

# SEMPEO2-34 - SQA Unit Code FP3G 04

## Forming and assembling electrical cable enclosure and support systems



### Overview

This standard covers a broad range of basic competences that you need to form and assemble electrical cable enclosure and support systems such as conduit, trunking and traywork systems. It will prepare you for entry into the engineering or manufacturing sectors, creating a progression between education and employment, or it will provide a basis for the development of additional skills and occupational competencies in the working environment.

The activities will include the forming and assembly of metallic and non-metallic systems, and will cover the selection of the appropriate materials, cutting and bending/forming the appropriate pieces that make up the enclosure. You will need to assemble the prepared pieces, using a range of connection devices, and to position, align and secure them in the correct locations, using the specified/appropriate techniques, wall/screen penetration and fastening devices.

Your responsibilities will require you to comply with health and safety requirements and organisational policy and procedures for the cable enclosure forming and assembly activities undertaken. You will need to take account of any potential difficulties or problems that may arise with the activities, or with the tools and equipment used, and to seek appropriate help and advice in determining and implementing a suitable solution. You will work under a high level of supervision, whilst taking responsibility for your own actions and for the quality and accuracy of the work that you carry out.

Your underpinning knowledge will provide an understanding of your work, and will enable you to apply appropriate cutting, bending forming and installation techniques and procedures safely. You will understand the forming and assembly methods and procedures used, and their application, and will know about the various enclosure systems and components used to produce the assemblies, to the required depth to provide a sound basis for carrying out the activities to the required specification.

You will understand the safety precautions required when carrying out the assembly and installation activities, especially those for handling long lengths of conduit or trunking. You will be required to demonstrate safe working practices throughout, and will understand the responsibility you owe to yourself and others in the workplace.

### Specific Standard Requirements

In order to prove your ability to combine different cable enclosure forming and assembly operations, at least one of the cable enclosure and support systems

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produced must be of a significant nature, and must contain a minimum of **four** of the features listed in scope 4.

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#### Performance criteria

*You must be able to:*

- P1 work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines
- P2 plan the assembly and installation of the cable enclosure system before you start
- P3 obtain the correct tools and equipment for the cutting, forming and assembly operations, and check that they are in a safe and usable condition
- P4 cut and form the cable enclosure components to the required size and shape, using appropriate tools and techniques
- P5 assemble the cable enclosure system, using the appropriate connectors
- P6 mount and secure the cable enclosure components safely and correctly to meet the specification requirements
- P7 check the completed assembly to ensure that all operations have been completed, and that the finished assembly is secure and meets the required specification
- P8 deal promptly and effectively with problems within your control, and seek help and guidance from the relevant people if you have problems that you cannot resolve
- P9 leave the work area in a safe and tidy condition on completion of the forming and assembly activities

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#### Knowledge and understanding

*You need to know and understand:*

- K1 the specific safety practices and procedures that you need to observe when forming and assembling cable enclosure/support systems (including any specific legislation, regulations or codes of practice for the activities, equipment or materials)
- K2 the hazards associated with forming and assembling cable enclosure/support systems, and with the tools and equipment used (such as using bending and forming equipment, handling long lengths of pipe and trunking, using solvents and adhesives), and how they can be minimised
- K3 the importance of wearing appropriate protective clothing and equipment (PPE), and keeping the work area safe and tidy
- K4 the interpretation of circuit and wiring diagrams, and specifications used for the installation (including BS and ISO schematics, wiring regulations, symbols and terminology)
- K5 the various types of electrical cable enclosure and support systems used, and their typical applications
- K6 the factors to be taken into account when choosing metallic or non-metallic systems, and the effects of ambient temperatures within conduit and trunking systems
- K7 marking out lengths to be cut, taking into account any allowances (such as for bending, screwing, gluing)
- K8 methods of holding workpieces without damaging them (such as the use of a pipe vice)
- K9 the tools and equipment used in the cutting, bending and forming operations (such as the use of conduit bending machines, threading equipment, hot air torches and bending springs)
- K10 methods of producing bends and sets in conduit materials (such as 90 degree bends, offsets, bridge sets)
- K11 methods of bending plastic conduit (such as using hot air guns and springs)
- K12 how to produce fabricated bends in trunking and traywork section material (such as bends, tee junctions, double and saddle sets)
- K13 the methods of forming screw threads on ends of conduit, and of using appropriate tools to remove all sharp edges and burrs
- K14 the various fittings used to assemble conduit, trunking and traywork systems (including screwed fittings, cemented fittings, straight connectors, bends, tees, inspection fittings, light, power and control outlet boxes)
- K15 the importance and use of inspection fittings (such as elbows and

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- junction boxes)
- K16 the problems to look for when checking finished components/installations (such as dimensional checks, position and angle of bends/sets, out of alignment, loose connections, insufficient supports, damaged threads, deformed pipe around area of bend, burrs and sharp edges that could damage cables, ensuring that trunking lengths are free from swarf or other obstructions before connecting into the system)
  - K17 how to join the system components (such as using screw fittings, cemented fittings, fabricated components, nuts and bolts)
  - K18 how to check alignment of components (including use of plumb bobs, levels and by visual means)
  - K19 the methods of supporting and securing the components (such as position and spacing of supporting brackets and devices, using pipe clips, saddles and supports)
  - K20 drilling masonry, and the types and application of masonry fixing devices used in installation work
  - K21 the need to ensure that components are clear of services (such as gas, water or electricity) before drilling walls
  - K22 the problems that can occur with the installation operations, and how these can be overcome
  - K23 when to act on your own initiative and when to seek help and advice from others
  - K24 the importance of leaving the work area in a safe and clean condition on completion of the assembly/installation activities (such as returning tools and equipment to its designated location, cleaning the work area, and removing and disposing of waste)

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### Additional Information

#### Scope/range related to performance criteria

*You must be able to:*

1. Carry out **all** of the following during the electrical cable enclosure forming and assembly activities:
  - 1.1 adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment (PPE) and other relevant safety regulations
  - 1.2 follow job instructions and assembly/installation drawings at all times
  - 1.3 ensure that the electrical cable enclosure system is kept free from foreign objects, dirt or other contamination
  - 1.4 return all tools and equipment to the correct location on completion of the installation activities
  
2. Form and assemble the following types of electrical cable enclosures/support systems:
  - 2.1 metal conduit systemsPlus **one** more from the following:
  - 2.2 non-metallic conduit systems
  - 2.3 metal trunking system
  - 2.4 non-metallic trunking systems
  - 2.5 traywork systems
  
3. Construct cable enclosures/support system components, to include carrying out **all** of the following:
  - 3.1 selecting the correct type and size of conduit, trunking or traywork (with regard to number of cables and climatic conditions)
  - 3.2 cutting the materials to the correct lengths (taking into account allowances for bends or joints required)
  - 3.3 removing all burrs and sharp edges
  - 3.4 producing external threads on conduit
  - 3.5 producing or fabricating bends, up to and including 90 degrees
  - 3.6 producing or fabricating bends over 90 degrees
  - 3.7 making tee/multiple junctions in trunking/traywork (where applicable)
  - 3.8 producing or fabricating offsets
  - 3.9 producing or fabricating bridge/saddle sets

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4. Assemble cable enclosure/support systems that include **all** of the following:
  - 4.1 bends/elbows (solid or inspection type)
  - 4.2 horizontal runs
  - 4.3 boxes (such as circular or square, terminal or multi branch)
  - 4.4 vertical dropsPlus **three** more from the following:
  - 4.5 straight connectors/couplings
  - 4.6 conversion units and adaptors
  - 4.7 tee pieces (such as solid or inspection type)
  - 4.8 cross over units (such as bridge or saddle sets)
  - 4.9 reducers
  - 4.10 off sets
  
5. Apply **all** of the following installation methods and techniques:
  - 5.1 marking out the location of the trunking, traywork or conduit
  - 5.2 positioning and securing the trunking, traywork or conduit using mechanical fixings
  - 5.3 drilling and preparing holes for the trunking, traywork or conduit
  - 5.4 levelling and alignment of the wiring enclosures and components
  
6. Check the completed assembly, to include carrying out **all** of the following:
  - 6.1 checking for level and alignment
  - 6.2 checking that all connections are secure
  - 6.3 checking that sufficient supports are used and that they are correctly spaced
  - 6.4 checking that correct outlets are used (such as for sockets, switches, light fittings, wire junction and inspection fittings)
  
7. Produce cable enclosure/support systems in accordance with **one** or more of the following standards:
  - 7.1 BS 7671/IET wiring regulations
  - 7.2 Other BS and/or ISO standards
  - 7.3 company standards and procedures

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