
7.15 Demonstrate proficiency in the use of an Optical Talk Set
7.16 Identify information contained in Material Safety Data Sheets and describe the importance of safety measures when using chemicals and compounds

8.0 Fiber Optic Safety

8.1 Identify information contained in Material Safety Data Sheets and describe the importance of safety measures when using chemicals and compounds
8.2 Demonstrate the correct procedures for disposing of fiber waste ends
8.3 Identify the eye safety procedures associated with fiber optic light sources (lasers and LED's), glass fragment hazards, chemicals and compounds
8.4 Explain the optimum environmental conditions which should be maintained when performing optical fiber splicing, connectorization and maintenance
8.5 Explain the hazards associated with cabling installation, maintenance and repair to include high voltage, shock hazards, voids, confined spaces, cable-ways, overhead safety, safety harnesses, lift equipment, trenching machines and submerged cables

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9.0 Optical Fiber Installation Practices

9.1 Define the terms “plenum” and “plenum rated fiber optic cable” in relation to TIA/EIA 568-B.3 Standard references

9.2 Define the terms “bend loss”, “dynamic bend radius” and “static bend radius” in relation to TIA/EIA 568-B.3 Standard references

9.3 Explain the advantage of installing fiber optic cable versus copper cabling

9.4 Explain the formula used to determine the dynamic bend radius of fiber optic cable when it is unknown or unspecified

Suggested Study Materials

ACES Int'l Certified Professional Fiber Optics Installer Theory and "Hands On" Course, ACES L.L.C. (by licensing agreement, June, 2002 all rights reserved) 241pp;
Technician’s Guide to Fiber Optics; 3rd Edition; David Sterling, Jr.; Delmar Publishing; 345pp; ISBN 0–7668–0171-3
Cabling--The Complete Guide to Network Wiring; David Groh and Jim McVee; 2000
National Electric Code; National fire Protection Assn.; 1998
TIA/EIA (Various Structured Cabling Standards & Technical Systems Bulletins)

Course Length: “Hands On” Training Courses are intended to produce a fully competent Professional Fiber Optics Installer

30 to 80 contact hours – 50%-75% lab

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