

# Model Curriculum

## 21. Service Engineer - Installation

SECTOR: CAPITAL GOODS  
SUB-SECTOR: MACHINE TOOLS, DIES, PLASTICS  
MANUFACTURING MACHINERY, TEXTILE  
MANUFACTURING MCHINERY  
PROCESS PLANT MACHINERY, ELECTRICAL  
AND POWER MACHINERY

OCCUPATION: Service  
REF ID: CSC/Q0501, V1.0  
NSQF LEVEL: 4



## Certificate

### CURRICULUM COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

**CAPITAL GOODS SKILL COUNCIL**

for the

**MODEL CURRICULUM**

Complying to National Occupational Standards of

Job Role/ Qualification Pack: 'Service Engineer - Installation' OP No. 'CSC/ Qo501, NSQF Level 4'

Date of Issuance: April 14<sup>th</sup>, 2014

Valid up to : August 30<sup>th</sup>, 2016

\*\*Valid up to the next review date of the Qualification Pack, or the  
\*Valid up to date mentioned above whichever is earlier.



Authorised Signatory  
Tourism & Hospitality Skill Council

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# Service Engineer-Installation

## CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a "Service Engineer-Installation", in the "Capital Goods" Sector/Industry and aims at building the following key competencies amongst the learner

<b>Program Name</b>	<b>Service Engineer-Installation</b>		
<b>Qualification Pack Name &amp; Reference ID. ID</b>	CSC/Q0501, v1.0		
<b>Version No.</b>	1.0	<b>Version Update Date</b>	
<b>Pre-requisites to Training</b>	Diploma-Mechanical Engineering Minimum 1 year apprenticeship or equivalent		
<b>Training Outcomes</b>	<p><b>After completing this programme, participants will be able to:</b></p> <ul style="list-style-type: none"> <li>• <b>Install mechanical equipment at site:</b> installation of a range of mechanical equipment such as machine tools, process control equipment, rotating mechanical equipment, conveyors, equipment for lifting and handling, hydraulic press, furnaces, auto / manual welding machines, shot blasting machines, process plant equipment, in accordance with approved procedures.</li> <li>• <b>Basic health and safety practices at the workplace:</b> identify risks and hazards at workplace, use of PPE, and apply good housekeeping practices, etc.,</li> <li>• <b>Work effectively with others:</b> effectively communicate with others and demonstrate good ethical practices and discipline.</li> </ul>		

This course encompasses 3 out of 3 National Occupational Standards (NOS) of “Service Engineer-Installation” Qualification Pack issued by “Capital Goods Skill Council”.

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1	<p><b>Install Mechanical Equipment At site</b></p> <p><b>Theory Duration</b> (hh:mm) 40:00</p> <p><b>Practical Duration</b> (hh:mm) 100:00</p> <p><b>Corresponding NOS Code</b> CSC/No601</p>	<ul style="list-style-type: none"> <li>• Explain common terms used in installation of machinery and plant equipment</li> <li>• Read assembly drawings, layout drawings and manufacturer’s guidelines</li> <li>• Interpret drawings, standards, quality control procedures</li> <li>• Undertake numerical operations, geometry and calculations</li> <li>• Solve algebraic linear equations</li> <li>• Perform trigonometric calculations</li> <li>• Define work power and energy and perform calculations using formulae</li> <li>• State SI units for work, power, energy, length, mass etc.</li> <li>• Define ‘friction’ and explain the impact of coefficient of friction</li> <li>• Define specific heat and latent heat and carryout calculations using formulae</li> <li>• Explain the need of various mechanical fasteners used in the installation – threaded fasteners, special securing devices, masonry fixing devices</li> <li>• Analyze torque requirement for threaded fasteners and explain the impact of under torque and over torque</li> <li>• List tools and instruments used for positioning, securing and aligning – spanners, wrenches, crow bars, torque wrenches, engineer’s levels, alignment telescope, laser devices, straight edges, feeler gauges, spirit levels, mandrels, dial test indicator, vernier calliper, micrometer, depth gauge, taut wires, tension meter. Autocollimator, multi meter, right angles/square blocks</li> <li>• Explain the techniques used to position, align ,level ,adjust the equipment</li> <li>• Follow safe material handling practices</li> <li>• Explain mechanical power transmission methods – belt drive, chain drive, coupling, clutch and brakes</li> <li>• Explain methods of connecting equipment to service supplies –Electrical, hydraulic, power transmission, compressed air or oils and fuel supplies</li> <li>• Follow safe working guidelines and safety regulations while performing installation</li> <li>• Carryout site inspection before</li> </ul>	<p>Training Kit (PowerPoint, Trainer Guide)</p> <p>spanners, wrenches, crow bars, torque wrenches, engineer’s levels, alignment telescope, laser devices, straight edges, feeler gauges, spirit levels, mandrels, dial test indicator, vernier calliper, micrometer, depth gauge, taut wires, tension meter. Autocollimator, multi meter, right angles/square blocks</p>

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		<p>commencing installation activity for safe access or any other obstructions</p> <ul style="list-style-type: none"> <li>• Plan the installation activities in an efficient and appropriate manner</li> <li>• Conduct survey and inspect the site for- accessibility of the site, obstructions or hazards, load test to access the suitability of the foundation for installation</li> <li>• Collect appropriate utilities for the installation activity</li> <li>• Check tools and equipment for any damage or wear and tear</li> <li>• Organize required material handling devices like cranes and fork lifts</li> <li>• Plan , organize and prioritize sequence of operation as per the sequence</li> <li>• Carryout installation as per specification and installation guidelines</li> <li>• Perform routing modifications/alterations as per the standard operating procedure</li> <li>• Carryout levelling, aligning , coupling and connecting as per the instruction sheet</li> <li>• Check the installed activity for the proper functioning               <ul style="list-style-type: none"> <li>○ Input/output voltage levels</li> <li>○ Functioning of hydraulic system</li> <li>○ Functioning of fans, motors, alternators etc</li> <li>○ Functioning of sub parts</li> <li>○ Oil and coolant level</li> <li>○ Functioning of the equipment</li> </ul> </li> <li>• Make adjustments, appropriate to the equipment being installed</li> <li>• Fill up technical charts, process charts and other documents as required</li> <li>• Communicate with colleagues and supervisor</li> <li>• Demonstrate active listening skills</li> <li>• Perform basic operations on computer</li> <li>• Use basic office applications like word processing spread sheet etc.</li> <li>• Demonstrate problem solving skills</li> <li>• Work in a team to achieve better results</li> <li>• Follow correct communication protocols with customers</li> <li>• Apply, analyze, and evaluate the information gathered from observation, experience, reasoning, or communication, as a guide to thought and action</li> </ul>	

Sr. No.	Module	Key Learning Outcomes	Equipment Required
2	<p><b>Health and safety</b></p> <p><b>Theory Duration</b> (hh:mm) 10:00</p> <p><b>Practical Duration</b> (hh:mm) 08:00</p> <p><b>Corresponding NOS Code</b> CSC/N1335</p>	<ul style="list-style-type: none"> <li>Explain the importance of personal protective equipment (PPE) required for gas cutting operation</li> <li>State the causes for accidents</li> <li>Identify job site hazardous work and state possible causes of risk or accident at the workplace</li> <li>Explain the importance of '5S' at the workplace</li> </ul>	<p>Training kit (Trainer guide, PowerPoint)</p> <p>Leather gloves, leather apron, welding screen – helmet types, hand screen welding and safety shoes</p>
3	<p><b>Fire Safety</b></p> <p><b>Theory Duration</b> (hh:mm) 05:00</p> <p><b>Practical Duration</b> (hh:mm) 30:00</p> <p><b>Corresponding NOS Code</b> CSC/N1335</p>	<ul style="list-style-type: none"> <li>Explain types of fires - Class A, B, C and D</li> <li>Select appropriate fire extinguisher to control fire</li> <li>Use PASS method to operate a fire extinguisher</li> <li>Follow fire safety signs and safe evacuation method in case of a fire</li> <li>Identify the location of assembly point, fire exit, fire alarm</li> <li>Follow reporting procedure in case of a fire</li> </ul>	<p>Training kit (Trainer guide, PowerPoint)</p> <p>Class A, B, C, D and K fire extinguishers</p>
4	<p><b>Emergencies, rescue and first aid procedure</b></p> <p><b>Theory Duration</b> (hh:mm) 09:00</p> <p><b>Practical Duration</b> (hh:mm) 18:00</p> <p><b>Corresponding NOS Code</b> CSC/N1335</p>	<ul style="list-style-type: none"> <li>Follow electrical safety procedures</li> <li>Use approved method to rescue a person from electrocution</li> <li>State the importance of first aid</li> <li>Identify the contents of a first aid kit and their application</li> <li>Administer first aid in case of bleeding, burns, choking, electrical shock, poisoning, etc.</li> <li>Use of CPR process</li> <li>Bandage wounds</li> <li>Explain stages of crisis and crisis management</li> <li>Prepare an incident report</li> </ul>	<p>Training kit (Trainer guide, PowerPoint)</p> <p>First aid kit with all contents</p>
5	<p><b>Work effectively with others</b></p> <p><b>Theory Duration</b> (hh:mm) 20:00</p>	<ul style="list-style-type: none"> <li>Explain the importance of team work and team dynamics</li> <li>State 4Cs of working in a team</li> <li>Explain types of communication</li> <li>Apply effective communication technique</li> <li>Overcome barriers to effective</li> </ul>	<p>Training kit (Trainer guide, PowerPoint)</p>

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	<b>Practical Duration</b> (hh:mm) 60:00  <b>Corresponding NOS Code</b> CSC/N1336	communication <ul style="list-style-type: none"> <li>• Demonstrate active listening skills</li> <li>• Demonstrate good customer service skills</li> <li>• Explain the importance of ethical behaviour in your day-to-day work</li> <li>• State the importance of discipline in life and apply the same at workplace</li> </ul>	
6	<b>Final Assessment</b>  <b>Theory Duration</b> (hh:mm) 04:00  <b>Practical Duration</b> (hh:mm) 06:00  <b>Corresponding NOS Code</b>	<ul style="list-style-type: none"> <li>• To test skills and knowledge</li> </ul>	
	<b>Total Duration</b>  <b>Theory Duration</b> <b>88:00</b>  <b>Practical Duration</b> <b>222:00</b>	<b>Unique Equipment Required:</b> spanners, wrenches, crow bars, torque wrenches, engineer's levels, alignment telescope, laser devices, straight edges, feeler gauges, spirit levels, mandrels, dial test indicator, vernier calliper, micrometer, depth gauge, taut wires, tension meter. Autocollimator, multi meter, right angles/square blocks, Personal Protective Equipment, Class A, B, C, D and K fire extinguishers, First aid kit with all contents	

Grand Total Course Duration: **310 Hours, 0 Minutes**

(This syllabus/ curriculum has been approved by Capital Goods Skill Council)



## Trainer Prerequisites for Job role: "Service Engineer-Installation" mapped to Qualification Pack: "CSC/Q0501 v1.0"

Sr. No.	Area	Details
1	<b>Description</b>	Perform for installing a range of mechanical equipment such as machine tools, process control equipment, rotating mechanical equipment, conveyors, equipment for lifting and handling, hydraulic press, furnaces, auto / manual welding machines, shot blasting machines, process plant equipment, in accordance with approved procedures.
2	<b>Personal Attributes</b>	Basic communication, numerical and computational abilities. Openness to learning, ability to plan and organize own work and identify and solve problems in the course of working. Understanding the need to take initiative and manage self and work to improve efficiency and effectiveness.
3	<b>Minimum Educational Qualifications</b>	Degree in Mechanical Engineering
4a	<b>Domain Certification</b>	Certified for Job Role: "Service Engineer- Installation" mapped to QP: "CSC/Q0501, v1.0". Minimum accepted score is 80%
4b	<b>Platform Certification</b>	Recommended that the Trainer is certified for the Job Role: "Trainer", mapped to the Qualification Pack: "SSC/Q1402". Minimum accepted 70 % as per respective SSC guidelines is 70%.
5	<b>Experience</b>	<ul style="list-style-type: none"> <li>3-4 years of industry experience in the relevant field</li> <li>3-4 years of teaching experience</li> </ul>

### Annexure: Assessment Criteria

<b>Assessment Criteria</b>	
<b>Job Role</b>	<b>Service Engineer-Installation</b>
<b>Qualification Pack</b>	<b>CSC/Q0501, v1.0</b>
<b>Sector Skill Council</b>	<b>Capital Goods Skill Council</b>

<b>Sr. No.</b>	<b>Guidelines for Assessment</b>
1	Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.
2	The assessment for the theory part will be based on knowledge bank of questions created by the SSC.
3	Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training centre(as per assessment criteria below)
4	Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criteria
5	To pass the Qualification Pack, every trainee should score a minimum of 60% in aggregate and 40% in each NOS
6	The marks are allocated PC wise; however, every NOS will carry a weight age in the total marks allocated to the specific QP

Assessable Outcome	Assessment Criteria	Total Mark (300)	Out Of	Marks Allocation	
				Theory	Skills Practical
<b>1. CSC/No501 Install mechanical equipment at site</b>	PC1.comply with health and safety, environmental and other relevant regulations and guidelines at work	<b>100</b>	3	1	2
	PC2.adhere to procedures and guidelines for personal protective equipment (PPE) and other relevant safety regulations while performing installation operations		4	1	3
	PC3.ensure work area is clean and safe from hazards		2	0	2
	PC4.ensure that all tools, equipment, power tool cables, extension leads are in a safe and usable condition		2	0	2
	PC5.obtain clearance to carry out the installation activities		2	0	2
	PC6.provide safe access and working arrangements for the installation area		3	0	3
	PC7.ensure safe isolation of services during the installation		2	0	2
	PC8.dispose of waste items in a safe and environmentally acceptable manner		2	1	1
	PC9.leave the work area in a safe condition and free from foreign object debris		2	0	2
	PC10.plan the installation activities in an efficient and appropriate manner		3	1	2
	PC11.activities in an efficient and appropriate manner installation survey and inspect the site and foundation for the following		3	0	3
	PC12.ensure that appropriate utilities are available (eg. gas, water, air, electricity)		2	0	2
	PC13.ensure that required installation consumables are available		2	0	2
	PC14.ensure that safety and environmental conditions can be met		3	1	2
	PC15.obtain necessary permits to carry out the required work		2	0	2
	PC16.check the installation job specification documentation are available and correct		2	0	2
	PC17.instruct and supervise marking out of positioning and layouts		2	0	2
	PC18.check and record for any physical damages to the machine/equipment		2	0	2
	PC19.compare received product and accessories with product order specifications		3	1	2
	PC20.take appropriate action in lieu with		3	0	3

Assessable Outcome	Assessment Criteria	Total Mark (300)	Out Of	Marks Allocation	
				Theory	Skills Practical
	manufacturer and customer, in case of any deviations				
	PC21.instruct and supervise use of grouting and adhesives after conducting foundation/site inspection		3	0	3
	PC22.instruct and supervise drilling holes for rig and anchor bolts		3	0	3
	PC23.instruct and supervise the movement and positioning of equipment, using cranes or forklifts as per the layout		3	1	2
	PC24.remove moisture absorbent bags, rust preventive, locking devices		2	0	2
	PC25.fill oils for lubrication, hydraulic and other special oils		2	0	2
	PC26.ensure the machine is clean		1	0	1
	PC27.install the machine in accordance with manufacturers' and site specifications		4	1	3
	PC28.perform routine modifications/alterations as per standard operating procedures or in consultation with manufacturer and customer, where required		5	2	3
	PC29.use the various installation tools and equipment as required		2	0	2
	PC30.apply installation techniques like leveling, aligning, coupling and connecting in accordance with specifications		4	1	3
	PC31.fill coolants, oil and other fluids as per specifications		3	1	2
	PC32.ensure the site is cleaned and clear of all debris and left in safe state		1	0	1
	PC33.all reports and documentation are completed correctly to required specifications		3	1	2
	PC34.produce installations which comply with the equipment manufacturer's operation specification/range		4	1	3
	PC35.deal promptly and effectively with problems within control, and seek help and guidance from the relevant people for problems that cannot be resolved		2	0	2
	PC36.complete the relevant paperwork, and pass to the appropriate people		2	0	2
	PC37.give a brief to the customer staff on do's and don'ts of the operation and maintenance of the machine		2	0	2
	PC38.switch on product equipment and carry out check for proper functioning without load		2	0	2
	PC39.make adjustments, appropriate to the equipment being installed		3	0	3
	<b>Total</b>		<b>100</b>	<b>14</b>	<b>86</b>

Assessable Outcome	Assessment Criteria	Total Mark (300)	Out Of	Marks Allocation	
				Theory	Skills Practical
<b>2.CSC/N1335 Use basic health and safety practices at the workplace</b>	PC1.use protective clothing/equipment for specific tasks and work conditions	<b>100</b>	5	2	3
	PC2.state the name and location of people responsible for health and safety in the workplace		3	1	2
	PC3.state the names and location of documents that refer to health and safety in the workplace		3	1	2
	PC4.identify job-site hazardous work and state possible causes of risk or accident in the workplace		5	2	3
	PC5.carry out safe working practices while dealing with hazards to ensure the safety of self and others state methods of accident prevention in the work environment of the job role		4	2	2
	PC6.state location of general health and safety equipment in the workplace		3	2	1
	PC7.inspect for faults, set up and safely use steps and ladders in general use		5	2	3
	PC8.work safely in and around trenches, elevated places and confined areas		5	2	3
	PC9.lift heavy objects safely using correct procedures		5	2	3
	PC10.apply good housekeeping practices at all times		4	2	2
	PC11.identify common hazard signs displayed in various areas		5	2	3
	PC12.retrieve and/or point out documents that refer to health and safety in the workplace		3	1	2
	PC13.use the various appropriate fire extinguishers on different types of fires correctly		4	1	3
	PC14.demonstrate rescue techniques applied during fire hazard		4	1	3
	PC15.demonstrate good housekeeping in order to prevent fire hazards		3	1	2
	PC16.demonstrate the correct use of a fire extinguisher		4	1	3
	PC17.demonstrate how to free a person from electrocution		4	1	3
	PC18.administer appropriate first aid to victims where required eg. in case of bleeding, burns, choking, electric shock, poisoning etc.		4	1	3
	PC19.demonstrate basic techniques of bandaging		3	1	2
	PC20.respond promptly and appropriately to an accident situation or medical emergency in real or simulated environments		4	1	3
	PC21.perform and organize loss minimization or rescue activity during an accident in real or simulated environments		3	1	2
	PC22.administer first aid to victims in case of a heart attack or cardiac arrest due to electric shock, before the arrival of emergency services in real or simulated cases		3	1	2

Assessable Outcome	Assessment Criteria	Total Mark (300)	Out Of	Marks Allocation	
				Theory	Skills Practical
	PC23.demonstrate the artificial respiration and the CPR Process		3	1	2
	PC24.participate in emergency procedures		3	2	1
	PC25.complete a written accident/incident report or dictate a report to another person, and send report to person responsible		4	1	3
	PC26.demonstrate correct method to move injured people and others during an emergency		4	1	3
	<b>Total</b>		<b>100</b>	<b>36</b>	<b>64</b>
3.CSC/N1336 Work effectively with others	PC1.accurately receive information and instructions from the supervisor and fellow workers, getting clarification where required	100	10	3	7
	PC2.accurately pass on information to authorized persons who require it and within agreed timescale and confirm its receipt		10	3	7
	PC3.give information to others clearly, at a pace and in a manner that helps them to understand		10	3	7
	PC4.display helpful behavior by assisting others in performing tasks in a positive manner, where required and possible		10	3	7
	PC5.consult with and assist others to maximize effectiveness and efficiency in carrying out tasks		10	3	7
	PC6.display appropriate communication etiquette while working		10	3	7
	PC7.display active listening skills while interacting with others at work		10	3	7
	PC8.use appropriate tone, pitch and language to convey politeness, assertiveness, care and professionalism		10	3	7
	PC9.demonstrate responsible and disciplined behaviors at the workplace		10	3	7
	PC10.escalate grievances and problems to appropriate authority as per procedure to resolve them and avoid conflict		10	3	7
	<b>Total</b>		<b>100</b>	<b>30</b>	<b>70</b>
	<b>Grand Total</b>	<b>300</b>	<b>300</b>	<b>80</b>	<b>220</b>
	<b>Percentage Weightage:</b>			<b>27</b>	<b>73</b>
	<b>Minimum Pass% to qualify (aggregate):</b>			<b>60</b>	