

ACES Intl



The Association of Communications & Electronics Schools International Inc.

Competency Requirements For:

Certified Professional Data Cabling Installer™ - CPDCI

Professional Data Cabling Installers are expected to acquire knowledge of basic electronics, data cabling and wiring 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 data cabling. Upon obtaining this basic knowledge and “hands on” skills, a CPDCI 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 Data Cabling Installer to become an efficient and profitable part of the workforce.

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

1.0 Basic Telecommunications Operations

- 1.1 Describe Central Offices and their role in telephony and data services
- 1.2 Describe Switching Centers and their role in telephony and data services
- 1.3 Describe Trunk Lines and their role in telephony and data services
- 1.4 Describe Private Branch Exchanges (PBXs) and their role in telephony and data services
- 1.5 Identify “On Hook” and “Off Hook” Conditions as they are found in telephony operations
- 1.6 Describe the CO Tip (T) and Ring (R) as they are used in telephony operations
- 1.7 Describe the CO Battery as it is used in telephony operations
- 1.8 Describe the series impedance as it is used in telephony operations
- 1.9 Describe the Talk Battery, Loop Current and Loop Resistance as they are used in telephony operations
- 1.10 Describe the Ringing Voltage as it is used in telephony operations
- 1.11 Describe Dual Tone Multi-Frequency signals generated by a “Touch Tone” telephone to include the concept of signal multiplexing

2 Tools and Test Equipment

- 2.1 Identify the cable cutter and describe it's use in data cabling installation
- 2.2 Identify the UTP jacket stripper and describe it's use in data cabling installation
- 2.3 Identify the COAX cable stripper and describe it's use in data cabling installation
- 2.4 Identify the Crimp Frame and describe it's use in data cabling installation
- 2.5 Identify the Crimp Dies and describe their use in data cabling installation
- 2.6 Identify the Punch Down tool and describe it's use in data cabling installation
- 2.7 Identify the Punch Down tool blades and describe their use in data cabling installation
- 2.8 Identify the Pedestal Access Wrench and describe it's use in data cabling installation
- 2.9 Identify the Cable Knife and describe it's use in data cabling installation

- 2.10 Identify the Electricians Scissors and describe their use in data cabling installation
- 2.11 Identify the Inspection Mirror and describe its use in data cabling installation
- 2.12 Identify the Wire Strippers and describe their use in data cabling installation
- 2.13 Identify the Driver Handle and describe its use in data cabling installation
- 2.14 Identify the Driver's Phillips Blades and describe their use in data cabling installation
- 2.15 Identify the Driver's Straight Tip Blades and describe their use in data cabling installation
- 2.16 Identify the Driver's Nut Driving Blades and describe their use in data cabling installation
- 2.17 Identify the Driver Star Blades and describe their use in data cabling installation
- 2.18 Identify the Allen Wrench and describe its use in data cabling installation
- 2.19 Identify the Continuity Test Set and describe its use in data cabling installation
- 2.20 Identify the Continuity Test Set Terminator and describe its use in data cabling Installation
- 2.21 Identify the Tone Generator and Tone Sensor
- 2.22 Identify a DMM (digital multimeter)
- 2.23 Identify a Field Network Analyzer (IE Fluke One Touch)
- 2.24 Identify a Cable Certifier Level II and Level III

3.0 Cable Identification

- 3.1 Identify various LAN cables: CAT 1 cable, CAT 2 cable, CAT 3 cable, CAT 4 cable, CAT 5 cable, CAT 5e cable and CAT 6 cable along with their Bandwidths, Data Rates, Applications and their corresponding Standards' encoding methods
- 3.2 Identify the characteristics and applications of twisted pair cables
- 3.3 Identify the physical differences between UTP, ScTP and STP cables
- 3.4 Identify the physical differences between RG6, RG8 and RG58
- 3.5 Describe the applications of Thicknet (RG8, IEEE802.3) and Thinnet (RG6, RG58, RG59 IEEE802.3)
- 3.6 Identify the Color Codes used for TIA/EIA 568A and TIA/EIA 568B Standards
- 3.7 Describe the ordered pair pin assignments listed in the TIA/EIA 568 Standards
- 3.8 Identify the applications of 2 pair, 3 pair, 4 pair and 25 pair UTP cable as listed in the TIA/EIA 568 Standards
- 3.9 Identify Hybrid and Composite cables and their applications

4.0 Topologies, Connectors and Components

- 4.1 Identify basic Network Topologies (Star, Bus and Ring) and their various combinations
- 4.2 List the applications of the basic Network Topologies (Star, Bus and Ring)
- 4.3 Identify the physical characteristics of the DB type connectors
- 4.4 Identify the physical characteristics of the F type connector
- 4.4 Identify the physical characteristics of the BNC type connector
- 4.5 Identify the physical characteristics of the RJ11 type connector
- 4.6 Identify the physical characteristics of the RJ45 type connector
- 4.7 Identify the physical characteristics of ST and SC type fiber optics connectors
- 4.8 Explain termination methods required for the F type, BNC type, RJ11 and RJ45 type connectors
- 4.9 Identify the physical characteristics of the 66 and 110 style IDCs (Insulation Displacement Contacts)
- 4.10 Identify the physical characteristics of rack mounted and wall mounted patch panels
- 4.11 Identify the physical characteristics of various Wall Plates and Modular Jacks used in data cabling installations
- 4.12 Describe the construction process and applications of RJ11 (standard telephone to modular wall jack) patch cords
- 4.12 Describe the construction process and applications of RJ45 (data communications device) patch cords
- 4.14 Describe the proper methods of constructing a basic horizontal link using CAT 5e cable (patch panel to 110 Interconnection Block and from the 110 Interconnection Block to the modular insert of a wall plate)
- 4.15 Describe the methods of constructing a basic horizontal link using coaxial cable

5.0 Industry Standards

- 5.1 Differentiate between TIA/EIA Standards (to include all previous versions) in reference to data cabling applications and installation practices
- 5.2 Identify installation practices and installation requirements contained in TIA/EIA 568B (Commercial Building Telecommunications Cabling Standard)
- 5.3 Identify installation practices and installation requirements contained in TIA/EIA 569A (Commercial Building Standard for Telecommunications Pathways and Spaces)
- 5.4 Identify installation practices and installation requirements contained in TIA/570A (Residential and Small Office/Home Office)
- 5.5 Identify installation practices and installation requirements contained in TIA/EIA 606 (Administration Standard for the Telecommunications Infrastructure of Commercial Buildings)
- 5.6 Identify installation practices and installation requirements contained in TIA/EIA 607 (Grounding and Bonding Requirements for Telecommunication Systems)

6.0 "Hands On" Skills for Data Cabling Connectorization and Testing

- 6.1 Demonstrate the ability to use a cable cutter to properly cut phone, COAX, 4 pair UTP, and 25 pair UTP cables
- 6.2 Demonstrate the ability to use a COAX cable stripper in preparation for termination
- 6.3 Demonstrate the ability to use a UTP cable stripper in preparation for termination
- 6.4 Demonstrate the ability to use a Crimp Frame Tool and the appropriate Die to secure COAXIAL Cable connectors in place
- 6.5 Demonstrate the ability to terminate a 'F' type connector using coax cable
- 6.6 Demonstrate the ability to terminate a BNC type connector using coax cable
- 6.7 Demonstrate the ability to strip a phone cable in preparation for termination
- 6.8 Demonstrate the ability to use a Crimp Frame Tool and the appropriate Die to terminate RJ-11 Modular phone plugs in place
- 6.7 Demonstrate the ability to use the Electricians scissors to cut UTP cable and the individual wires
- 6.8 Demonstrate the ability to differentiate between the USOC, TIA/EIA 568 A and the TIA/EIA 568 B pin assignments
- 6.9 Demonstrate the ability to terminate the RJ-11 plug using phone cable and the USOC pin-out
- 6.10 Demonstrate the ability to use a Punch Down Tool with the appropriate blade to terminate UTP Cable to a '66' type block
- 6.11 Demonstrate the ability to use a Crimp Frame Tool and the appropriate die to terminate RJ-45 plugs in place
- 6.12 Demonstrate the ability to terminate the RJ-45 plug using the TIA/EIA 568 B pin out
- 6.13 Demonstrate the ability to use a Punch Down Tool and the appropriate blade to terminate UTP Cable to a '110' type terminal block on the patch panel, interconnection block and modular insert placed into a wall plate
- 6.14 Demonstrate the ability to terminate a Basic Link using the TIA/EIA 568 B pin out
- 6.15 Demonstrate the ability to use a Continuity Tester to verify correct installation of the RJ-11 connector onto phone cable
- 6.16 Demonstrate the ability to use a Continuity Tester to verify correct installation of the RJ-45 connector onto UTP cable
- 6.17 Demonstrate the ability to use a Continuity Tester to verify correct installation of the 'F' type connector onto coax cable
- 6.18 Demonstrate the ability to use a Continuity Tester to verify correct installation of the BNC type connector onto coax cable
- 6.19 Demonstrate the ability to use a Tone Generator and Tone Sensor in identifying a specific cable
- 6.20 Explain the use and test indications of a Field Network Analyzer in identifying active devices on the network, IP addresses used and collisions detected on the network
- 6.21 Demonstrate the ability to use and interpret the results of a Level II Cable Certifier to include mapping the cable, cable length, Attenuation, NEXT, FEXT and ACR

- 6.22 Demonstrate the ability to use and interpret the results of a Level III Cable Certifier to include mapping the cable, cable length, Attenuation, NEXT, FEXT, ACR, PSNEXT and ELFEXT

7.0 Data Cabling Safety

- 7.1 Discuss and identify potential safety hazards and concerns to be identified during a "walk through" of spaces to be worked in
- 7.2 Identify potential safety concerns when working overhead
- 7.3 List potential safety concerns when working on ladders and scaffolding
- 7.4 Identify safe working practices in the work place
- 7.5 Identify the role of MSDS sheets in a safe working environment
- 7.6 List potential hazards of electrical power when installing low voltage cabling

8.0 Data Cabling Installation Practices

- 8.1 Define the term "EMI" as used in data cabling installation practices and determine its common sources in an office, home or industrial setting
- 8.2 Define the term "attenuation" as used in data cabling installation practices and determine its common source(s)
- 8.3 Identify the requirements of the TIA/EIA Industry Standards to determine the maximum length of patch cords, cross-connect jumpers and horizontal Permanent Link
- 8.4 Identify the requirements of the TIA/EIA Standards to determine the correct color for mated pairs of 2-pair, 3-pair, 4-pair and 25 UTP cable
- 8.5 Identify the requirements of the TIA/EIA Standards to determine maximum untwisting of CAT 5 and CAT 5e UTP paired cable for a given application
- 8.6 Identify the requirements of the TIA/EIA Standards to determine acceptable cable media in a horizontal subsection/area
- 8.7 Identify the requirements contained in the NEC (Code) to determine the fire rating required of data cabling in a given application

Suggested Study Materials

ACES Int'l Certified Professional Data Cabling Installer Theory and "Hands On" Course, ACES L.L.C. (by licensing agreement, June, 2002 all rights reserved) 235pp; ISBN (awaiting auth.)

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 Data Cabling Installer

30 to 80 contact hours – 50%-75% lab