



Model Curriculum

1. Tack Welder

SECTOR: Construction
SUB-SECTOR: Real Estate and Infrastructure Construction
OCCUPATION: Fabrication
REF ID: CON/Q1251, V1.0
NSQF LEVEL: 3





TABLE OF CONTENTS

1. Curriculum	01
2. Trainer Prerequisites	08
3. Annexure: Assessment Criteria	09



Tack Welder

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a “Tack Welder”, in the “Construction” Sector/Industry and aims at building the following key competencies amongst the learner

Program Name	Tack Welder		
Qualification Pack Name & Reference ID. ID	CON/Q1251, v1.0		
Version No.	1.0	Version Update Date	14-08-2017
Pre-requisites to Training	Preferably 10 th standard with 3 years site experience working under a welder for Non trained worker/ 3 years site experience as a certified Helper Fabrication who has worked under a welder for Trained worker		
Training Outcomes	After completing this programme, participants will be able to: <ul style="list-style-type: none">• Perform tack welding operations on structural steel elements:- Carry out tack welding operations on structural steel elements by performing all required preparatory activities and following necessary safety precautions• Carry out pre heating of materials before cutting and welding process:- Perform pre heating works on structural steel elements using an oxy-fuel torch• Work effectively in a team to deliver desired results at the workplace :- Organised working procedure within a team at site• Work according to personal health, safety and environment protocol at construction site: Importance of Health & Safety aspects & measures to be followed while working.		

This course encompasses 4 out of 4 National Occupational Standards (NOS) of “Tack Welder” Qualification Pack issued by “Construction Skill Development Council of India”.

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1	<p>Introduction</p> <p>Theory Duration (hh:mm) 08:00</p> <p>Practical Duration (hh:mm) 00:00</p>	<ul style="list-style-type: none"> • Introduction to role and responsibilities of the job role • Introduction to various types of welding • Introduction to different processes involved in fabrication & their purpose • need and importance of tack welding • Brands of welding equipments & their power ratings • Various hazards in fabrication Yards • Occupational Disease related to welding works and their symptoms • Importance of following safety precautions while welding • Introduction to Shop drawings (symbols and details etc.) • Basic math • units of measurement and conversion • career growth paths 	<ul style="list-style-type: none"> • class room • White board • Computer • Projector • Charts and displays regarding MIG and SMAW welding
2	<p>Perform tack welding operations on structural steel elements</p> <p>Theory Duration (hh:mm) 60:00</p> <p>Practical Duration (hh:mm) 140:00</p> <p>Corresponding NOS Code CON/N1251</p>	<p>Theory:</p> <p>Preparatory Works:</p> <ul style="list-style-type: none"> • different components of welding equipment (name and function) • various adjustments in welding kit and effects of the same • concept of polarity (according to type of welding) • defects that occur in welding nozzle and ways to avoid the same • importance and purpose of clamping the base metal before starting the weld • methods of cleaning the base metal (removal of oil, paints or rust and moisture) • effects of welding on unclean and wet surface • importance of placing the gas cylinders in upright position <p>Performing Welding Works:</p>	<ul style="list-style-type: none"> • Different types of cleaners and accessories • Clamps and vices • Spark lighter • Welding Transformer with all accessories • Welding Transformer (or) Inverter based welding machine with all accessories • D.C Arc welding rectifiers set with all accessories • AC/DC SMAW and GTAW welding machine with water or air cooled torch and standard accessories • Argon regulator, • Gas hose,

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		<ul style="list-style-type: none"> • importance of choosing comfortable and suitable posture for welding • relation between various parameters of welding (current, electrode feed rate, gas flow rate, travel speed etc.) • identification of overheating and ways to avoid the same • procedure of carrying out welding smoothly <p>Safety while welding:</p> <ul style="list-style-type: none"> • identification of hazards (including unsafe acts and unsafe conditions) at workplace and reporting procedure for same • checking for gas leakage • safety norms to be followed while carrying out welding works (at site and yard) <p><u>Demonstration\Practical:</u></p> <ul style="list-style-type: none"> • Performing tack welding operations by following safety norm while performing the following <ol style="list-style-type: none"> 1. Preparatory works including Preparation of base metal, preparation of welding Kit(including preliminary adjustment of parameters) 2. Striking the arc, following standard procedure 3. Produce tack weld of required specifications by carrying out necessary adjustments 4. Terminate the weld smoothly 5. Dismantle the welding kit and store appropriately 	<ul style="list-style-type: none"> • water circulating system (if required) • Trolley for cylinder • Clamps • Tapes • Electrode holders • Gas regulators • Flashback arrestors • Welding helmet • Welding glass • Chipping hammer • Chisel • Leather Hand Gloves • Jump suit • Wire brush • Hand & Leg guards leather • Safety goggles • Nose mask • Ear protection • Fire extinguishers • Sand buckets
3	Carry out pre heating of materials before	<u>Theory:</u>	<ul style="list-style-type: none"> • Chipping hammer • Chisel

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	<p>cutting and welding process</p> <p>Theory Duration (hh:mm) 38:00</p> <p>Practical Duration (hh:mm) 90:00</p> <p>Corresponding NOS Code</p> <p>CON/N1252</p>	<ul style="list-style-type: none"> • different gases employed in the process • importance of oxygen • concept of a neutral flame and its importance • common terminologies associated with pre heating • requirements and necessity of preheating • effects of heating on metal both physical and metallurgical • methods of heat transfer and process of same • effects of heating a painted or oily, rust and dust surface • importance of restricting the movement of metal while heating • methods of maintenance of heating apparatus • importance of correct body postures • importance of shape of flame in heat transfer • relation of heat transfer and flame size, point and its effect • Different components of oxy fuel heating torch (knobs, valves, switches and gauges of equipment) and checks for their working conditions • importance and purpose of clamping the base metal before starting the weld • methods of cleaning the base metal (removal of oil, paints or rust and moisture) • Different temperature measurement instruments and tools and their applications • method of adjusting gas flow rate • different temperatures for different metals and alloys <p><u>Demonstration\ Practical:</u></p>	<ul style="list-style-type: none"> • Leather Hand Gloves • Jump suit • Wire brush • Hand & Leg guards leather • Safety goggles • Nose mask • Ear protection • Fire extinguishers • Clamps and vices • Spark lighter • Sand buckets • Temperature measuring gun or chalks • Oxygen Gas Pressure regulator • Acetylene Gas Pressure regulator • Portable gas cutting machine • Trolley for cylinder • Oxy Acetylene Gas cutting blow pipe • Oxygen, Acetylene Cylinders • Flashback arrestors

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		<ul style="list-style-type: none"> • Performing preheating operations by following safety norm while performing the following <ol style="list-style-type: none"> 1. Preparatory works including Preparation of base metal, preparation of heating kit(including preliminary adjustment of parameters) 2. Striking the flame, following standard procedure 3. Obtaining and maintaining neutral flame 4. Obtaining flame of desired length and thickness 5. Heating the base metal symmetrically and uniformly 6. Shutting the flame off, dismantling the torch and storing it appropriately 	
4	<p>Work effectively in a team to deliver desired results at the workplace</p> <p>Theory Duration (hh:mm) 07:00</p> <p>Practical Duration (hh:mm) 17:00</p> <p>Corresponding NOS Code CON/N8001</p>	<p>Theory:-</p> <ul style="list-style-type: none"> • Method of oral and written communication skills with co-workers, trade seniors while handling and carrying out visual checks on materials, tools and equipments • How to interpret scope of preheating and tack welding activities, material/ tools handling by adhering to instructions or consulting with seniors • Method of reporting to seniors clearly and promptly • Seek necessary support and complete assigned tasks within stipulated time duration • Keep good relation and maintain well behavior with co-workers <p>Demonstration/ Practical (D/P) :- The skills will be developed and practiced while carrying out following trade related activities in a predictable and familiar working condition</p> <ol style="list-style-type: none"> 1. Selection of materials, tools or devices for defined purpose under 	

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		2. carrying out preparatory activities for Preheating and tack welding activities 3. Carrying out Preheating and tack welding activities	
5	<p>Work according to personal health, safety and environment protocol at construction site</p> <p>Theory Duration (hh:mm) 10:00</p> <p>Practical Duration (hh:mm) 38:00</p> <p>Corresponding NOS Code CON/N9001</p>	<p>Theory:-</p> <ul style="list-style-type: none"> • Types of hazards involved in construction sites • Types of hazards involved in of preheating and tack welding works • Emergency safety control measures and actions to be taken under emergency situation • Concept of :- <ol style="list-style-type: none"> 1. First Aid process 2. Use of fire extinguisher 3. Classification of fires and fire extinguisher 4. Safety drills 5. Types and use of PPEs as per general safety norms • Reporting procedure to the concerned authority in emergency situations • Standard procedure of handling, storing and stacking material, fabrication accessories • What is safe disposal of waste, type of waste and their disposal • basic ergonomic principles as per applicability <p>Demonstration/ Practical (D/P) :- The skills will be developed and practiced while carrying out following trade related activities in a predictable and familiar working condition.</p> <ol style="list-style-type: none"> 1. Selection of PPEs and use them appropriately as per working need of scaffolding activities like: <ol style="list-style-type: none"> 1. Selection of materials, tools or devices for defined purpose under 2. carrying out preparatory activities for Preheating and tack welding activities 3. Carrying out Preheating and tack welding activities 2. Selection of fire extinguisher based on classification of fire, standard practice of 	<ul style="list-style-type: none"> • Leather Hand Gloves • Jump suit • Wire brush • Hand & Leg guards leather • Safety goggles • Nose mask • Ear protection • Fire extinguishers • Sand buckets • Flashback arrestors • Welding helmet • Welding glass

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		storing & stacking firefighting equipments/ materials at work locations 3. Disposal of waste materials as per their nature and effects on weather	
	Total Duration Theory Duration 123:00 Practical Duration 285:00	Unique Equipment Required: class room, White board , Computer, Projector, Charts and displays regarding MIG and SMAW welding Different types of cleaners and accessories, Clamps and vices, Spark lighter, Welding Transformer with all accessories, Welding Transformer (or) Inverter based welding machine with all accessories, D.C Arc welding rectifiers set with all accessories, AC/DC SMAW and GTAW welding machine with water or air cooled torch and standard accessories, Argon regulator, Gas hose, ,water circulating system (if required), Trolley for cylinder, Clamps, Tapes, Electrode holders, Gas regulators, Flashback arrestors, Welding helmet, Welding glass Chipping hammer, Chisel, Leather Hand Gloves, Jump suit, Wire brush, Hand & Leg guards leather, Safety goggles, Nose mask, Ear protection, Fire extinguishers, Sand buckets Chipping hammer, Chisel, Leather Hand Gloves, Jump suit Wire brush, Hand & Leg guards leather, Safety goggles Nose mask, Ear protection, Fire extinguishers, Clamps and vices, Spark lighter, Sand buckets, Temperature measuring gun or chalks, Oxygen Gas Pressure regulator , Acetylene Gas Pressure regulator, Portable gas cutting machine, Trolley for cylinder, Oxy Acetylene Gas cutting blow pipe , Oxygen, Acetylene Cylinders, Flashback arrestors Leather Hand Gloves, Jump suit, Wire brush, Hand & Leg guards leather, Safety goggles, Nose mask, Ear protection Fire extinguishers, Sand buckets Flashback arrestors, Welding helmet, Welding glass	

Grand Total Course Duration: **408 Hours, 0 Minutes**

(This syllabus/ curriculum has been approved by Construction Skill Development Council of India)

Trainer Prerequisites for Job role: “Tack Welder” mapped to Qualification Pack: “CON/Q1101 , v1.0”

Sr. No.	Area	Details
1	Description	To deliver accredited training service, mapping to the curriculum detailed above, in accordance with the Qualification Pack “CON/Q1251”.
2	Personal Attributes	Aptitude for conducting training, and pre/ post work to ensure competent, employable candidates at the end of the training. Strong communication skills, interpersonal skills, ability to work as part of a team; a passion for quality and for developing others; well-organised and focused, eager to learn and keep oneself updated with the latest in the mentioned field
3	Minimum Educational Qualifications	ITI/12th
4a	Domain Certification	Trainer/Assessor-80% in each NOS of Qualification Pack “MEP/Q0102” or “MEP/Q0104” and Lead trainer/Lead Assessors- 90% in each NOS of Qualification Pack “MEP/Q0101” or “MEP/Q0103”
4b	Platform Certification	Trainer/Assessor-50% in each NOS of Qualification Pack “MEP/Q0101” or “MEP/Q0103”& 80% overall, Lead trainer/ Lead Assessors- 50% in each NOS of Qualification Pack “MEP/Q0101” or “MEP/Q0103”and overall 90%
5	Experience	<ul style="list-style-type: none"> i. Technical Degree holder with minimum three years of Field experience and preferably two years of teaching experience or, ii. In case of a Diploma Holder five years of field experience and preferably two years of teaching experience or, iii. In case of ITI/12th pass minimum eight years of field experience and preferably two years of teaching Experience.



CRITERIA FOR ASSESSMENT OF TRAINEES

<u>Job Role</u>	Tack Welder
<u>Qualification Pack</u>	CON/Q1251
<u>Sector Skill Council</u>	Construction

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 knowledge part will be based on knowledge bank of questions created by Assessment Bodies subject to approval by SSC
3. Individual assessment agencies will create unique question papers for knowledge/theory part for assessment of candidates as per assessment criteria given below
4. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on assessment criteria.
5. The passing percentage for each QP will be 50%. To pass the Qualification Pack, every trainee should score a minimum of 50% individually in each NOS.
6. The Assessor shall check the final outcome of the practices while evaluating the steps performed to achieve the final outcome.
7. The trainee shall be provided with a chance to repeat the test to correct his procedures in case of improper performance, with a deduction of marks for each iteration.
8. After the certain number of iteration as decided by SSC the trainee is marked as fail, scoring zero marks for the procedure for the practical activity.
9. 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 within the specified timeframe set by SSC.
10. Minimum duration of Assessment of each QP shall be of 4hrs/trainee.

Assessment outcomes	Assessment Criteria for outcomes	Total Mark	Marks Allocation		
			Out Of	Theory	Skills Practical
CON/N1251: Perform tack welding operations on structural steel elements	PC1. identify any hazardous conditions in the work place relevant to work	100	4	1	3
	PC2. check that electrical cables from the machine are insulated and terminated properly		3	1	2
	PC3. avoid wearing loose clothing and wear welding jumpsuits or any other uniform issued on site		3	1	2
	PC4. ensure that there is no leakage in gas pipelines		3	1	2
	PC5. avoid presence of moisture in vicinity of the working area and work piece		3	1	2
	PC6. avoid any unsafe act by self particularly while working in workplace		3	1	2
	PC7. identify and use the fire protection tools and equipment based upon the type of fire		3	1	2
	PC8. participate in safety drills organized in workplace		3	1	2
	PC9. participate in tool box talks as organized in workplace				
	PC10. identify the location for tack welding		3	1	2
	PC11. setup the welding machine as per requirement		10	2	8
	PC12. connect work clamps in correct polarity				
	PC13. ensure that cables do not cause interference in welding		2	1	1
	PC14. place the gas cylinders in upright position		2	1	1
	PC15. check the welding nozzle prior to begin welding for defects		5	1	4
	PC16. check that base metal is properly clamped and secured against movement as applicable		3	1	2
	PC17. clean the joint to remove any dust, or foreign particles from the joint		3	1	2
	PC18. remove any oil, paints or rust from the joint and its vicinity				
	PC19. check that all connections are tight and secure.		3	1	2
	PC20. select suitable position for welding the joint		6	1	5

	PC21. adjust the current and electrode feed rate to suite the requirements		8	1	7
	PC22. adjust the flow of gas to move it is compatible with the feeding rate		8	1	7
	PC23. strike the arc correctly without causing defects		5	1	4
	PC24. maintain proper electrode extension length to avoid defects		5	1	4
	PC25. finish the tack smoothly		4	1	3
	PC26. avoid overheating of base metal by adjusting the voltage		5	1	4
	PC27. carry out welding for necessary length only		3	1	2
		Total	100	20	80
CON/N1252: Carry out preheating of materials before cutting and welding process	PC1. identify any hazardous conditions in the work place relevant to work	100	4	1	3
	PC2. avoid wearing loose clothing and wear welding jumpsuits or any other uniform issued on site		3	1	2
	PC3. ensure that there is no leakage in gas pipelines		3	1	2
	PC4. ensure that proper purging is done prior to welding the pipelines or tube sections		2	1	1
	PC5. ensure that flash arrestor is installed and functioning properly		4	1	3
	PC6. avoid presence of moisture in vicinity of the working area and work piece		4	1	3
	PC7. strike the flame with prescribed lighters and not using open flames		3	1	2
	PC8. avoid any unsafe act by self particularly while working in workplace		3	1	2
	PC9. identify and use the fire protection tools and equipment based upon the type of fire		3	1	2
	PC10. participate in safety drills organized in workplace		3	1	2
	PC11. participate in tool box talks as organized in workplace		3	1	2
	PC12. ascertain the location of pre heat		8	1	7
	PC13. ascertain the required temperature		3	1	2
	PC14. ensure that gas cylinders are in upright position		4	1	3
	PC15. ensure that all knobs, values, switches and gauges of equipment are in working condition				

	PC16. clean the surface of base metal prior to pre heat		3	1	2
	PC17. ensure that temperature measurement instrument is available				
	PC18. ensure that joint is secure clamped and immovable		3	1	2
	PC19. ensure that nozzle of torch is clean		3	1	2
	PC20. strike the flame using gas cutting torch lighter		3	1	2
	PC21. adjust the fuel gas flow to obtain desired length of flame		8	2	6
	PC22. adjust oxygen flow to concentrate the flame into desired thickness for heat transfer		8	2	6
	PC23. hold the torch above the metal joint such that it is not too close to overheat the material and not too far to cause heat loss		8	2	6
	PC24. move the torch above and around the joint for symmetrical heat transfer		8	2	6
	PC25. check the temperature of the metal regularly to avoid overheating of metal		3	1	2
	PC26. close the fuel gas flow before turning off oxygen while closing the torch.		3	1	2
	PC27. carry out basic maintenance of torch and other apparatus as per requirements		3	1	2
		Total	100	20	80
CON/N8001: Work effectively in a team to deliver desired results at the workplace	PC1. pass on work related information/ requirement clearly to the team members	100	10	2	8
	PC2. inform co-workers and superiors about any kind of deviations from work		5	1	4
	PC3. address the problems effectively and report if required to immediate supervisor appropriately		5	1	4
	PC4. receive instructions clearly from superiors and respond effectively on same		5	1	4
	PC5. communicate to team members/subordinates for appropriate work technique and method		5	1	4
	PC6. seek clarification and advice as per requirement and applicability		10	2	8
	PC7. hand over the required material, tools tackles, equipment and work fronts timely to interfacing teams		30	6	24
	PC8. work together with co-workers in a synchronized manner		30	6	24

		Total	100	20	80
CON/N9001: Work according to personal health, safety and environment protocol at construction site	PC1. identify and report any hazards, risks or breaches in site safety to the appropriate authorities	100	5	1	4
	PC2. follow emergency and evacuation procedures in case of accidents, fires, natural calamities		5	1	4
	PC3. follow recommended safe practices in handling construction materials, including chemical and hazardous material whenever applicable		10	2	8
	PC4. participate in safety awareness programs like Tool Box Talks, safety demonstrations, mock drills, conducted at site		5	1	4
	PC5. identify near miss , unsafe condition and unsafe act		5	1	4
	PC6. use appropriate Personal Protective Equipment (PPE) as per work requirements including: <ul style="list-style-type: none"> • Head Protection (Helmets) • Ear protection • Fall Protection • Foot Protection • Face and Eye Protection • Hand and Body Protection • Respiratory Protection (if required) 		10	2	8
	PC7. handle all required tools, tackles , materials & equipment safely		5	1	4
	PC8. follow safe disposal of waste, harmful and hazardous materials as per EHS guidelines		5	1	4
	PC9. install and apply properly all safety equipment as instructed		15	3	12
	PC10. follow safety protocol and practices as laid down by site EHS department		15	3	12
	PC11. collect and deposit construction waste into identified containers before disposal, separate containers that may be needed for disposal of toxic or hazardous wastes		10	2	8
	PC12. apply ergonomic principles wherever required		10	2	8
	Total	100	20	80	