Model Curriculum

Assistant Tungsten Inert Gas Welder (GTAW)

SECTOR:	**CAPITAL GOODS**
SUB-SECTOR:	**1. Machine Tools** **2. Dies, Moulds and Press Tools** **3. Plastic Manufacturing Machinery,** **4.Textile Manufacturing Machinery, Process** **5.Plant Machinery,** **6.Electrical and Power Machinery,** **7.Light Engineering Goods**
OCCUPATION:	**Welding and Cutting**
REF ID:	**CSC/Q0212, V1.0**
NSQF LEVEL:	**4**

Skill India
कौशल भारत-कुशल भारत

CGSC
CAPITAL GOODS SKILL COUNCIL

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National
Skill Development
Corporation
Transforming the skill landscape

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: **'Assistant Tungsten Inert Gas Welder (GTAW)'** QP No. **'CSC/ Q 0212, NSQF Level 4 '**

Date of Issuance: April 10th, 2014

Valid up to : August 30th, 2016

Authorised Signatory
Tourism & Hospitality Skill Council

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Assistant Tungsten Inert Gas Welder (GTAW)

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a "Assistant Tungsten Inert Gas Welder (GTAW)", in the "Capital Goods" Sector/Industry and aims at building the following key competencies amongst the learner

Program Name	**Assistant Tungsten Inert Gas Welder (GTAW)**		
Qualification Pack Name & Reference ID. ID	CSC/Q0212, v1.0		
Version No.	1.0	**Version Update Date**	
Pre-requisites to Training	10th Standard passed, preferably		
Training Outcomes	**After completing this programme, participants will be able to:** • **Perform basic Tungsten Inert Gas (TIG) Welding also known as Gas Tungsten Arc:** Performing of basic manual TIG (GTAW) welding for a range of standard welding job requirements. This involves welding different materials (carbon steel, low alloy steel) in various positions. The welder can prepare various joints including corner, fillet and tee. • **Basic health and safety practices at the workplace:** Identify site hazards 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 "Assistant Tungsten Inert Gas Welder (GTAW)" Qualification Pack issued by "Capital Goods Skill Council".

Sr. No.	Module	Key Learning Outcomes	Equipment Required

1	**Perform basic Tungsten Inert Gas Welding (TIG) also known as Gas Tungsten Arc Welding (GTAW)**
	
	Theory Duration
	(hh:mm)
	40:00
	
	Practical Duration
	(hh:mm)
	100:00
	
	Corresponding NOS Code
	CSC/N0212
		• State the necessity of welding
		• Explain various types of welding processes
		• Compare welding processes and state their advantages
		• State the principle of TIG welding
		• Explain safe working practices to be followed while carrying out TIG welding
		• Identify hazards associated with TIG welding and take remedial measures
		• Identify various types of joints
		  ○ Fillet lap joint
		  ○ Tee-fillet joint
		  ○ Corner joint
		  ○ Butt joint
		  ○ Double J joint
		• Explain various welding positions
		• List Personal Protective Equipment required for TIG welding and state their use
		• Demonstrate the method to correctly wear PPE
		• Explain the factors to be considered in TIG welding like type and thickness of the base metal, current type and polarity, type of shielding gas to be used
		• State the purpose of using shielding gas in TIG welding
		• Identify various gases/combination of gases for shielding
		• Identify equipment required for welding
		  ○ Transformer
		  ○ Rectifier
		  ○ Inverter
		  ○ Generator
		  ○ Multimeter
		  ○ Voltmeter
		  ○ Welding torch
		  ○ Electrode
		  ○ Filler wire
		  ○ Return clamp
		• List common tools used in TIG welding
		  ○ Wire brushes
		  ○ Linishers
		  ○ Hammer
		  ○ Power saw
		  ○ Angle
		  ○ Grinders- Pedestal and straight
			Training kit (Trainer guide, PowerPoint), Transformer,rectifier,inverter ,generator,multimeter,volt meter, Welding torch, electrode, filler wire Return clamp, jigs and fixtures, ceramic nozzle, collet, collet holder, gas lens, bakelite cap, Wire brushes, linishers, hammer, power saw, Angle Grinders- Pedestal and straight, chisel etc. Leather gloves; leather apron; welding screen - helmet type; hand screen welding; safety shoes, center punch, divider, calliper outside, steel rule, ball peen hammer, chipping hammer.

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		○ Chisel • Explain the process and importance of purging • Explain the method to prepare the work area for welding operation • Prepare the materials and joint in readiness for welding • Select suitable shielding gases based on the base metal • Plan for the welding operations ○ Correct setup of the joint ○ Check for earthing and electrical connections ○ Set correct parameters • Connect flow meters and adjust flow rate • Check the condition of base material and prepare edges for the welding • Produce joints from various materials in different forms ○ Sheet (less than 5 mm) ○ Plate (8 mm) ○ Pipe/tube • Check the dimensions as per WPS • Identify possible defects and take corrective actions ○ Lack of continuity ○ Uneven ripple formation ○ Incorrect weld size or profile ○ Undercut ○ Overlap ○ Inclusions ○ Porosity ○ Internal and surface cracks ○ Lack of fusion ○ Lack of penetration ○ Welding spatter ○ Stray arc strikes ○ Sharp edges	
2	**Health and safety** **Theory Duration** (hh:mm) 10:00 **Practical Duration** (hh:mm) 08:00 **Corresponding NOS Code**	• 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 possible causes of risk or accident at the workplace • Explain the importance of '5S' at the workplace	Training kit (Trainer guide, PowerPoint) Leather gloves, leather apron, welding screen – helmet types, hand screen welding and safety shoes

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	CSC/N1335		
3	**Fire Safety** **Theory Duration** (hh:mm) 05:00 **Practical Duration** (hh:mm) 30:00 **Corresponding NOS Code** CSC/N1335	• 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	Training kit (Trainer guide, PowerPoint) Class A, B, C, D and K fire extinguishers
4	**Emergencies, rescue and first aid procedure** **Theory Duration** (hh:mm) 09:00 **Practical Duration** (hh:mm) 18:00 **Corresponding NOS Code** CSC/N1335	• 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	Training kit (Trainer guide, PowerPoint) First aid kit with all contents
5	**Work effectively with others** **Theory Duration** (hh:mm) 20:00 **Practical Duration** (hh:mm) 60:00 **Corresponding NOS Code** CSC/N1336	• 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	Training kit (Trainer guide, PowerPoint)
	Total Duration **Theory Duration**	**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; transformer, rectifier, inverter, generator, multimeter, volt meter, Welding torch, electrode, filler wire Return clamp,	

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	84:00 **Practical Duration 216:00**	jigs and fixtures, ceramic nozzle, collet, collet holder, gas lens, bakelite cap, Wire brushes, linishers, hammer, power saw, Angle Grinders-Pedestal and straight, chisel etc. Leather gloves; leather apron; welding screen - helmet type; hand screen welding; safety shoes, Fire Extinguishers, First aid kit with all contents.	

Grand Total Course Duration: **300 Hours, 0 Minutes**

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

Trainer Prerequisites for Job role: "Assistant Tungsten Inert Gas Welder (GTAW)" mapped to Qualification Pack: "CSC/Q0212 v1.0"

Sr. No.	Area	Details
1	**Description**	Perform manual TIG (GTAW) welding for a range of standard welding job requirements. This is for a skilled welder who can weld different materials (carbon steel, aluminum, nickel, titanium, copper and stainless steel) in various positions and prepare various joints including corner, butt, fillet and tee. Set-up and prepare for operations interpreting the right information from the WPS.
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: "Assistant Tungsten Inert Gas Welder (GTAW)" mapped to QP: "CSC/Q0212, v1.0". 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 as per respective SSC guidelines is 80%.
5	**Experience**	• 3-4 years of industry experience in the relevant field • 3-4 years of teaching experience

Annexure: Assessment Criteria

Assessment Criteria	
Job Role	Assistant Tungsten Inert Gas Welder (GTAW)
Qualification Pack	CSC/Q0212, 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 canter based on this criteria
5	To pass the Qualification Pack , every trainee should score a minimum of 70% in every NOS.
6	In case of successfully passing only certain number of NOS's, the trainee is eligible to take subsequent assessment on the balance NOS's to pass the Qualification Pack.

Assessable Outcome	Assessment Criteria	Total Mark (300)	Out Of	Marks Allocation	
				Theory	Skills Practical
1.CSC/N0212 Perform Basic Manual Tungsten Inert Gas (TIG) Welding also known as Gas Tungsten Arc Welding (GTAW) Welding	PC1.work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines	**100**	3	1	2
	PC2.take necessary safety precautions for TIG welding operations		2	0	2
	PC3.interpret weld procedure data sheets Specifications		3	1	2
	PC4.check that all measuring equipment is within calibration date		2	0	2
	PC5.check if welding machines eg. transformer, inverters (AC/DC), rectifiers and generators have been made available by the authorized person		2	1	1
	PC6.check if welding torch, tungsten electrode and filler wire have been made available by the authorized person		2	1	1
	PC7.prepare for the TIG welding process		2	1	1
	PC8.prepare the materials and joint in readiness for welding		2	0	2
	PC9.fit the welding shielding gases given by the authorised person, for a range of given applications		2	0	2
	PC10.plan the welding activities before they start them effectively and efficiently for achieving specifications as per WPS		2	0	2
	PC11.connect torches and the components		2	0	2
	PC12.connect and adjust regulators and flow meters to cylinders		3	1	2
	PC13.read, set and adjust current (amperage) as required		3	1	2
	PC14.set pre-purge with shielding gas as Required		2	1	1
	PC15.prepare tungsten by sharpening or balling it to desired tip shape		3	1	2
	PC16.set and verify gas flow rates		2	1	1
	PC17.prepare and support the joint, using the appropriate methods		3	1	2
	PC18.tack weld the joint at appropriate intervals, and check the joint for accuracy before final welding		2	0	2
	PC19.match feed and travel speed as Required		2	0	2
	PC20.perform TIG welding operations using appropriate welding techniques to meet welding procedure specification requirements		5	1	4
	PC21.use correct technique for starting the arc (using HF (high frequency) unit,		4	2	2

Assessable Outcome	Assessment Criteria	Total Mark (300)	Out Of	Marks Allocation	
				Theory	Skills Practical
	scratching the electrode on the job material, lifting the electrode immediately after touching the job material)				
	PC22.use correct angle of torch and filler Wire		4	1	3
	PC23.weld the joint to the specified quality, dimensions and profile		4	1	3
	PC24.use manual welding and related equipment, to carry out TIG welding processes		4	1	3
	PC25.produce joints of the required quality and of specified dimensional accuracy which achieve a weld quality equivalent to Level B of ISO 5817		4	1	3
	PC26.use both methods to produce the various joints a) with filler wire b) without filler wire (autogenously)		4	2	2
	PC27.produce joints from various materials in different forms		2	0	2
	PC28.weld joints in good access situations, in select positions		3	1	2
	PC29.make sure that the work area is maintained and left in a safe and tidy condition		2	0	2
	PC30.use appropriate methods and equipment to check the quality, and that all dimensional and geometrical aspects of the weld are to the specification		4	2	2
	PC31.check that the welded joint conforms to the specification, by checking various quality parameters using visual inspection		3	1	2
	PC32.identify various weld defects		3	1	2
	PC33.detect surface imperfections and deal with them appropriately		2	1	1
	PC34.report any defect or imperfection identified to the authorised person		2	0	2
	PC35.shut down and make safe the welding equipment on completion of the welding activities		2	0	2
	PC36.detect equipment malfunctions and deal with them appropriately		2	0	2
	PC37.deal promptly and effectively with problems within their control, and seek help and guidance from the relevant people if they have problems that they cannot resolve		2	0	2
	Total		**100**	**26**	**74**
2.CSC/N1335 Use basic health and safety	PC1.use protective clothing/equipment for specific tasks and work conditions	**100**	5	2	3
	PC2.state the name and location of people responsible for health and safety in the workplace		3	1	2

Assessable Outcome	Assessment Criteria	Total Mark (300)	Out Of	Marks Allocation	
				Theory	Skills Practical
practices at 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 CPR Process		3	1	2

Assessable Outcome	Assessment Criteria	Total Mark (300)	Out Of	Marks Allocation	
				Theory	Skills Practical
	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/N1336 Work effectively with others	PC1.accurately receive information and instructions from the supervisor and fellow workers, getting clarification where required		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**	**92**	**208**
	Percentage Weightage:			**31**	**69**
	Minimum Pass% to qualify (aggregate):			**70**	