

## COURSE OVERVIEW IT0001 Network Cable Termination & Installation

### Course Title

Network Cable Termination & Installation

### Course Date/Venue

April 06-10, 2025/Manama Hall, Golden Tulip Bahrain Hotel, Kingdom of Bahrain

### Course Reference

IT0001

### Course Duration/Credits

Five days/3.0 CEUs/30 PDHs



### Course Description



***This practical and highly-interactive course includes practical sessions and exercises where participants carryout fiber optic splicing, testing and troubleshooting. Theory learnt in the class will be applied using our state-of-the-art equipment.***



This course is designed to provide participants with a detailed and up-to-date overview of Network Cable Termination & Installation. It covers the network types, importance of structured cabling in industrial environments and key components of a network cables; the types of network cables and the cabling standards and safety in petrochemical environments; the cable testers and certifiers, crimping tools and punch-down tools, cable tracers, tone generators and fiber optic splicing tools; and the network topologies, documentation and labeling standards and cable pathways and infrastructure planning.



Further, the course will also discuss the techniques for pulling cables through conduits, avoiding damage during installation, strategies for large-scale cabling projects and cable separation; the termination of twisted pair cables, fiber optic cable installation and cable management systems; the compliance with standards and codes and the importance of testing during installation; the splicing techniques and using splicing machines effectively as well as polishing and inspecting fiber ends and OTDR (Optical Time-Domain Reflectometer) basics; and using cable testers, troubleshooting common issues and proper testing and certifying fiber optic cables.

During this interactive course, participants will learn the termination of cables in patch panels, identifying and labeling ports, managing patch cords for accessibility and integrating cable management accessories; the industrial network reliability, troubleshooting and repair techniques, diagnosing common network cable issues, repairing damaged cables and avoiding recurrence of installation faults; the integration of cabling for industrial control systems (ICS) with SCADA and PLC systems and choosing cables for data, power and control signals; planning proper cabling for high-speed networks, integrating wireless network and selecting cabling for explosion-proof areas; and integrating with surveillance and security systems and the network troubleshooting.

### **Course Objectives**

Upon the successful completion of this course, each participant will be able to:-

- Apply and gain an in-depth knowledge on network cable termination and installation
- Discuss network types, importance of structured cabling in industrial environments and key components of a network cables
- Identify the various types of network cables and explain cabling standards and safety in petrochemical environments
- Recognize cable testers and certifiers, crimping tools and punch-down tools, cable tracers and tone generators and fiber optic splicing tools
- Discuss network topologies, documentation and labeling standards and cable pathways and infrastructure planning
- Apply techniques for pulling cables through conduits, avoid damage during installation, strategies for large-scale cabling projects and cable separation
- Describe termination of twisted pair cables and apply fiber optic cable installation and cable management systems
- Comply with standards and codes and discuss the importance of testing during installation
- Carryout splicing techniques and use splicing machines effectively as well as polish and inspect fiber ends and discuss OTDR (Optical Time-Domain Reflectometer) basics
- Use cable testers, troubleshoot common issues and apply proper testing and certifying fiber optic cables
- Terminate cables in patch panels, identify and label ports, manage patch cords for accessibility and integrate cable management accessories
- Recognize industrial network reliability and implement proper troubleshooting and repair techniques by diagnosing common network cable issues, repairing damaged cables and avoiding recurrence of installation faults
- Integrate cabling for industrial control systems (ICS) with SCADA and PLC systems and choose cables for data, power and control signals
- Plan proper cabling for high-speed networks, integrate wireless network and select cabling for explosion-proof areas
- Integrate with surveillance and security systems and perform network troubleshooting

### **Exclusive Smart Training Kit - H-STK®**



Participants of this course will receive the exclusive “Haward Smart Training Kit” (H-STK®). The H-STK® consists of a comprehensive set of technical content which includes **electronic version** of the course materials conveniently saved in a **Tablet PC**.

### **Who Should Attend**

This course provides an overview of all significant aspects and considerations of network cable termination and installation for network installation technicians and contractors, project managers, IT managers and network administrators, compliance officers, legal advisors, contractors and subcontractors, building and facilities managers, regulatory authorities or inspectors, risk management professionals.

### **Training Methodology**

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

- 30% Lectures
- 20% Practical Workshops & Work Presentations
- 30% Hands-on Practical Exercises & Case Studies
- 20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

### **Course Fee**

**US\$ 5,500** per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

### **Accommodation**

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

**Course Certificate(s)**

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours.


**Certificate Accreditations**

Certificates are accredited by the following international accreditation organizations: -

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British Accreditation Council (BAC)

Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

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The International Accreditors for Continuing Education and Training (IACET - USA)

Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

Haward Technology’s courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units (CEUs)** in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant’s involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant’s CEU and PDH Transcript of Records upon request.

**Course Instructor(s)**

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:



**Mr. Ken Steel** is a **Senior Electrical, Instrumentation & Communications Engineer** with over **30 years** of extensive experience. His expertise widely covers **Network & Wireless System, LAN & WAN Network, UYAP Network, Network Routing Protocols, Multicast Protocols, Network Management Protocols, Network Configuration & Management, Network Monitoring, Network Design & Implementation, Systems & Networks Protection, Network Fundamentals & Troubleshooting, Advanced Networking Technology, Fiber Optic Cable Installation, Wireless Network Integration, Network Troubleshooting, Heat Tracing & Insulation**

**Installation & Testing, HV Terminations, High & Low Voltages on Overhead Cranes, HV/MV Cable Splicing, Cable & Over Head Power Line, HV/MV Switchgear, HV Cable Design, Medium & High Voltage Equipment, High Voltage Circuit Breaker Inspection & Repair, High Voltage Power System, HV Equipment Inspection & Maintenance, HV Switchgear Operation & Maintenance, Resin / Heat Shrink & Cold Shrink Joints, HV/LV Equipment, LV & HV Electrical System, Cable Splicing & Termination, High Voltage Electrical Safety, LV, MV & HV Cable Installations & Properties, LV Substation, MV & LV Cable, UPS Systems, MV & LV Direct on Line Motor Drives, MV & LV VSD Motor Drives, MV & LV Soft Starter Motor Drives, LV Two Speed Motor Drives, Underground Transformer Oil Containment Tank, Electrical & Instrumentation Construction Installation, 1500KW, 1000KW, 1752KW Diesel Power Plant Installation, 110KV Overhead Line, 110KV Outdoor Switchgear, 110KV/10KV 6500KVA Transformer, Transformer Substation, 1600KVA 10KV/0.4KV & 2 Off 1000KVA Diesel Generators, 1600KVA 10KV/0.4KV & 1650KVA Diesel Generator, 110KV/35KV/10KV Substation, 110KV/10KV Transformers, 110KV & 2 Off 6KV Overhead Lines, 34.5KV, 13.8KV, 4.16KV & 480V Switchgear, 4.16KV & 480V MCC, Transformers & Motor Drives Substations, Diesel Driven Generators, Overhead Cranes, Overhead Cranes & HVAC Units, AC & DC Drives, Data Logger, Electrical, Instrumentation & Mechanical Installation Maintenance, Slab Mills, Pre Heat Ovens, Hydraulic Shears, Stamping Machine, Gearboxes, Rollers, Pumps, Valves, Electro Magnets & Pump House Operation, Boilers Construction And Commissioning, Valve Calibration & Testing, Level Gauges, Pressure & Flow Transmitters Installation & Calibration, Pressure & Leak Testing of Boilers, Leak Testing, SMP, Elect, I&C, F&G, HVAC & Utility Services, Nitrogen Leak Test Operations, Steam Blowing Activities, SMP, Elect, I&C, F&G, HVAC & Utility Services, PTW Issue (PA/AC), Installation & Mechanical Piping and Hydro Testing & Leak Testing of Lines Installation.**

During Mr. Steel's career life, he has gained his practical experience through several significant positions and dedication as the **3GP PBF & Boilers SC Commission Support, SC Site Execution Superintendent, E&I Construction Superintendent, High Voltage Construction Supervisor, Control & Power Construction Supervisor, Electrical & Instrumentation Supervisor, Electrical Technician, Construction Support Electrical Engineer, E&I Engineer, Electrical/Instrumentation Site Supervisor, Q.A/Q.C Inspector, Electrical/ Instrumentation Technician, Maintenance Fitter Instrumentation Technician, Millwright, Apprentice Millwright and Senior Instructor/Lecturer** for Tengiz Chevron Oil Kazakhstan, Al Jubail Saudi Arabia, Escravos Delta state Nigeria, Lurgi S.A, SuD Chemie Sasol Catalysts, J C Groenewalds Construction (LTA), Tycon (Goodyear S.A.), Dragline Construction and Iscor Vanderbijlpark.

Mr. Steel has a **Diploma in Electronics Mechanic**. Further, he is a **Certified Instructor/Trainer** and delivered numerous trainings, courses, workshops, seminars and conferences internationally.



**Course Program**

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

**Day 1: Sunday, 06<sup>th</sup> of April 2025**

0730 - 0800	Registration & Coffee
0800 - 0815	Welcome & Introduction
0815 - 0830	<b>PRE-TEST</b>
0830 - 0930	<b>Introduction to Networking Basics</b> Overview of Network Types (LAN, WAN, MAN) • Importance of Structured Cabling in Industrial Environments • Key Components of a Network (Switches, Routers, Patch Panels, etc.) • Standards & Protocols (ISO/IEC 11801, TIA/EIA 568)
0930 - 0945	Break
0945 - 1045	<b>Types of Network Cables</b> Coaxial Cables (Characteristics & Applications) • Twisted Pair Cables (Cat5e, Cat6, Cat6a, Cat7) • Fiber Optic Cables (Single-Mode versus Multi-Mode) • Shielded versus Unshielded Cables
1045 - 1145	<b>Cabling Standards &amp; Safety in Petrochemical Environments</b> IEEE, ANSI, & TIA Standards for Cabling • Explosion-Proof Standards & Certifications • Safety Protocols for Hazardous Locations • Grounding & Bonding Requirements
1145 - 1230	<b>Tools &amp; Equipment Overview</b> Cable Testers & Certifiers • Crimping Tools & Punch-Down Tools • Cable Tracers & Tone Generators • Fiber Optic Splicing Tools
1230 - 1245	Break
1245 - 1330	<b>Understanding Network Topologies</b> Star, Ring, Bus, & Hybrid Topologies • Structured Cabling Architecture (Backbone & Horizontal Cabling) • Industrial Network Layouts for Petrochemical Facilities • Importance of Redundancy & Fault Tolerance
1330 - 1420	<b>Documentation &amp; Labeling Standards</b> Cable Numbering & Labeling Schemes • Rack & Patch Panel Labeling Practices • Importance of Network Diagrams & As-Built Documentation • Maintaining Organized Cable Management Systems
1420 - 1430	<b>Recap</b> Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day One





**Day 2: Monday, 07<sup>th</sup> of April 2025**

0730 – 0830	<b>Cable Pathways &amp; Infrastructure Planning</b> Tray Systems, Conduits, & Raceways • Routing Considerations in Petrochemical Facilities • Minimizing EMI (Electromagnetic Interference) • Adhering to Bend Radius & Pulling Tension Limits
0830 – 0930	<b>Pulling &amp; Laying Cables</b> Techniques for Pulling Cables Through Conduits • Avoiding Damage During Installation • Strategies for Large-Scale Cabling Projects • Cable Separation in Mixed Environments
0930 – 0945	Break
0945 – 1100	<b>Termination of Twisted Pair Cables</b> T568A versus T568B Wiring Schemes • Crimping Connectors (RJ45) • Punching Down on Patch Panels & Keystone Jacks • Avoiding Common Termination Mistakes
1100 – 1230	<b>Basics of Fiber Optic Cable Installation</b> Preparing Fiber Optic Cables for Installation • Types of Connectors (LC, SC, ST) • Cleaning & Preparing Connectors • Handling & Storage of Fiber Optic Cables
1230 – 1245	Break
1245 – 1330	<b>Cable Management Systems</b> Horizontal & Vertical Cable Management Trays • Velcro versus Zip Ties: Best Practices • Maintaining Airflow & Aesthetics in Racks • Future-Proofing Cable Installations
1330 – 1420	<b>Compliance with Standards &amp; Codes</b> NFPA, IEC, & Local Petrochemical Regulations • Importance of Testing During Installation • Documentation & Reporting Requirements • Environmental Considerations in Cable Routing
1420 – 1430	<b>Recap</b> Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day Two

**Day 3: Tuesday, 08<sup>th</sup> of April 2025**

0730 – 0830	<b>Advanced Termination of Fiber Optic Cables</b> Splicing Techniques (Fusion & Mechanical Splicing) • Using Splicing Machines Effectively • Polishing & Inspecting Fiber Ends • OTDR (Optical Time-Domain Reflectometer) Basics
0830 – 0930	<b>Testing &amp; Certifying Copper Cables</b> Using Cable Testers (Continuity, Resistance, & Performance Tests) • Certifying Cat5e, Cat6, & Cat6a Cables • Troubleshooting Common Issues (Open, Short, Crosstalk) • Generating Test Reports
0930 – 0945	Break
0945 – 1100	<b>Testing &amp; Certifying Fiber Optic Cables</b> Insertion Loss & Return Loss Testing • Visual Fault Locators & Fiber Inspection Scopes • Tier 1 & Tier 2 Testing for Fiber Optics • Reporting & Analyzing Test Results





1100 – 1230	<b>Patch Panel Termination &amp; Organization</b> Terminating Cables in Patch Panels • Identifying & Labeling Ports • Managing Patch Cords for Accessibility • Integrating Cable Management Accessories
1230 – 1245	Break
1245 – 1330	<b>Industrial Network Reliability</b> Shielding & Grounding in Harsh Environments • Protecting Cables from Heat, Chemicals, & Mechanical Stress • Redundancy Strategies for Mission-Critical Networks • Planning for Maintenance & Upgrades
1330 – 1420	<b>Troubleshooting &amp; Repair Techniques</b> Diagnosing Common Network Cable Issues • Tools for Quick Fault Location • Repairing Damaged Cables (Copper & Fiber Optic) • Avoiding Recurrence of Installation Faults
1420 – 1430	<b>Recap</b> Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day Three

**Day 4: Wednesday, 09<sup>th</sup> of April 2025**

0730 – 0830	<b>Cabling for Industrial Control Systems (ICS)</b> Integration with SCADA & PLC Systems • Choosing Cables for Data, Power, & Control Signals • EMI Protection in Industrial Networks • Synchronization of Cabling with Control Loops
0830 – 0930	<b>Cabling for High-Speed Networks</b> Planning for 10Gbps & Higher Networks • Fiber Optics in High-Bandwidth Environments • Supporting IoT Devices in Industrial Networks • Importance of Bandwidth Testing
0930 – 0945	Break
0945 – 1100	<b>Wireless Network Integration</b> Supporting Wired & Wireless Hybrid Systems • Installing Access Points & PoE Cabling • Site Surveys for Wireless Coverage • Managing Cabling for Outdoor Wireless Systems
1100 – 1230	<b>Cabling for Explosion-Proof Areas</b> Selecting Cables & Enclosures for Hazardous Zones • Complying with ATEX & IECEx Standards • Installation Methods for Explosion-Proof Areas • Inspection & Maintenance Requirements
1230 – 1245	Break
1245 – 1330	<b>Integration with Surveillance &amp; Security Systems</b> Installing Cables for IP Cameras • PoE (Power over Ethernet) Cabling Considerations • Managing Cabling for Access Control Systems • Securing Network Cabling for Critical Infrastructure
1330 – 1420	<b>Review of Emerging Trends</b> Advances in Fiber Optic Technologies • Modular & Pre-Terminated Cabling Systems • Impact of 5G on Structured Cabling • Sustainable Cabling Practices
1420 – 1430	<b>Recap</b> Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day Four







**Day 5: Thursday, 10<sup>th</sup> of April 2025**

0730 – 0830	<b>Hands-On Cable Termination Workshop</b> Terminating Twisted Pair Cables (RJ45) • Splicing & Testing Fiber Optic Cables • Assembling & Organizing a Patch Panel
0830 – 0930	<b>Practical Installation Exercise</b> Pulling & Routing Cables through a Simulated Environment • Terminating & Testing Complete Cabling Runs • Identifying & Resolving Real-World Challenges
0930 – 0945	Break
0945 – 1100	<b>Network Troubleshooting Scenarios</b> Simulating Common Network Issues • Diagnosing Faults Using Tools & Test Equipment • Proposing & Implementing Solutions
1100 – 1215	<b>Project: Building a Small Industrial Network</b> Designing a Structured Cabling Layout • Installing & Certifying the Network • Documenting the Project for Handover
1215 – 1230	Break
1230 – 1330	<b>Safety &amp; Compliance Assessment</b> Reviewing Safety Procedures During Installation • Assessing Adherence to Industry Standards • Addressing Environmental Considerations
1330 – 1400	<b>Course Conclusion</b> Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course
1400 – 1415	<b>POST-TEST</b>
1415 – 1430	Presentation of Course Certificates
1430	Lunch & End of Course





### Practical Sessions

Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout fiber optic splicing, testing and troubleshooting exercises using the following state-of-the-art fiber optics technology and equipment, suitable for classroom training.



**Optical Fiber Fusion Splicer**



**Optical Fiber Comprehensive Tester**

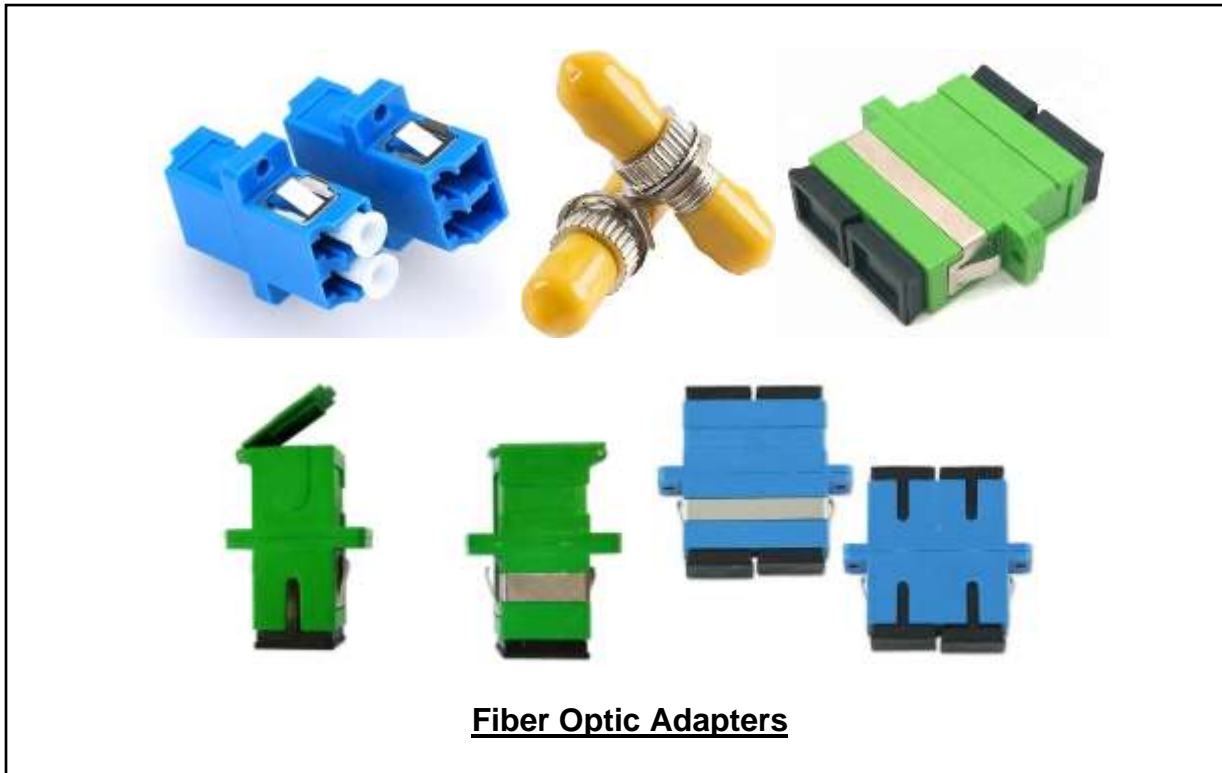


**Optical Fiber Cold Connection Tools Set**





**Fiber Optic Cable Tester**



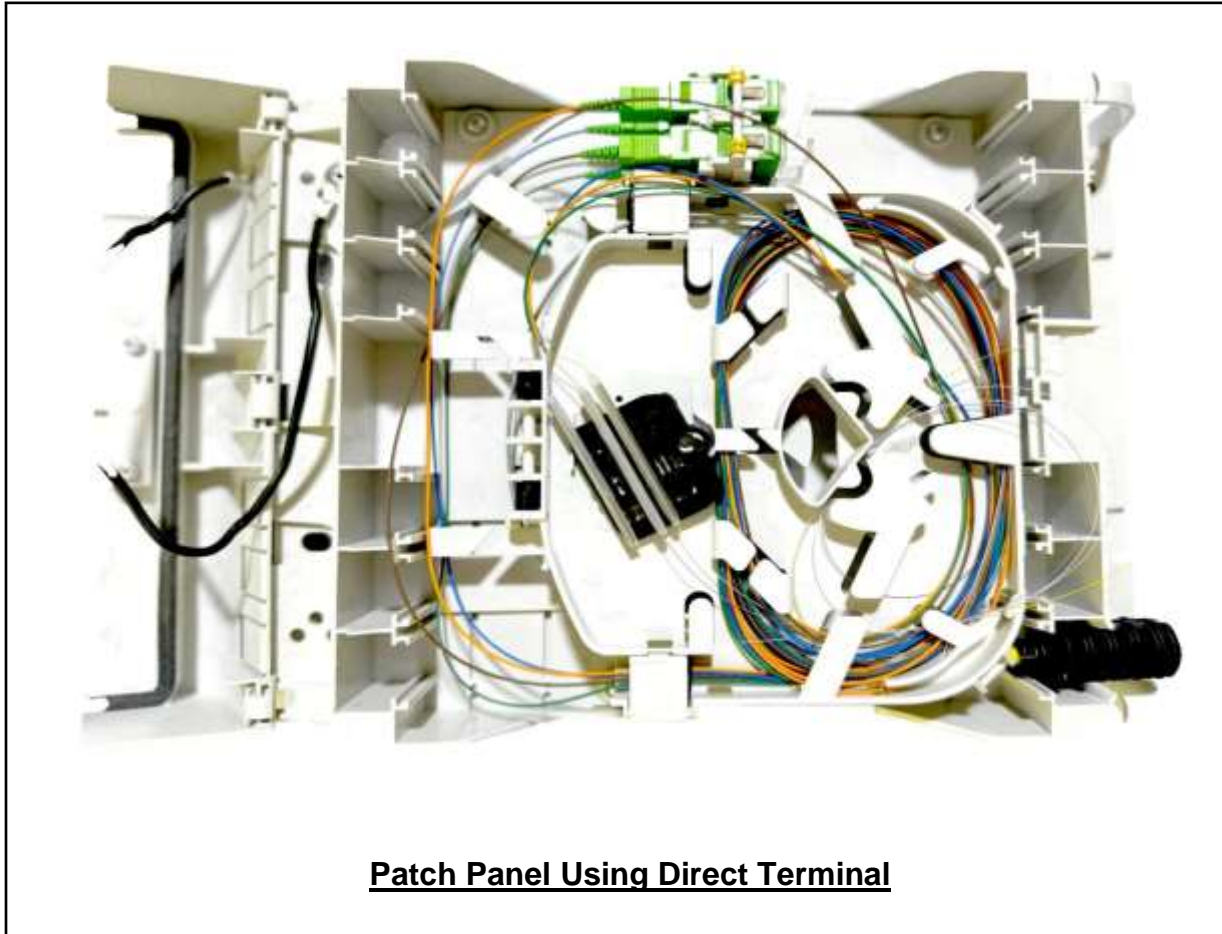
**Fiber Optic Adapters**



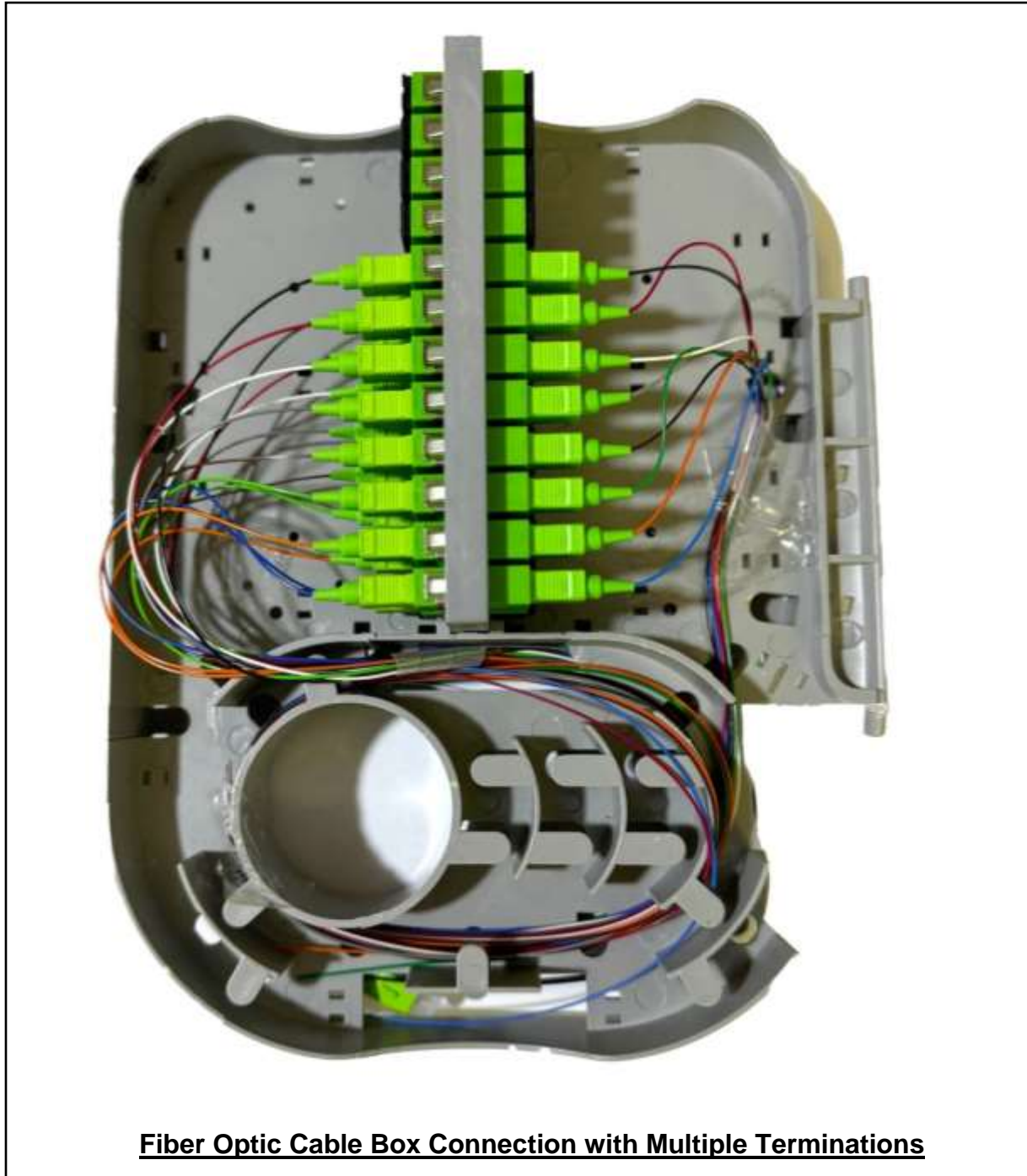








**Patch Panel Using Direct Terminal**



**Fiber Optic Cable Box Connection with Multiple Terminations**

**Course Coordinator**

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