

Model Curriculum

7. Stud Welding Operator

SECTOR: CAPITAL GOODS
SUB-SECTOR: MACHINE TOOLS, PLASTICS
MANUFACTURING MACHINERY, TEXTILE
MANUFACTURING MACHINERY, PROCESS
PLANT MACHINERY, ELECTRICAL AND
POWER MACHINERY, LIGHT ENGINEERING
GOODS
OCCUPATION: WELDING AND CUTTING
REF ID: CSC/Q0210, 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 CURRICULAM

Complying to National Occupational Standards of
Job Role/ Qualification Pack: 'Stud Welding Operator' OP No. 'CSC/ Qo21o NSQF Level 4'

Date of Issuance: July 12th, 2016

Valid up to : Aug 30th, 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
(Capital Goods Skills Council)

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Stud Welding Operator

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a “Stud Welding Operator”, in the “Capital Goods” Sector/Industry and aims at building the following key competencies amongst the learner

Program Name	Stud Welding Operator		
Qualification Pack Name & Reference ID. ID	CSC/Q0210, v1.0		
Version No.	1.0	Version Update Date	
Pre-requisites to Training	10th Standard pass, preferably		
Training Outcomes	<p>After completing this programme, participants will be able to:</p> <ul style="list-style-type: none"> • Work safely: Explain the importance of safe working practices at the workplace, and comply with health and safety legislation, regulations and other guidelines. • Prepare for cutting operation: Identify stud welding equipment and their functions. Also, arrange the stud welding setup and test the equipment for any malfunction or leakages. • Carry out the cutting operation, and test for accuracy: Weld the studs to the required shape as per the specification by stud welding setup and range of hand tools to ensure that the final product meets tolerance requirement. • Deal with contingency: Adherence to standard operating procedure in case of equipment failure or hazards arising out of stud welding operation • Basic health and safety practices at the workplace: Identify risks and hazards at workplace, and apply good housekeeping practices, etc. • Work effectively with others: Effectively communicate with others and demonstrate good ethical practices and discipline. 		

This course encompasses 3 out of 3 National Occupational Standards (NOS) of “Stud Welding Operator” Qualification Pack issued by “Capital Goods Skill Council”.

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1	<p>Introduction to stud welding</p> <p>Theory Duration (hh:mm) 10:00</p> <p>Practical Duration (hh:mm) 00:00</p> <p>Corresponding NOS Code CSC/N0210</p>	<ul style="list-style-type: none"> State the various opportunities available in fabrication industry Describe the role and responsibilities of a stud welding operator Explain the various types of welding processes State the principle and application of stud welding – types of machines, heat and pressure to form a weld, heating effect of welding current, welding and pressure cycles, machine functions, principal features of welded joint State the application of stud welding in duct work, boilers and bridges List components used in stud welding set up – constant current power source, stud welding gun, weld cable with stud gun control guard, control cable, ground cable with “c” type connector Explain the types, components and operation of a stud welding gun for welding Explain types, sizes of studs and pins used in stud welding List the types of guns used in stud welding like hand held pistol grip configuration, fixed production gun, List the components of a gun like leg screw, chuck adaptor, set screw, ferrule, ferrule grip, foot screws, foot, legs, chuck and plunge Explain the types and ferrules used in stud welding 	<p>Training kit (Trainer guide, PowerPoint)</p>
2	<p>Work safely</p> <p>Theory Duration (hh:mm) 05:00</p> <p>Practical Duration (hh:mm) 10:00</p> <p>Corresponding NOS Code CSC/N0210</p>	<ul style="list-style-type: none"> Explain the importance of safe working practices Comply with health and safety legislation, regulations and other guidelines Follow general safety practices at the workplace Identify hazards at the workplace and take corrective actions to avoid such hazards Follow the stated procedure to lift heavy objects and material handling State the causes of fire and apply appropriate method to control fire accidents List the personal protective equipment (PPE) required for gas cutting operation Wear suggested personal protective 	<p>Training kit (Trainer guide, PowerPoint)</p> <p>Leather apron; leather gloves; welding screen – helmet type; hand screen welding; safety shoes; fire extinguisher- dry powder type; fire bucket with sand and first aid kit</p>

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		<p>equipment correctly</p> <ul style="list-style-type: none"> Follow the safety recommendations while handling stud welding equipment Explain the hazards associated with stud welding and how they can be minimized Explain the method to stop and restart the machine in case of emergency and follow standard operating procedure List and understand the importance of stud welding parameters 	
3	<p>Prepare for welding operation</p> <p>Theory Duration (hh:mm) 10:00</p> <p>Practical Duration (hh:mm) 25:00</p> <p>Corresponding NOS Code CSC/N0210</p>	<ul style="list-style-type: none"> Interpret welding procedure data sheets and gather welding information along with specifications Connect accessories to the power source as per the requirement Check for correct functioning of the setup Prepare the surface as per the requirement (the surface should be free from rust, paint, oil ,grease, moisture and other contaminants) Use abrasive wheel, wire brush , drill burr or end mill for cleaning the surface Identify various types of fasteners and ferrules Setup equipment parameter –cable length, position of return clamp, gun capacity depending on the stud diameter,polarity,stud extension, amperage, time setting, plunge and lift Demonstrate the method of levelling and squaring gun to the base metal while stud welding Carryout stud welding on a approved test specimen Record weld position, nature of base metal, stud surface, current and time during the specimen testing Adjust parameters like plunge, lift ,time and current based on the test results 	<p>Training kit (Trainer guide, PowerPoint), Leather apron; leather gloves; welding screen – helmet type; hand screen welding; safety shoes; fire extinguisher- dry powder type; fire bucket with sand and first aid kit, DC current power source, controller, welding gun, cables to tie the system components and base metal together</p>
4	<p>Carryout welding operation</p> <p>Theory Duration (hh:mm) 05:00</p> <p>Practical Duration (hh:mm) 35:00</p> <p>Corresponding NOS</p>	<ul style="list-style-type: none"> Locate the position of stud by referring to specification, marked layout, drawing layouts or templates Adjust parameters based on the work piece thickness Level and square the gun to the base metal to start welding Stud weld threaded and non threaded fasteners accurately in downward position Stud weld fasteners of different diameters in the downward position Understand the possible causes of defects and take remedial actions to avoid 	<p>Training kit (Trainer guide, PowerPoint), Leather apron; leather gloves; welding screen – helmet type; hand screen welding; safety shoes; fire extinguisher- dry powder type; fire bucket with sand and first aid kit, DC current power</p>

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	Code CSC/N0210	defects	source, controller, welding gun, cables to tie the system components and base metal together, marking tools, measuring tools
5	Test for Output Theory Duration (hh:mm) 05:00 Practical Duration (hh:mm) 20:00 Corresponding NOS Code CSC/N0210	<ul style="list-style-type: none"> Visually inspect welded component for any defect Carryout non destructive test for fillet formation, fillet height using fillet gauge, flow or bend of fillet, after weld length and undercut Carryout destructive test to understand tensile strength, bend strength and torque strength 	Training kit (Trainer guide, PowerPoint), measuring tools, fillet gauge
6	Deal with contingencies Theory Duration (hh:mm) 05:00 Practical Duration (hh:mm) 10:00 Corresponding NOS Code CSC/N0210	<ul style="list-style-type: none"> Able to communicate with superiors regarding malfunctioning of any component Seek assistance from superiors in case of any difficulty Shut down the equipment safely after the welding operation Understand relevant legislation, standards, policies and procedures Know various departs and their function Follow hierarchy protocol Understand the work flow and know your role in the work flow Read and interpret information correctly Fill appropriate forms Perform numerical calculations Participate in on-the-job learning, training and development, interventions and assessments Use problem solving skills Explain the importance of planning and organizing day-to-day activities Know the importance of self management State the importance of team work Avoid and manage distractions at the work place 	Training kit (Trainer guide, PowerPoint)
7	Health and safety Theory Duration (hh:mm) 10:00	<ul style="list-style-type: none"> Explain the importance of personal protective equipment (PPE) required for gas cutting operation State the causes for accidents Identify job site hazardous work and state 	Training kit (Trainer guide, PowerPoint) Leather gloves, leather apron,

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	<p>Practical Duration (hh:mm) 08:00</p> <p>Corresponding NOS Code CSC/N1335</p>	<p>possible causes of risk or accident at the workplace</p> <ul style="list-style-type: none"> Explain the importance of '5S' at the workplace 	<p>welding screen – helmet types, hand screen welding and safety shoes</p>
8	<p>Fire Safety</p> <p>Theory Duration (hh:mm) 05:00</p> <p>Practical Duration (hh:mm) 30:00</p> <p>Corresponding NOS Code CSC/N1335</p>	<ul style="list-style-type: none"> Explain types of fires - Class A, B, C and D Select appropriate fire extinguisher to control fire Use PASS method to operate a fire extinguisher Follow fire safety signs and safe evacuation method in case of a fire Identify the location of assembly point, fire exit, fire alarm Follow reporting procedure in case of a fire 	<p>Training kit (Trainer guide, PowerPoint)</p> <p>Class A, B, C, D and K fire extinguishers</p>
9	<p>Emergencies, rescue and first aid procedure</p> <p>Theory Duration (hh:mm) 09:00</p> <p>Practical Duration (hh:mm) 18:00</p> <p>Corresponding NOS Code CSC/N1335</p>	<ul style="list-style-type: none"> Follow electrical safety procedures Use approved method to rescue a person from electrocution State the importance of first aid Identify the contents of a first aid kit and their application Administer first aid in case of bleeding, burns, choking, electrical shock, poisoning, etc. Use of CPR process Bandage wounds Explain stages of crisis and crisis management Prepare an incident report 	<p>Training kit (Trainer guide, PowerPoint)</p> <p>First aid kit with all contents</p>
10	<p>Work effectively with others</p> <p>Theory Duration (hh:mm) 20:00</p> <p>Practical Duration (hh:mm) 60:00</p> <p>Corresponding NOS Code CSC/N1336</p>	<ul style="list-style-type: none"> Explain the importance of team work and team dynamics State 4Cs of working in a team Explain types of communication Apply effective communication technique Overcome barriers to effective communication Demonstrate active listening skills Demonstrate good customer service skills Explain the importance of ethical behaviour in your day-to-day work State the importance of discipline in life and apply the same at workplace 	<p>Training kit (Trainer guide, PowerPoint)</p>

Sr. No.	Module	Key Learning Outcomes	Equipment Required
11	<p>Final Assessment</p> <p>Theory Duration (hh:mm) 04:00</p> <p>Practical Duration (hh:mm) 06:00</p> <p>Corresponding NOS Code</p>	<ul style="list-style-type: none"> To test skills and knowledge 	
	<p>Total Duration</p> <p>Theory Duration 88:00</p> <p>Practical Duration 222:00</p>	<p>Unique Equipment Required: Leather gloves; leather apron; welding screen - helmet type; hand screen welding; safety shoes; fire extinguishers - dry powder fire extinguisher; fire bucket with sand, first aid kit; DC Power source, Controller, Welding gun, cables scribe - 15 cm; dividers 20 cm; calliper outside 15 cm; prick punch; chisel cold flat - 19 mm; centre punch - 9 mm x 127 mm; rule 60 cm; two fold; brass topped to read inches and mm; hammer scaling 0.25 kg with handle; steel rule - 30 cm to read inch and millimetre; Vernier calliper (digital) - 0-150 mm; ball peen hammer with handle - 0.25 kg; cross peen hammer with handle - 0.25 kg; holding tongs - 30 cm; wire brush - 15 cm x 3.7 cm and double ended spanner</p>	

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

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

Trainer Prerequisites for Job role: “Stud Welding Operator” mapped to Qualification Pack: “CSC/Q0210 v1.0”

Sr. No.	Area	Details
1	Description	Perform stud welding to secure studs and pins to metal surfaces to attach materials such as boilers surfaces, insulation and refractories. This can be done through manual processes or with machines in downward position. Set-up and prepare for operations interpreting the right information from the specification documents.
2	Personal Attributes	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	Minimum Educational Qualifications	Diploma /Degree in Mechanical Engineering
4a	Domain Certification	Certified for Job Role: “ <u>Stud Welding Operator</u> ” mapped to QP: “ <u>CSC/Q0201, v1.0</u> ”. Minimum accepted score is 80%
4b	Platform Certification	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	Experience	<ul style="list-style-type: none"> • 3-4 years of industry experience in the relevant field • 3-4 years of teaching experience

Annexure: Assessment Criteria

Assessment Criteria	
Job Role	Stud Welding Operator
Qualification Pack	CSC/Q0210, v1.0
Sector Skill Council	Capital Goods Skill Council

Sr. No.	Guidelines for Assessment
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
1.CSC/ N 0210 Weld stud joints using stud welding equipment /machines	PC1.work safely at all times, complying with health and safety and other relevant regulations and guidelines	100	3	1	2
	PC2.stop machine/equipment in case of emergencies and start when safe using correct procedure		3	1	2
	PC3.operate machine/equipment safety devices in line with set procedures		3	1	2
	PC4.stop the machine/equipment in a timely and safe manner during an emergency		2	0	2
	PC5.interpret stud welding information from welding procedure data sheets specifications		2	1	1
	PC6.set up stud welding machine/equipment for operations as per requirement		3	1	2
	PC7.ensure portable equipment power leads are undamaged and securely connected		2	0	2
	PC8.check if all machinery and equipment is calibrated and approved for use		2	0	2
	PC9.check if base metal plates are approved for stud welding process		2	0	2
	PC10. check if all equipment mechanical and electrical systems operate correctly		2	0	2
	PC11.identify maintenance requirements for various equipment/machine parts		1	0	1
	PC12. ensure welding material surface is appropriately prepared with required surface pre-treatment		2	0	2
	PC13. match consumables to welding process		1	0	1
	PC14.identify different types and sizes of common fasteners and ferrules		1	0	1
	PC15.remove damaged and defective materials, equipment and consumables from operations		2	0	2
	PC16. select required amount of materials		1	0	1
	PC17. set up, check, adjust and operate stud welding machines		3	0	3
	PC18. set up the equipment parameters in accordance with instructions and the welding procedure specifications		4	1	3
	PC19. check supplies of components and consumables are adequate and correctly prepared		2	0	2
	PC20. check that the parent material, components, consumables and joint preparation comply with specifications		4	1	3
	PC21. produce test specimen by welding stud to approved specimen plates		3	0	3
	PC22. weld position, nature of base metal and stud surfaces, current, and time shall be recorded during		2	0	2

Assessable Outcome	Assessment Criteria	Total Mark (300)	Out Of	Marks Allocation	
				Theory	Skills Practical
	specimen testing				
	PC23.test specimen through approved tests and record results		3	0	3
	PC24. adjust parameters as per test results to achieve desired output including plunge, lift, time and current		3	0	3
	PC25.confirm that the machine is set up and operating correctly, ready for the joining operations to be carried out		2	0	2
	PC26.follow the relevant joining procedure and work instructions		3	1	2
	PC27. carry out and monitor the machine/equipment operations in accordance with specifications and job instructions		4	1	3
	PC28. select positions of stud placement by looking at specifications, marked layout, drawing layout or provided templates		3	0	3
	PC29. monitor the process operation and make adjustments to parameters, in order to produce welded components covering different components and different material thicknesses		3	0	3
	PC30. level and square gun to base metal before starting the weld		3	0	3
	PC31.stud weld threaded and unthreaded fasteners accurately		3	0	3
	PC32.stud weld fasteners of different diameters in downward position		3	0	3
	PC33.produce welded components which meet all the required quality parameters		4	1	3
	PC34.ensure stud welds are correctly pitched out and located		2	0	2
	PC35.meet the required dimensional accuracy within specified tolerances		4	1	3
	PC36.achieve the rate of output as specified		2	0	2
	PC37.support carrying out of destructive and non-destructive tests		2	0	2
	PC38.detect equipment malfunctions and deal with them appropriately		2	0	2
	PC39.deal promptly and effectively with problems within own control and seek timely and appropriate assistance from relevant personnel as per organizational procedure		3	0	3
	PC40. shut down the equipment to a safe condition on conclusion of welding activities		1	0	1
	Total		100	11	89
2.CSC/ N 1335 Use basic	PC1.use protective clothing/equipment for specific tasks and work conditions		5	2	3
	PC2.state the name and location of people		3	1	2

Assessable Outcome	Assessment Criteria	Total Mark (300)	Out Of	Marks Allocation	
				Theory	Skills Practical
health and safety practices at the workplace	responsible for health and safety in the workplace				
	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
	PC23.demonstrate the artificial respiration and the		3	1	2

Assessable Outcome	Assessment Criteria	Total Mark (300)	Out Of	Marks Allocation	
				Theory	Skills Practical
	CPR Process				
	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
	Total		100	36	64
3.CSC/ N 1336 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
	Total		100	30	70
	Grand Total	300	300	107	193
	Percentage Weightage:			36	64
	Minimum Pass% to qualify (aggregate):			60	