SEMEMI249

Assisting in the installation of equipment to produce an engineered system

Overview

This standard identifies the competences you need to assist in the installation of equipment to produce an engineered system, in accordance with approved procedures. You will be required to assist in the installation of a range of equipment, all of which encompass an integrated system involving two or more of the following interactive technologies: mechanical, electrical, fluid power or process controller. Typical systems will include automated equipment such as robots, pick-and-place devices, stacking devices, automated systems, transfer equipment, processing plant, and material handling devices such as jigs and fixtures with fluid power and electrical mechanisms attached.

This standard does not involve maintenance/repair type activities, such as removal and replacement of existing equipment, or the installation of items of equipment that are simple, self-contained items requiring minimal installation. It does, however, include the connection of sub-assemblies where these have been broken down for transportation purposes.

You will be required to use the appropriate tools and equipment throughout the installation activities, and to apply a range of installation methods and techniques to position, level and align the equipment, and to make connections to sensors and actuators which could be electrical, fluid power, water or fuel supply, as appropriate to the equipment installed. Where appropriate, you may also assist in working with computers or programmable logic controllers (PC/PLCs), making connections, installing hardware and loading and editing software. The installation activities will include making checks and adjustments, in line with your permitted authority, and assisting others to ensure that the installed equipment functions to the required specification.

Your responsibilities will require you to comply with organisational policy and procedures for the installation activities undertaken, and to report any problems with the activities, tools or equipment used that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You must check that all tools, equipment and materials used in the installation activities are removed from the work area on completion of the work, and that the relevant job/task documentation is completed accurately and legibly. You will be expected to work to instructions, alone or in conjunction with others, taking personal responsibility for your own actions, and for

the quality and accuracy of the work that you carry out.

The installation activity may be carried out as a team effort, but you must demonstrate a significant personal contribution to the installation activities, in order to satisfy the requirements of the standard, and you must demonstrate competence in all the areas required by the standard.

Your underpinning knowledge will be sufficient to provide a sound basis for your work, and will enable you to adopt an informed approach to applying procedures for the installation of an engineered system. You will have an understanding of the equipment being installed, and its installation requirements, in adequate depth to provide a sound basis for carrying out the installation process safely and effectively.

You will understand the safety precautions required when carrying out the installation activities, especially those for ensuring the safe isolation of services. You will be required to demonstrate safe working practices throughout, and will understand your responsibility for taking the necessary safeguards to protect yourself and others in the workplace.

Performance criteria

You must be able to:

P1 work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines

P2 follow all relevant instructions/documentation for the installation being carried out

P3 use the correct tools and equipment for the installation operations, and check that they are in a safe and usable condition

P4 assist in the installation, positioning and securing of the equipment, using appropriate methods and techniques

P5 carry out and/or assist in checking the installation, and make any adjustments in accordance with the specification

P6 assist in using fault location methods and techniques on the installed equipment

P7 deal with problems within your control and report those that cannot be solved

P8 dispose of waste materials in line with organisational and environmentally safe procedures

P9 complete and store all relevant documentation in accordance with organisational requirements

Knowledge and understanding

You need to know and understand:

K1 how to work safely at all times complying with health and safety and other relevant regulations, directives and guidelines
K2 the importance of wearing the appropriate personal protective equipment (PPE), and of keeping the work area clean and tidy
K3 how to obtain and interpret information from job instructions and other documentation used in the installation activities
K4 the basic principles of how the system functions, and its operating sequence
K5 methods of marking out the site for positioning the equipment, and the tools and equipment used for this
K6 methods of drilling holes in masonry for rag bolts and expanding bolts
K7 the various mechanical fasteners that will be used, and their method of installation

K8 methods of lifting, handling and supporting the equipment during the installation activities
K9 methods of levelling and aligning the equipment, and the types of tools, instruments and techniques used
K10 methods of connecting to mechanical power transmission devices
K11 the different types of cabling used in the installation activities, and their methods of termination
K12 the different types of wiring enclosures that are used
K13 the installation and termination of a range of electrical components
K14 why electrical bonding is critical, and why it must be both mechanically and electrically secure
K15 the care, handling and application of ohmmeters, multimeters and other electrical measuring instruments
K16 methods of assembling and installing pipework, hoses and fittings
K17 how to recognise a range of fluid power components
K18 recognition of contaminants and the issues they can create, and the effects and likely symptoms of contamination in the system
K19 the recognition of process instrumentation and associated peripherals
K20 the recognition of PLC systems and associated peripheral devices
K21 the procedures and precautions to be adopted to eliminate electrostatic discharge (ESD)

K22 how to conduct any necessary checks to ensure the equipment integrity, functionality, accuracy and quality of the installation

K23 how to recognise installation defects

K24 the issues that can occur with the installation operations, and how these can be overcome

K25 the fault-finding techniques to be used if the equipment fails to operate correctly

K26 the recording documentation to be completed for the activities undertaken

K27 the extent of your own responsibility and to whom you should report if you have problems that you cannot resolve

Scope/range related to performance criteria

1 Carry out all of the following during the installation of the engineered system:
1.1 adhere to procedures or systems in place for risk assessment, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
1.2 confirm that authorisation to carry out the installation activities has been given
1.3 check that safe access and working arrangements for the installation area have been provided
1.4 confirm that services have been safely isolated, ready for the installation (such as mechanical, electricity, gas, air or fluids)
1.5 check that all required installation consumables are available
1.6 leave the work area in a safe condition and free from foreign object debris

2 Assist in the installation of an engineered system, which includes installing equipment for two of the following interactive technologies:
installing mechanical equipment/components:
assist in carrying out all of the following:
2.1 installing mechanical equipment (such as machine tools, processing plant, turbines engines transfer equipment)
2.2 levelling equipment
2.3 aligning and securing sub-assemblies and units
2.4 connecting units (such as shafts, couplings, belt and chain drives)

Plus, one of the following:
2.5 setting and adjusting drive mechanisms (such as shafts and couplings, belt and chain drives)
2.6 setting and adjusting operating mechanisms (such as levers, linkages, cams and followers)
2.7 setting and adjusting control mechanisms (such as clutches and brakes)

installing electrical and electronic equipment/components:
assist in carrying out all of the following:
2.8 installing electrical equipment (such as switch gear and distribution panels, motors and starters, luminaires)
2.9 attaching suitable cable identification (such as colour coding or numbering systems)

2.10 installing wiring enclosures/cable protection systems (such as conduit, trunking and tray work)
2.11 installing, routeing and securing wires and cables (such as PVC, mineral and armoured cables)

Plus, one of the following:
2.12 terminating cables to electrical components
2.13 terminating cables to main distribution centre

installing fluid power components:
assist in carrying out all of the following:
2.14 installing fluid power equipment (such as compressors, pumps, accumulators, storage reservoirs and receivers)
2.15 installing fluid power components (such as cylinders, valves, sensors, actuators, filters and regulators)
2.16 installing rigid and flexible pipework and hoses
2.17 connecting components to pipework, using appropriate fittings
2.18 dressing and securing piping and hoses

installing process controller components:
assist in carrying out all of the following:
2.19 installing process controllers or sequential controllers (such as PLCs, data communication links)
2.20 installing and connecting wires and cables to components
2.21 installing input/output interfacing
2.22 installing program logic peripherals (such as modems, PC peripheral devices)
2.23 checking and confirming that signal measurement and transmission are satisfactory

installing instrumentation and control components:
assist in carrying out all of the following:
2.24 installing instrumentation and control equipment (such as pressure, flow, level, temperature, speed, weight, vibration)
2.25 installing and connecting peripherals (such as sensors, actuators, relays, switches)
2.26 installing and connecting process pipework

Plus, one of the following:

2.27 connecting electrical/pneumatic supply to instruments/sensors

2.28 connecting signal transmission supply to instruments/sensors

2.29 checking and confirming that signal measurement and transmission are satisfactory

3 Apply installation methods and techniques, to include four of the following:

3.1 marking out positions of all equipment

3.2 securing by using mechanical fixings (threaded fasteners)

3.3 drilling and preparing holes

3.4 securing by using adhesives

3.5 aligning and levelling equipment

3.6 applying screw fastener locking devices

3.7 shimming and packing

3.8 fitting anti-vibration mountings

3.9 moving and positioning equipment, using appropriate lifting and handling equipment

3.10 securing by using masonry fixings (such as rag bolts or expanding bolts)

4 Use two of the following groups of instruments during the installation activities:

4.1 alignment devices (such as plumb lines, spirit levels, inclinometers, laser equipment)

4.2 linear measuring devices (such as tapes, dial test indicators, micrometers, verniers, feeler gauges)

4.3 electrical measuring equipment (such as multimeter, continuity tester, insulation resistance, earth loop impedance tester)

4.4 fluid/power testing equipment (such as pressure or flow testing devices, speed or temperature measurement)

5 Carry out all of the following checks and adjustments as appropriate to the equipment being installed:

5.1 making visual checks of the installation, for completeness and freedom from damage

5.2 topping up fluid/oil reservoirs

5.3 ensuring that all bolts are correctly torqued, and that locking devices are fitted to fasteners

5.4 ensuring that all pipe connections are correctly made, secure and leak free

5.5 ensuring that all moving parts are clear of obstructions and are guarded
5.6 making sensory checks of the system (sight, sound, smell, touch)

Plus: Assist in carrying out two of the following:
5.7 confirm that the correct software has been installed
5.8 ensuring that all electrical connections are correctly made, earth bonding is secure and connections covered
5.9 testing that the system operates to the installation specification

6 Assist in dealing with two of the following conditions during the installation process:
6.1 installations with no faults
6.2 partial equipment malfunction
6.3 complete malfunction of equipment

7 Assist in using fault location methods and techniques on the installation, to include one of the following:
7.1 diagnostic aids (such as company records/history, manufacturers' manuals, fault analysis charts, troubleshooting guides)
7.2 fault finding techniques (such as six point, half-split, unit substitution)
7.3 functional testing the installation/running equipment self-diagnostics

8 Produce installations which comply with one of the following:
8.1 equipment manufacturer's operation range
8.2 BS, ISO and/or BSEN standards
8.3 customer (contractual) standards and requirements
8.4 organisational standards and procedures

9 Complete the relevant paperwork, to include one of the following, and pass it to the appropriate people:
9.1 installation records
9.2 organisational specific documentation
9.3 job card
9.4 electronic reports

SEMEMI249

Assisting in the installation of equipment to produce an engineered system

Developed by	Enginuity
Version Number	3
Date Approved	31 Mar 2026
Indicative Review Date	01 Apr 2029
Validity	Current
Status	Original
Originating Organisation	Enginuity
Original URN	SEMEMI2-49
Relevant Occupations	Maintenance Fitter
Suite	Engineering Maintenance and Installation Suite 2
Keywords	Engineering; manufacturing; installation; engineered systems; robots; pick and place devices; stacking devices; transfer devices