Model Curriculum

Welding Operator

SECTOR: Electronics
SUB-SECTOR: Passive Components
OCCUPATION: Production
REF ID: ELE/Q0102, V 1.0
NSQF LEVEL: 4

Skill India कौशल भारत-कुशल भारत

ESSCI Skilling India in Electronics

N·S·D·C National Skill Development Corporation

Certificate

CURRICULUM COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

ELECTRONICS SECTOR SKILLS COUNCIL OF INDIA

for the

MODEL CURRICULUM

Complying to National Occupational Standards of

Job Role/ Qualification Pack: **'Welding Operator'** QP No. **'ELE/Q0102, NSQF Level 4'**

Date of Issuance: **November 15th, 2018**

Valid up to: **November 14th, 2021**

** Valid up to the next review date of the Qualification Pack*

Authorised Signatory
(Electronics Sector Skills Council of India)

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Welding Operator

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of "Welding Operator", in the "Electronics" Sector/Industry and aims at building the following key competencies amongst the learner.

Program Name	**Welding Operator**		
Qualification Pack Name and Reference ID	ELE/Q0102, Version 1.0		
Version No.	1.0	**Version Update Date**	15/11/2018
Pre-requisites to Training	10th/12th standard Passed preferably		
Training Outcomes	**After completing this programme, participants will be able to -** • **Evaluate the job role of a Welding Operator**: Describe the tasks which needs to be performed by a welding operator • **Describe the work requirement and operation of welding equipment:** List the work requirement to operate a welding equipment • **Describe how to check welding quality and undertake preventive maintenance:** Analyze the quality of welding and practice preventive steps • **Describe how to achieve productivity and quality of standards:** List the ways to achieve the desired productivity and quality • **Illustrate how to interact with supervisor or colleagues:** Demonstrate proper interaction with your supervisor and colleagues • **List the potential sources of accidents and safety procedures:** Evaluate the potential sources of accidents and safety measures • **Describe how to use safety gear to avoid accidents:** Practice the proper use of PPEs to avoid accidents • **Describe proper communication method:** Practice how to communicate with your supervisor and colleagues		

This course encompasses 3 out of 3 National Occupational Standards (NOS) of "Welding Operator" Qualification Pack issued by "Electronics Sector Skill Council of India".

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1.	**Introduction to the Job Role** **Theory Duration** (hh:mm) 2:00 **Practical Duration** (hh:mm) 4:00 **Corresponding NOS Code** Bridge Module	• Elucidate the job role of a Welding Operator • Discuss the key competencies required for a Welding Operator • Discuss the job opportunities for a Welding Operator	Participant Handbook, Data projector, Laptop, Computer, Speaker, Projection Screen, Whiteboard And Whiteboard Makers, Duster, Note Book, Pen, Pencil
2.	**Welding the copper lead wire to resistor** **Theory Duration** (hh:mm) 15:00 **Practical Duration** (hh:mm) 20:00 **Corresponding NOS Code** ELE/N0102	• List the required materials and equipment for welding • Describe how to read the job sheet • Demonstrate ways to assess welding parameters • Compare the thickness of wires and materials required for welding process • Examine how to start and adjust welding machine • Demonstrate how to install welding work pieces to the welding machine • Practice how to add chemicals to work pieces to ensure bonding • Describe how to fix work pieces such as grinder, cutter, drills and flux into welding machine • Demonstrate how to set the machine based on size of cap and load on the machine • Examine how to insert the lead wire through the hole provided in the top	Different Types of Joints, Resistors, Diodes, Capacitors, Integrated Circuits, Signal Generators, Cathode Ray Oscilloscope (CRO), Multi-meters, LED, Batteries covered Electrode, TIG Welding rod, GMAW Solid Wire, GMAW flux cored wire, SAW wire, Strip Electrodes, Power Source, Electrode Holder and cables , Welder Protection, Fume Extraction, Welding Arc, Plasma, SMAW, welding electrodes, TIG Welding Machine, Torch with Nozzle, Work Clamp, Tungsten, Grinding Wheel, MIG Welder, AC or DC Sources Of

		plate the welding electrode • Recall how to push the wire until it comes out of the upper moving portion • Practice how to set the variance and voltage depending upon the cap size • Explain how to adjust welding heads and tooling as per specifications • Recall how to place the materials onto the machine • Describe how to operate the welding machine • Illustrate how to remove completed work pieces from the machine using handling tools • Identify how to monitor the machine to obtain desired weld • State how to check the various indicators of the machine	Power, Angle Grinders, Plasma Cutters, Drills, Flux, Filler Material, Thermoplastics/Metals, Chipping Hammer, Wire Brush, Hand File, Vice Grips, Pliers, Clamps, Adjustable Wrench, Micro-Computer, Welding Machine, Height Gauge, Co2 gas cylinder + Regulator + Gas Heater and Flow Meter, Argon Gas Cylinder, Hydraulic and Lubricating Oil, Consumables Like Electrodes Gas Cylinder and Similar Item, Defective and Good Samples of Weld, Calliper, Micrometre, Asbestos Gloves, Flame-Proof Aprons, Safety Helmets, Trousers, Safety Shoes, Protective Goggles, Safety Mask, Respirator
3.	**Recognising the raw materials, production processes, quality control, costs, and other techniques** **Theory Duration** (hh:mm) 29:00 **Practical Duration** (hh:mm) 40:00 **Corresponding NOS**	• Demonstrate how to visually check the completed weld • State how to maintain and perform minor repairs • Practice how to perform regular cleaning of machine, equipment and work area • Examine ways to ensure damage and defect-free machine with zero unscheduled downtime • State how to achieve 100 percent target number to be welded • Describe how to ensure “zero defect” welding • Practice steps to ensure conformance to company specification	TIG Welding Rod, GMAW Solid Wire, GMAW Flux Cored Wire, SAW Wire, Strip Electrodes, Power Source, Electrode Holder And Cables , Welder Protection, Fume Extraction, Welding Arc, Calliper, Micrometre Defective and Good Samples of Weld, Gloves, Flame-Proof Aprons, Safety Helmets, Trousers, Safety Shoes, Protective Goggles, Safety Mask, Respirator

	Code ELE/N0102	• Explain how to document the outcome of weld performed	
4.	**Interacting with supervisor or colleagues** **Theory Duration** (hh:mm) 10:00 **Practical Duration** (hh:mm) 20:00 **Corresponding NOS Code** ELE/N9919	• Analyse work requirements by receiving instructions from reporting supervisor • Identify standard operating procedure of the company • Demonstrate how to escalate problems that cannot be handled • Describe how to resolve personnel issues • State how to rectify errors and minimize mistakes • Demonstrate how to communicate with your superior • Describe how to handover work on time • Assemble required spares and raw materials from tool room or stores • Describe how to deposit unused or faulty materials to the stores • Demonstrate how to resolve conflicts with colleagues • Illustrate how to put team over individual goals	Participant Handbook, Data Projector, Laptop, Computer, Speaker, Projection Screen, Whiteboard And Whiteboard Makers, Duster, Note Book, Pen, Pencil, SOPs (production line steps, equipment Maintenance, Inspection Procedures, New Employee Training, Billing And Collections Process, etc.)
6.	**Maintenance of work area and it's safety, security** **Theory Duration** (hh:mm) 10:00 **Practical Duration** (hh:mm) 20:00 **Corresponding NOS Code** ELE/N9921	• Describe how to spot and report potential hazards • Comply with company policies regarding hazardous materials • Demonstrate how to avoid accidents related to your job role • Illustrate how to handle an electrical drill and sharp cutting objects • Comply with health and safety procedure • Comply with the evacuation procedures properly • Demonstrate how to take adequate safety measures while at work • List how to ensure zero accidents at work • State how to avoid damage of	Participant Handbook, Data Projector, Laptop, Computer, Speaker, Projection Screen, Whiteboard and Whiteboard Makers, Duster, Note Book, Pen, Pencil, Welding Cap, Eye Protection, Hearing Protection, Welding Gloves, Breathing Protection, Protective Clothing, Footwear, Welding Helmet, Face Shield, Cutters, Cloth, Cutting Jaws, Oil/Grease, Fire Extinguisher

		components due to negligence in ESD procedures • Describe how to ensure no loss for company due to safety negligence • Recall how to ensure proper machine maintenance	
7.	**Demonstrating proper use of machines and tools without causing harm** **Theory Duration** (hh:mm) 10:00 **Practical Duration** (hh:mm) 20:00 **Corresponding NOS Code** ELE/N9921	• Identify which safety gear must be used for a particular task • Illustrate how to use eye, respiratory and hearing protection • Demonstrate how to use safety gear • List the standard safety procedures to follow while handling tools and machines • State the Importance of various safety procedures	Welding Cap, Eye Protection, Hearing Protection, Welding Gloves, Breathing Protection, Protective Clothing, Footwear, Welding Helmet, Face Shield, Cutters, Cloth, Cutting Jaws, Oil/Grease, Fire Extinguisher, Flammable Metals, Footrest, Yoga Mat, Antistatic Wrist Straps, Static Control Garments, Dissipative Floor Materials, Antistatic Paints, Air Ionizers, Static Protective Bags, Voltmeters, Field Meters
8.	**Communicate with supervisor** **Theory Duration** (hh:mm) 10:00 **Practical Duration** (hh:mm) 15:00 **Corresponding NOS Code** ELE/N9921	• Explain how to improve process flow to reduce repetitive hazards • State how to report on mishandling of tools, machines or hazardous materials • Recall how to escalate about any hazardous materials or things found in the premises • Discuss how to report about any breach in safety • Recall how to follow electrostatic discharge (ESD) measures for electronic component safety	Participant Handbook, Data Projector, Laptop, Computer, Speaker, Projection Screen, Whiteboard and Whiteboard Makers, Duster, Note Book, Pen, Pencil, Report Formats
9.	**Defining Organizational**	• Describe the mission, vision, and organizational hierarchy that needs	Participant Handbook, Data Projector, Laptop,

	Context **Theory Duration** (hh:mm) 10:00 **Practical Duration** (hh:mm) 05:00 **Corresponding NOS Code** Bridge Module	to be adhered • Define the protocols that needs to be followed in an organization • Discuss the importance of following protocols.	Computer, Speaker, Projection Screen, Whiteboard and Whiteboard Makers, Duster, Note Book, Pen, Pencil
	Total Duration **Theory Duration** (hh:mm) 96:00 **Practical Duration** (hh:mm) 144:00	**Unique Equipment Required** Different types of Joints, Resistors, Diodes, Capacitors, Integrated Circuits, Signal Generators, Cathode Ray Oscilloscope (CRO), Multi-meters, LED, Batteries, Covered Electrode, TIG Welding Rod, GMAW solid wire, GMAW Flux Cored Wire, SAW Wire, Strip Electrodes, Power Source, Electrode Holder And Cables , Welder Protection, Fume Extraction, Welding Arc, Plasma, SMAW, Welding Electrodes, TIG Welding Machine, Torch With Nozzle, Work Clamp, Tungsten, Grinding Wheel, MIG Welder, AC or DC Sources of Power, Angle Grinders, Plasma Cutters, Drills, Flux, Filler Material, Thermoplastics/Metals, Chipping Hammer, Wire Brush, Hand File, Vice Grips, Pliers, Clamps, Adjustable Wrench, Micro- Computer, Welding Machine, Height Gauge, Co2 gas Cylinder + Regulator + Gas Heater and Flow Meter, Argon Gas Cylinder, Hydraulic and Lubricating Oil, Consumables Like Electrodes Gas Cylinder and Similar Item, Defective and Good Samples Of Weld, Calliper, Micrometre, Asbestos Gloves, Flame-Proof Aprons, Safety Helmets, Trousers, Safety Shoes, Protective Goggles, Safety Mask, Respirator, Welding Cap, Eye Protection, Hearing Protection, Welding Gloves, Breathing Protection, Protective Clothing, Footwear, Welding Helmet, Face Shield, Cutters, Cloth, Cutting Jaws, Oil/Grease, Fire Extinguisher, Flammable Metals, Footrest, Yoga Mat, Antistatic Wrist Straps, Static Control Garments, Dissipative Floor Materials, Antistatic Paints, Air Ionizers, Static Protective Bags, Voltmeters, Field Meters, etc.	

Grand Total Course Duration: **240 Hours 0 Minutes**

(This syllabus/ curriculum has been approved by ***Electronics Sector Skill Council of India)***

Trainer Prerequisites for Job role: "Welding Operator" mapped to Qualification Pack: "ELE/Q0102" Version 1.0

Sr. No.	Area	Details
1	**Description**	To deliver accredited training service, mapping to the curriculum detailed above, in accordance with the Qualification Pack "ELE/Q0102, version 1.0".
2	**Personal Attributes**	A Trainer should be free from socio-economic preferences and prejudice. He/ she should be safety conscious and proficient in handling and use security/ safety equipment. Besides being knowledgeable, he/ she should be energetic, motivating, innovative and good at communication. The trainer should be able to establish rapport with the trainees and employ innovative methods to impart instructions.
3	**Minimum Educational Qualification**	10th/12th standard passed preferably
4a	**Domain Certification**	Certified for Job Role "Welding Operator" mapped to the Qualification Pack "ELE/Q0102, v 1.0". Minimum accepted score is 80%.
4b	**Platform Certification**	Recommended that the Trainer is certified for the Job Role: "Trainer", mapped to the Qualification Pack: "MEP/Q0102". Minimum accepted score is 80%.
5	**Experience**	As per the standards set by relevant SSC to practice in different industry sectors.

Assessment Criteria for Welding Operator

Job Role: Welding Operator
Qualification Pack: ELE/Q0102, V 1.0
Sector Skill Council: Electronics Sector Skill Council of India

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. Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS.
4. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training centre (as per assessment criteria below).
5. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training centre based on this criterion.
6. To pass the Qualification Pack, every trainee should score a minimum of 70% of aggregate marks to successfully clear the assessment.
7. In case of unsuccessful completion, the trainee may seek reassessment on the Qualification Pack.

Compulsory NOS Total Marks: 300				Marks Allocation	
Assessment outcomes	**Assessment Criteria for outcomes**	**Total Marks**	**Out of**	**Theory**	**Skills Practical**
ELE/N0102 Weld the copper lead wire to resistor	PC1.collect the required materials and equipment for welding	100	4	2	2
	PC2.record the number received		4	2	2
	PC3.read the job sheet to for specifications of the lot received		4	2	2
	PC4.assess welding parameters such as temperature, pressure, electrode type, electrode distance or gap, welding current, voltage, process time, etc.		4	2	2
	PC5.compare the thickness of copper wire, filler material and flux required for welding process		4	2	2

	PC6.program operating instructions into the computers to adjust and start welding machine		4	2	2
	PC7.install welding work pieces to the welding machine aligning in a way that work pieces do not turn or fall down		4	2	2
	PC8.add chemicals to work pieces to ensure bonding		4	2	2
	PC9.fix work pieces such as grinder, cutter, drills and flux into welding machine		4	2	2
	PC10.set the machine based on size of cap and load on the machine		4	2	2
	PC11.insert the lead wire through the hole provided in the top plate of the upper moving portion above the welding electrode		4	2	2
	PC12.push the wire until it comes out of the bottom of the upper moving portion		4	1	3
	PC13.set the variance and voltage depending upon the cap size		4	1	3
	PC14.choose and fix the bottom electrode according to cap size		3	1	2
	PC15.adjust welding heads and tooling according to work specifications		3	1	2
	PC16.place the materials onto the machine		3	1	2
	PC17.operate the welding machine as specified in work order to weld the electro tinned copper lead wire to the centre of steel and cap		3	1	2
	PC18.remove completed work pieces from the machine using handling tools		3	1	2
	PC19.monitor the machine constantly to obtain desired weld		3	1	2
	PC20.check gauge, dials, and other indicators of the machine		3	1	2
	PC21.check visually on the completed weld to ensure conformance to company specifications		3	1	2
	PC22.maintain and perform minor repairs on welding, if needed		3	1	2
	PC23.perform regular cleaning of machine, equipment and work area as prescribed by machine manufacturer using air hoses, cleaning fluids and hand tools		3	1	2
	PC24.ensure damage and defect-free machine with zero unscheduled downtime		3	1	2

	PC25.achieve 100% target number to be welded		3	1	2
	PC26.ensure zero defective welding		3	1	2
	PC27.ensure conformance to specification of the company		3	1	2
	PC28.document the outcome of weld performed PC29.deliver to the next stage on time		3	1	2
		Total	**100**	**40**	**60**
ELE/N9919 Work with superiors and colleagues	PC1.analyse work requirements by receiving instructions from reporting supervisor		8	3	5
	PC2.identify standard operating procedure of the company		8	3	5
	PC3.escalate problems that cannot be handled including repetitive PCB defects, machine failures, potential hazards, process disruptions, repairs and maintenance of machine		7	3	4
	PC4.report work completed and receive feedback on work done		7	3	4
	PC5.resolve personnel issues		7	3	4
	PC6.rectify errors as per feedback and minimize mistakes to zero in future		7	3	4
	PC7.communicate about process flow improvements, quality of output, product defects received from previous process, repairs and maintenance of tools and machinery as required and find technical solutions on specific issues	**100**	7	3	4
	PC8.handover completed work and deliver the work of expected quality despite constraints		7	3	4
	PC9.collect required spares and raw materials from tool room or stores		7	3	5
	PC10.deposit unused or faulty materials, parts and tools to stores		7	3	5
	PC11.assist colleagues where necessary and as per capability		7	3	4
	PC12. record the procedure accurately and store information securely in line with the salon's policies		7	3	4
	PC13.complete rework in time based on feedback from quality or process departments		7	3	4
	PC14.put team over individual goals		7	3	4
		Total	**100**	**40**	**60**

ELE/N9921 Follow safety standards	PC1.spot and report potential hazards on time	100	5	2	3
	PC2.follow company policy and rules regarding hazardous materials		5	2	3
	PC3.avoid accidents related to use of potentially dangerous chemicals, gases, sharp tools and hazards from machines which involves exposure to possible injuries such as cuts, bites, stings, minor burns, etc.		5	2	3
	PC4.handle with care when using an electrical drill and sharp cutting objects		5	2	3
	PC5.understand which safety gear must be used for a particular task		5	2	3
	PC6.eye, respiratory and hearing protection as per company policy		5	2	3
	PC7.use safety gear such as respirator, mask, skull caps, gloves, goggles, jacket, etc., as prescribed for the job		5	2	3
	PC8.comply with standard health and safety procedure followed in the company while handling an equipment and hazardous materials and tools or situations		5	2	3
	PC9.understand and follow the evacuation procedure properly such as fire drills, emergency evacuation procedures, first aid to self and others, etc., which help in case of an emergency		5	2	3
	PC10.take adequate safety measures while on work to prevent accidents		5	2	3
	PC11.ensure zero accidents in work		5	2	3
	PC12.avoid damage of components due to negligence in ESD procedures		5	2	3
	PC13.ensure no loss for company due to safety negligence		5	2	3
	PC14.ensure proper machine maintenance, work process achieving quality outputs as per the company standard		5	2	3
	PC15.improve process flow to reduce anticipated or repetitive hazards		6	2	4
	PC16.report on mishandling of tools, machines or hazardous materials and on electrical problems that could result in accident		6	2	4
	PC17.escalate about any hazardous materials or things found in the premises		6	2	4
	PC18.report about any breach of safety		6	3	3

	procedure in the company				
	PC19.follow electrostatic discharge (ESD) measures for electronic component safety		6	3	3
		Total	**100**	**40**	**60**