Senior Construction Welder

Electives: Senior Construction Welder MIG/ Senior Construction Welder TIG/ Senior Construction Welder SMAW

QP Code: CON/Q1253

Version: 1.0

NSQF Level: 5

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CON/Q1253: Senior Construction Welder

Brief Job Description

The job holder performs welding works on structural steel members in complex positions using MIG or TIG or SMAW welding. The person is also expected to operate semi-automatic welding machine. The individual should possess sound technical knowledge, should be able to monitor and maintain safe and quality working practices.

Personal Attributes

The individual is expected to be physically fit and mentally alert and safety cautious to be able to work across various location and height withstanding extreme condition while working. Moreover the individual should preferably not be suffering from any respiratory disorder, vision defects and skin allergies due to exposure to light and heat. They should have good communication skills and shall be able to work within a team to handle various welding tools and materials.

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. CON/N1259: Carry out semi-automatic welding
2. CON/N8001: Work effectively in a team to deliver desired results at the workplace
3. CON/N8002: Plan and organize work to meet expected outcomes
4. CON/N9002: Manage workplace for safe and healthy work environment

Electives*(mandatory to select at least one):*

Elective 1: Senior Construction Welder MIG

This job holder is responsible for carrying out welding in 4G, 4F, 5G, 5F, 6G and 6GR positions on structural elements using MIG Welding

1. CON/N1260: Conduct preparatory works for welding connections using Gas Metal Arc Welding
2. CON/N1261: Carry out Gas Metal Arc Welding in 4g, 4f, 5g, 5f, 6g, 6gr on structural elements as per work requirements

Elective 2: Senior Construction Welder TIG

This job holder is responsible for carrying out welding in 4G, 4F, 5G, 5F, 6G and 6GR positions on structural elements using TIG Welding

1. CON/N1262: Conduct preparatory works for welding connections using Gas Tungsten Arc Welding

2. CON/N1263: Carry out Gas Tungsten Arc Welding in 4g, 4f, 5g, 5f, 6g, 6gr on structural elements as per work requirements

Elective 3: Senior Construction Welder SMAW

This job holder is responsible for carrying out welding in 4G, 4F, 5G, 5F, 6G and 6GR positions on structural elements using SMAW Welding

1. CON/N1264: Conduct preparatory works for welding connections using Shielded Metal ArcWelding

2. CON/N1265: Carry out shielded metal arc welding in 4G, 4F, 5G, 5F, 6G, 6GR positions onstructural elements as per work requirement

Qualification Pack (QP) Parameters

Sector	Construction
Sub-Sector	Real Estate and Infrastructure construction
Occupation	Fabrication
Country	India
NSQF Level	5
Credits	NA
Aligned to NCO/ISCO/ISIC Code	NCO-2004/7218.20
Minimum Educational Qualification & Experience	12th Class with 3-5 Years of experience as a Construction Welder MIG/TIG/SMAW respectively or equivalent OR 12th Class OR 12th Class
Minimum Level of Education for Training in School	
Pre-Requisite License or Training	NA
Minimum Job Entry Age	18 Years
Last Reviewed On	25/10/2017

Next Review Date	31/03/2022
Deactivation Date	31/03/2022
NSQC Approval Date	19/12/2018
Version	1.0
Reference code on NQR	2019/CON/CSDCI/03119
NQR Version	1.0

CON/N1259: Carry out semi-automatic welding

Description

This unit describes the skills and knowledge required to carry out semi-automatic welding

Scope

The scope covers the following:

- Carry out welding operations using semi-automated welding machines

Elements and Performance Criteria

Carry out welding operations using semi-automated welding machines

To be competent, the user/individual on the job must be able to:

PC1. identify and operate various parts and controls of the equipment

PC2. check, inspect or confirm that the supporting equipments like pumps, power etc. are properly functioning

PC3. ensure that there is no gas leakage from the equipment

PC4. check the welding tips and torch for cleanliness and other defects

PC5. ensure that the positioning of the elements is accurate and joints to be welded are aligned properly

PC6. ensure that prepared joints are clean and tidy

PC7. confirm that shrinkage allowances are considered during joint preparation

PC8. supervise the fixing operation and check the orientation of the elements is as per specifications or drawings

PC9. read, interpret and respond to all outputs as shown in the work cell of the equipment

PC10. report to superiors in case of any non-conformity

PC11. estimate the quantities of required consumables

PC12. identify the filler material from the specifications as per work requirements

PC13. confirm that the welder is fully operational and control of all parameters are functioning

PC14. monitor the wire feed rate, gas flow rate, amperage and other welding parameters during the welding operation

PC15. monitor the welding while operating the equipment to diagnose any defect in the connections

PC16. make appropriate adjustments in the settings from the work cell as per requirement

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. standard practices for welding work

KU2. safety rules and regulations for handling and storing required tools, equipment and materials for welding works
KU3. personal protection including the use of the related safety gears and equipment
KU4. service request procedures for tools, materials and equipment
KU5. statutory compliance requirements related to working at height
KU6. statutory compliance requirement related to workmen engagement
KU7. operational standards, maintenance of tools and equipment
KU8. how to read and interpret fabrication drawing relevant to task
KU9. how to interpret manuals and specifications relevant to task
KU10. basic principal of measurement, arithmetic and geometric calculations
KU11. technical specifications, standards relevant to work
KU12. terminology used in welding works
KU13. linear conversion of units
KU14. units of measurement
KU15. basic computer literacy
KU16. operation and functions of various controls installed in the equipment
KU17. different parameters that can be controlled through work cell
KU18. safety precautions to be considered while operating the equipment
KU19. auxiliary equipments required for proper functioning of the equipment
KU20. proper placing and positioning the elements as per requirements
KU21. consumables to feed to the equipment
KU22. how to estimate the quantities of the materials required for completing the assigned task
KU23. how to confirm the joint specifications from the drawings
KU24. how to ensure the quality of the weld
KU25. how to identify the placing and positioning of the elements

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. write in at least two language, preferably in the local language of the site and basic English
GS2. provide clear and simple instructions, details & sketches to sub-ordinate
GS3. record and documents daily productivity report, daily labour attendance & details regarding work
GS4. prepare basic status updates for the superiors in the prescribed format
GS5. read one or more language, preferably in the local language of the site
GS6. read drawing, welding specification and standards
GS7. read key documents including quality standards, standards working methods & applicable tolerance limits
GS8. read various, sign boards, safety rules and safety tags, instructions related to exit routes during emergency at the workplace
GS9. speak in one or more language, preferably in one of the local language of the site

GS10. listen and follow instructions clearly given by the superior

GS11. provide clear instructions to subordinates for completion of task as per work plan, time schedule and quality

GS12. estimate required material and resources for work

GS13. confirm the functioning of the equipment and compatibility of the consumables for executing the work

GS14. ensure the positions and orientation of the job as per welding sequence

GS15. decide whether the welding parameters and connections are suitable and as per requirements

GS16. plan work & organize required resource in coordination with team members and superior

GS17. decide the orientation and position of job as per work schedule and sequence instructed by seniors

GS18. confirm the availability of all consumables and other resources in required quantity before starting the work

GS19. ensure completion of work as per agreed time schedule and quality

GS20. conduct appropriate check of the axillary units to avoid any malfunction

GS21. confirm that the equipment has undergone scheduled maintenance

GS22. make suitable adjustments in the welding connections as per requirements

GS23. assess quantity of materials for day work

GS24. analyse the actions of self that may result in wastage of material and consumables and avoid the same so as to optimize their use

GS25. identify and assess the actions of self and coworkers that may result in unsafe conditions at site

GS26. assess complexity of the tasks and provide guidance for carrying out corrective action as per requirement

GS27. observe the operation of the welder and all the auxiliary equipment to detect any anomalies and unsafe conditions

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Carry out welding operations using semi-automated welding machines	**40**	**60**	**-**	**-**
PC1. identify and operate various parts and controls of the equipment	2.5	3.5	-	-
PC2. check, inspect or confirm that the supporting equipments like pumps, power etc. are properly functioning	2.5	3.5	-	-
PC3. ensure that there is no gas leakage from the equipment	2.5	3.5	-	-
PC4. check the welding tips and torch for cleanliness and other defects	2.5	3.5	-	-
PC5. ensure that the positioning of the elements is accurate and joints to be welded are aligned properly	2.5	3.5	-	-
PC6. ensure that prepared joints are clean and tidy	2.5	3.5	-	-
PC7. confirm that shrinkage allowances are considered during joint preparation	2.5	3.5	-	-
PC8. supervise the fixing operation and check the orientation of the elements is as per specifications or drawings	2.5	3.5	-	-
PC9. read, interpret and respond to all outputs as shown in the work cell of the equipment	3	5	-	-
PC10. report to superiors in case of any non-conformity	2.5	3.5	-	-
PC11. estimate the quantities of required consumables	2.5	3.5	-	-
PC12. identify the filler material from the specifications as per work requirements	2.5	3.5	-	-
PC13. confirm that the welder is fully operational and control of all parameters are functioning	2.5	3.5	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC14. monitor the wire feed rate, gas flow rate, amperage and other welding parameters during the welding operation	3	5	-	-
PC15. monitor the welding while operating the equipment to diagnose any defect in the connections	2	4	-	-
PC16. make appropriate adjustments in the settings from the work cell as per requirement	2	4	-	-
NOS Total	**40**	**60**	**-**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	CON/N1259
NOS Name	Carry out semi-automatic welding
Sector	Construction
Sub-Sector	Real Estate and Infrastructure construction
Occupation	Fabrication
NSQF Level	5
Credits	TBD
Version	1.0
Last Reviewed Date	25/10/2017
Next Review Date	31/03/2022
NSQC Clearance Date	19/12/2018

CON/N8001: Work effectively in a team to deliver desired results at the workplace

Description

This unit describes the skills and knowledge required to work effectively within a team to achieve the desired results

Scope

The scope covers the following:

- Interact and communicate effectively with co-workers, superiors and sub-ordinates across different teams
- Support co-workers, superiors and sub-ordinates within the team and across interfacing teams to ensure effective execution of assigned task

Elements and Performance Criteria

Interact and communicate in effective and conclusive manner

To be competent, the user/individual on the job must be able to:

PC1. pass on work related information/ requirement clearly to the team members

PC2. inform co-workers and superiors about any kind of deviations from work

PC3. address the problems effectively and report if required to immediate supervisor appropriately

PC4. receive instructions clearly from superiors and respond effectively on the same

PC5. communicate to team members/subordinates for appropriate work technique and method

PC6. seek clarification and advice as per the requirement and applicability

Support co-workers to execute project requirements

To be competent, the user/individual on the job must be able to:

PC7. hand over the required material, tools tackles, equipment and work fronts timely to interfacing teams

PC8. work together with co-workers in a synchronized manner

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. own roles and responsibilities

KU2. importance of effective communication and establishing strong working

KU3. risks of a failure in teamwork in terms of effects on project outcomes, timelines, safety at the construction site, etc.

KU4. different modes of communication, and its appropriate usage

KU5. importance of creating healthy and cooperative work environment among the gangs of workers

KU6. different activities within his work area where an interaction with other workers is required

KU7. applicable techniques of work, properties of materials used, tools and tackles used, safety standards that co- workers might need as per the requirement

KU8. importance of proper and effective communication and the expected adverse

KU9. importance and need of supporting co-workers facing problems for smooth

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. write in at least one language, preferably in the local language of the site

GS2. read in one or more languages, preferably the local language of the site

GS3. read communication from team members regarding work completed, materials used, tools and tackles used, support required

GS4. speak in one or more languages, preferably in one of the local language of the site

GS5. listen and follow instructions / communication shared by superiors/ co-workers regarding team requirements or interfaces during work processes

GS6. orally communicate with co-workers regarding support required to complete the respective work

GS7. decide on what information is to be shared with co-workers within the team or from interfacing gang of workers

GS8. plan work and organize required resources in coordination with team members

GS9. complete all assigned task in coordination with team members

GS10. take initiative in resolving issues among co-workers or report the same to superiors

GS11. ensure best ways of coordination among team members

GS12. communicate with co-workers considering their educational / social background

GS13. evaluate the complexity of task and determine if any guidance is required from superiors

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Interact and communicate in effective and conclusive manner	**28**	**42**	**-**	**-**
PC1. pass on work related information/ requirement clearly to the team members	4	6	-	-
PC2. inform co-workers and superiors about any kind of deviations from work	4	6	-	-
PC3. address the problems effectively and report if required to immediate supervisor appropriately	8	12	-	-
PC4. receive instructions clearly from superiors and respond effectively on the same	4	6	-	-
PC5. communicate to team members/subordinates for appropriate work technique and method	4	6	-	-
PC6. seek clarification and advice as per the requirement and applicability	4	6	-	-
Support co-workers to execute project requirements	**12**	**18**	**-**	**-**
PC7. hand over the required material, tools tackles, equipment and work fronts timely to interfacing teams	6	9	-	-
PC8. work together with co-workers in a synchronized manner	6	9	-	-
NOS Total	**40**	**60**	**-**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	CON/N8001
NOS Name	Work effectively in a team to deliver desired results at the workplace
Sector	Construction
Sub-Sector	Generic
Occupation	Generic
NSQF Level	5
Credits	TBD
Version	1.2
Last Reviewed Date	23/05/2015
Next Review Date	31/03/2022
NSQC Clearance Date	21/07/2016

CON/N8002: Plan and organize work to meet expected outcomes

Description

This unit describes the knowledge and the skills required for an individual to plan and organize own work in order to meet expected outcome

Elements and Performance Criteria

Prioritize work activities to achieve desired results

To be competent, the user/individual on the job must be able to:

PC1. understand clearly the targets and timelines set by superiors

PC2. plan activities as per schedule and sequence

PC3. provide guidance to the subordinates to obtain desired outcome

PC4. plan housekeeping activities prior to and post completion of work

Organize desired resources prior to commencement of work

To be competent, the user/individual on the job must be able to:

PC5. list and arrange required resources prior to commencement of work

PC6. select and employ correct tools, tackles and equipment for completion of desired work

PC7. complete the work with allocated resources

PC8. engage allocated manpower in an appropriate manner

PC9. use resources in an optimum manner to avoid any unnecessary wastage

PC10. employ tools, tackles and equipment with care to avoid damage to the same

PC11. organize work output, materials used, tools and tackles deployed

PC12. processes adopted to be in line with the specified standards and instructions

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. importance of proper housekeeping

KU2. policies, procedures and work targets set by superiors

KU3. roles and responsibilities in executing the work for subordinates and self

KU4. standard practices of work to be adopted for assigned task

KU5. how to use available resources in a judicious and appropriate manner to minimize wastages or damage

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. write in at least one language, preferably in the local language of the site

GS2. list out the assigned works and targets

GS3. read in one or more language, preferably the local language at the site

GS4. read communication from co-workers, superiors and notices from other departments as per requirement of the level

GS5. speak in one or more language, preferably one of the local language at the site

GS6. listen and follow communication shared by co-workers regarding standard work processes, resources available, timelines, etc.

GS7. communicate effectively with co-workers and subordinates

GS8. decide on what sequence is to be adopted for execution of work

GS9. plan and organize the materials, tools, tackles and equipment required to execute the work

GS10. complete all assigned task with proper planning and organizing

GS11. arrange or seek help to arrange for material, tools and tackles in case of shortfall

GS12. analyze areas of work which could result in a delay of work, wastage of material or damage to tools and tackles

GS13. evaluate potential solutions to minimize avoidable delays and wastages at the construction site

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Prioritize work activities to achieve desired results	**17**	**25.5**	**-**	**-**
PC1. understand clearly the targets and timelines set by superiors	5	7.5	-	-
PC2. plan activities as per schedule and sequence	4	6	-	-
PC3. provide guidance to the subordinates to obtain desired outcome	5	7.5	-	-
PC4. plan housekeeping activities prior to and post completion of work	3	4.5	-	-
Organize desired resources prior to commencement of work	**23**	**34.5**	**-**	**-**
PC5. list and arrange required resources prior to commencement of work	4	6	-	-
PC6. select and employ correct tools, tackles and equipment for completion of desired work	3	4.5	-	-
PC7. complete the work with allocated resources	3	4.5	-	-
PC8. engage allocated manpower in an appropriate manner	2	3	-	-
PC9. use resources in an optimum manner to avoid any unnecessary wastage	2	3	-	-
PC10. employ tools, tackles and equipment with care to avoid damage to the same	2	3	-	-
PC11. organize work output, materials used, tools and tackles deployed	4	6	-	-
PC12. processes adopted to be in line with the specified standards and instructions	3	4.5	-	-
NOS Total	**40**	**60**	**-**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	CON/N8002
NOS Name	Plan and organize work to meet expected outcomes
Sector	Construction
Sub-Sector	Generic
Occupation	Generic
NSQF Level	5
Credits	TBD
Version	1.1
Last Reviewed Date	23/03/2015
Next Review Date	31/03/2022
NSQC Clearance Date	19/05/2015

CON/N9002: Manage workplace for safe and healthy work environment

Description

This unit describes the skill and knowledge required to maintain a healthy & safe working environment for the group of people working under an individual

Scope

This unit/task covers the following:

- Ensure healthy and safe working environment for subordinates.
- Ensure effective implementation of health, safety and environment policies and procedures
- Identify and respond to risks / fire and emergencies associated with the work practices, workplace and ensure related organizational & statuary requirement as followed

Elements and Performance Criteria

Ensure healthy and safe working environment for subordinates

To be competent, the user/individual on the job must be able to:

PC1. ensure proper housekeeping at workplace

PC2. implement safe handling , stacking methods at workplace / store

PC3. ensure that health and safety plan is followed by all subordinates

PC4. Identify any hazard in workplace and notify them to appropriate authority

PC5. ensure that all safety and protection installation are correctly placed & adequate

PC6. ensure safe access is available at work place for movement of workers & materials

PC7. ensure safe use of tools and tackles by the workmen as per applicability

PC8. ensure appropriate use of following Personal Protective Equipment (PPE) as per applicability: Head Protection (Helmets Ear Protection Fall Protection Foot Protection Face and Eye Protection, Hand &Body Protection Respiratory Protection

PC9. maintain entrances & exit from confined spaces , excavated pits and other location in concurrence with safety parameters or instruction form safety personals

Identify and respond to risks / fire and emergencies associated with the work practices, workplace and ensure related organizational & statuary requirement as followed

To be competent, the user/individual on the job must be able to:

PC10. ensure organizational policies and procedures are followed for health , safety and welfare, in relation to: methods of receiving or sourcing information dealing with accidents and emergencies associated with the work and environment reporting stooping work evacuation fire risks and safe exit procedures

PC11. follow procedures for accident recording and reporting as per organizational and statuary requirements

PC12. ensure effective adherence to response to emergency procedures /protocols

PC13. report any case of emergency / risks to the concern people at the construction site

PC14. report any perceived risk hazards to the superiors / concerned EHS

PC15. demonstrate the use of fire protection equipments for different type of fire hazard

PC16. implement control measures to reduce risk & meet legal requirement as per organizational policies

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. the policies, procedures and protocol set up by the EHS Department With respect to Health , Safety and Environment at the respective construction site

KU2. reporting procedures in cases of breaches or hazards in site safety, accidents or emergency situations

KU3. safe working practices for tools, tackles and equipment

KU4. workplace policies and health and safety requirements for dealing with potential risks as defined by the EHS department

KU5. how to respond to accidents & emergencies

KU6. the appropriate personal protective equipment to be used based on various working conditions

KU7. how to use necessary material ,tools, tackles and equipment in a safe and appropriate manner as specified by site EHS for each level and respective workman gang

KU8. monitoring working in workplace keeping safety & health in mind

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. write in one or more language

GS2. read in one or more language

GS3. read instructions, rules, guidelines, sign boards related to safety as per the requirements

GS4. speak in one or more language, preferably one of the local language at the site

GS5. listen and follow instructions shared by site EHS and superiors regarding site safety

GS6. communicate reporting of site conditions, hazards, accidents, etc.

GS7. decide upon the appropriate application & installation of safety equipments like barricades and nets

GS8. decide upon the tools box talks contents

GS9. identify any hazards in workplace organize safety equipments prior to commencing work

GS10. work to ensure safe and healthy environmental conditions at workplace

GS11. identify analysis & report hazards, accidents, health and safety risks, etc. or seek help from the appropriate authorities to address the same as per the guidelines laid down by site EHS

GS12. analyze areas of work which are potential safety hazards and could result in damage to life or property for the respective gang at the construction site

GS13. respond to critical health risks or accidents on an urgent basis through appropriate actions

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Ensure healthy and safe working environment for subordinates	**20**	**30**	**-**	**-**
PC1. ensure proper housekeeping at workplace	2	3	-	-
PC2. implement safe handling , stacking methods at workplace / store	2	3	-	-
PC3. ensure that health and safety plan is followed by all subordinates	2	3	-	-
PC4. Identify any hazard in workplace and notify them to appropriate authority	2	3	-	-
PC5. ensure that all safety and protection installation are correctly placed & adequate	2	3	-	-
PC6. ensure safe access is available at work place for movement of workers & materials	2	3	-	-
PC7. ensure safe use of tools and tackles by the workmen as per applicability	4	6	-	-
PC8. ensure appropriate use of following Personal Protective Equipment (PPE) as per applicability: Head Protection (Helmets Ear Protection Fall Protection Foot Protection Face and Eye Protection, Hand &Body Protection Respiratory Protection	2	3	-	-
PC9. maintain entrances & exit from confined spaces , excavated pits and other location in concurrence with safety parameters or instruction form safety personals	2	3	-	-
Identify and respond to risks / fire and emergencies associated with the work practices, workplace and ensure related organizational & statuary requirement as followed	**20**	**30**	**-**	**-**

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. ensure organizational policies and procedures are followed for health , safety and welfare, in relation to: methods of receiving or sourcing information dealing with accidents and emergencies associated with the work and environment reporting stooping work evacuation fire risks and safe exit procedures	4	6	-	-
PC11. follow procedures for accident recording and reporting as per organizational and statuary requirements	2	3	-	-
PC12. ensure effective adherence to response to emergency procedures /protocols	3	4.5	-	-
PC13. report any case of emergency / risks to the concern people at the construction site	3	4.5	-	-
PC14. report any perceived risk hazards to the superiors / concerned EHS	3	4.5	-	-
PC15. demonstrate the use of fire protection equipments for different type of fire hazard	3	4.5	-	-
PC16. implement control measures to reduce risk & meet legal requirement as per organizational policies	2	3	-	-
NOS Total	**40**	**60**	**-**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	CON/N9002
NOS Name	Manage workplace for safe and healthy work environment
Sector	Construction
Sub-Sector	Generic
Occupation	Generic
NSQF Level	5
Credits	TBD
Version	1.0
Last Reviewed Date	23/03/2015
Next Review Date	31/03/2022
NSQC Clearance Date	19/05/2015

CON/N1260: Conduct preparatory works for welding connections using Gas Metal Arc Welding

Description

This unit describes the skills and knowledge required to conduct preparatory works for welding connections using gas metal arc welding

Scope

The scope covers the following:

- Work according to standard health and safety requirements
- Confirm proper joint preparation for base metal of thickness 3.15 mm to 100 mm
- Set up and prepare welding equipment for carrying out required work
- Interpret and understand weld requirements and specifications

Elements and Performance Criteria

Work according to standard health and safety requirements

To be competent, the user/individual on the job must be able to:

PC1. use and identify proper personal protective equipment such as hand gloves, nose mask, ear plugs, head protection, safety harness etc

PC2. use appropriate welding masks

PC3. check the electrical connections for tightness and termination

PC4. inspect the lighting arrangement for adequacy

PC5. inspect and Clear the work area of any flammable objects like boxes, plastic etc

PC6. ensure that subordinates are following safety norms

PC7. attend any and all perp talks and tool box talks organized on site

PC8. participate in all safety drills organized on site

PC9. use appropriate fire safety equipment and procedure in case of fire

PC10. identify and report any other unsafe act or condition to appropriate authority

Confirm proper joint preparation for base metal of thickness 3.15 mm to 100 mm

To be competent, the user/individual on the job must be able to:

PC11. confirm the joint profiles against the welding requirements and specifications

PC12. ensure that surface is cleaned before commencing the welding operations

PC13 . check that appropriate root gap is available

PC14. check the bevel angle before commencing the welding operations

PC15. make sure that surface is smooth and free of irregularities

PC16. ensure that the surface is free from any oxides, dust or foreign particles and is not painted or galvanized

PC17. ensure that there is no moisture near the segments during the welding operations

PC18. report any anomalies in joint to the superiors

Set up and prepare welding equipment for carrying out required work

To be competent, the user/individual on the job must be able to:

PC19. ensure that the gas cylinders are in upright positions

PC20. inspect electric connections for adequate tightness and secured prior to commencement of work

PC21. ensure that work clamps are adequately secured and in correct polarity (-ve on welding bed and +ve on electrode)

PC22. ensure proper lighting at workplace

PC23. make initial adjustments of electrode consumption rate and voltage as per requirement

PC24. inspect that the gas valves are properly functioning and adjust the same

PC25. ensure that electrodes are compatible with base metal requirement

PC26. ensure ventilation arrangement is available

PC27. check the electrodes comply with weld requirements

PC28. check and adjust the filler stick out length as per requirements

PC29. ensure that there is no gas leakage around the work place

PC30. set the shielding gas flow rate as per convenience or requirement initially

Interpret and understand weldrequirements and specifications

To be competent, the user/individual on the job must be able to:

PC31. identify the joints to be welded, their location and position of welding

PC32. prioritize the sequence of welding joints as per work requirements

PC33. extract the weld specifications like type of joint, throat for fillet, number of passes required, specifications of filler rod, required heat input, preheat temperature etc. form relevant charts and drawings

PC34. estimate the number or length of filler material required to complete the weld

PC35. estimate the requirements of pre heating

PC36. check the weld location for proper access and space for welding

PC37. check the compliance of clamping and anchoring arrangements installed in place for distortion control against work requirements

PC38. confirm that shrinkage allowances are considered while assembling the job

PC39. read and interpret the welding requirements from technical specifications and drawings

PC40. interpret standard welding symbols used in drawings and speculations correctly

PC41. reproduce technical drawings as simplified hand sketches for explaining and providing clear instructions to subordinates

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. standard practices for construction welding work

KU2. safety rules and regulations for handling and storing required tools, equipment and materials for construction welding works

KU3. personal protection including the use of the related safety gears and equipment

KU4. service request procedures for tools, materials and equipment

KU5. statutory compliance requirements related to working at height
KU6. statutory compliance requirement related to workmen engagement
KU7. operational standards, maintenance of tools and equipment
KU8. how to read, interpret, understand, simplify and reproduce fabrication shop drawings
KU9. how to read and understand the welding specifications and requirements
KU10. basic principal of measurement, arithmetic and geometric calculations
KU11. technical specifications, standards relevant to work
KU12. terminology used in welding works
KU13. linear conversion of units
KU14. units of measurement
KU15. basic computer literacy
KU16. how to estimate the quantity of consumables required for welding
KU17. how to check the bevel angles
KU18. effects of unclean and rough joints on connections
KU19. effects of moisture on the surface of joint
KU20. effects of reversing the polarity and its applications
KU21. different types of consumables, their specifications, conditions of use and storage and their compatibility with base materials
KU22. various parameters of welding, their adjustments, importance, application and the number of joints for welding
KU23. how to prioritize the joints for welding
KU24. different terms used in welding, their definitions, importance, andapplications
KU25. how to weld in enclosed or restricted space
KU26. causes and effects of distortion and different procedures implied to reduce it
KU27. fire protection and prevention methods, equipments and their use
KU28. use of welding mask
KU29. understand the safety evacuation plan for concerned relevance
KU30. various hazards involved in welding
KU31. different types of personnel protective equipments and their application
KU32. importance of proper lighting and ventilation
KU33. different occupational disease, their causes and remedies

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. write in at least two language, preferably in the local language of the site and basic English
GS2. provide clear and simple instructions, details & sketches to sub-ordinate
GS3. record and documents daily productivity report, daily labour attendance & details regarding work
GS4. prepare basic status updates for the superiors in the prescribed format
GS5. read one or more language, preferably in the local language of the site

GS6. read drawing, welding specification and standards

GS7. read key documents including quality standards, standards working methods& applicable tolerance limits

GS8. read various, sign boards, safety rules and safety tags, instructions related toexit routes during emergency at the workplace

GS9. speak in one or more language, preferably in one of the local language of the site

GS10. listen and follow instructions clearly given by the superior

GS11. provide clear instructions to subordinates for completion of task as per work plan, time schedule and quality

GS12. decide upon the initial setting of the welding equipment

GS13. decide the priority of the weld based upon welding sequence

GS14. decide if the space available for welding is sufficient for welding in desired position

GS15. decide if the anchorage provided is sufficient to avoid distortion

GS16. plan work & organize required resource in coordination with team members and superior

GS17. interpret the technical drawings and welding symbols to understand the weld requirement

GS18. prioritize the weld sequence as per the weld requirement

GS19. ensure completion of work as per agreed time schedule and quality

GS20. inspect electric connections and make suitable adjustments as per requirements

GS21. check and confirm proper functioning of welding equipment

GS22. report to seniors in case of any ambiguity regarding joint preparation, weld specification, issued consumables and equipment, etc.

GS23. assess quantity of materials for day work

GS24. analyse the actions of self that may result in wastage of material and consumables and avoid the same so as to optimize their use

GS25. identify and assess actions of self and coworkers that may lead to unsafe conditions

GS26. understand the relationship between various welding variables and adjustments and employ the same to avoid defects in welding

GS27. assess complexity of the tasks and provide guidance for carrying out corrective action as per requirement

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Work according to standard health and safety requirements	**10**	**9**	**-**	**-**
PC1. use and identify proper personal protective equipment such as hand gloves, nose mask, ear plugs, head protection, safety harness etc	1	1	-	-
PC2. use appropriate welding masks	1	1	-	-
PC3. check the electrical connections for tightness and termination	1	1	-	-
PC4. inspect the lighting arrangement for adequacy	1	1	-	-
PC5. inspect and Clear the work area of any flammable objects like boxes, plastic etc	1	1	-	-
PC6. ensure that subordinates are following safety norms	1	1	-	-
PC7. attend any and all perp talks and tool box talks organized on site	1	-	-	-
PC8. participate in all safety drills organized on site	1	1	-	-
PC9. use appropriate fire safety equipment and procedure in case of fire	1	1	-	-
PC10. identify and report any other unsafe act or condition to appropriate authority	1	1	-	-
Confirm proper joint preparation for base metal of thickness 3.15 mm to 100 mm	**8**	**11**	**-**	**-**
PC11. confirm the joint profiles against the welding requirements and specifications	1	2	-	-
PC12. ensure that surface is cleaned before commencing the welding operations	1	1	-	-
PC13 . check that appropriate root gap is available	1	2	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC14. check the bevel angle before commencing the welding operations	1	1	-	-
PC15. make sure that surface is smooth and free of irregularities	1	2	-	-
PC16. ensure that the surface is free from any oxides, dust or foreign particles and is not painted or galvanized	1	1	-	-
PC17. ensure that there is no moisture near the segments during the welding operations	1	1	-	-
PC18. report any anomalies in joint to the superiors	1	1	-	-
Set up and prepare welding equipment for carrying out required work	**12**	**21**	**-**	**-**
PC19. ensure that the gas cylinders are in upright positions	1	2	-	-
PC20. inspect electric connections for adequate tightness and secured prior to commencement of work	1	1	-	-
PC21. ensure that work clamps are adequately secured and in correct polarity (-ve on welding bed and +ve on electrode)	1	1	-	-
PC22. ensure proper lighting at workplace	1	1	-	-
PC23. make initial adjustments of electrode consumption rate and voltage as per requirement	1	3	-	-
PC24. inspect that the gas valves are properly functioning and adjust the same	1	1	-	-
PC25. ensure that electrodes are compatible with base metal requirement	1	2	-	-
PC26. ensure ventilation arrangement is available	1	1	-	-
PC27. check the electrodes comply with weld requirements	1	4	-	-
PC28. check and adjust the filler stick out length as per requirements	1	2	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC29. ensure that there is no gas leakage around the work place	1	1	-	-
PC30. set the shielding gas flow rate as per convenience or requirement initially	1	2	-	-
Interpret and understand weldrequirements and specifications	**10**	**19**	**-**	**-**
PC31. identify the joints to be welded, their location and position of welding	1	1	-	-
PC32. prioritize the sequence of welding joints as per work requirements	1	2	-	-
PC33. extract the weld specifications like type of joint, throat for fillet, number of passes required, specifications of filler rod, required heat input, preheat temperature etc. form relevant charts and drawings	1	4	-	-
PC34. estimate the number or length of filler material required to complete the weld	1	2	-	-
PC35. estimate the requirements of pre heating	1	1	-	-
PC36. check the weld location for proper access and space for welding	1	1	-	-
PC37. check the compliance of clamping and anchoring arrangements installed in place for distortion control against work requirements	1	2	-	-
PC38. confirm that shrinkage allowances are considered while assembling the job	1	1	-	-
PC39. read and interpret the welding requirements from technical specifications and drawings	0.5	1.5	-	-
PC40. interpret standard welding symbols used in drawings and speculations correctly	0.5	2.5	-	-
PC41. reproduce technical drawings as simplified hand sketches for explaining and providing clear instructions to subordinates	1	1	-	-
NOS Total	**40**	**60**	**-**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	CON/N1260
NOS Name	Conduct preparatory works for welding connections using Gas Metal Arc Welding
Sector	Construction
Sub-Sector	Real Estate and Infrastructure construction
Occupation	Fabrication
NSQF Level	5
Credits	TBD
Version	1.0
Next Review Date	25/10/2019

CON/N1261: Carry out Gas Metal Arc Welding in 4g, 4f, 5g, 5f, 6g, 6gr on structural elements as per work requirements

Description

This unit describes the skills and knowledge required to carry out Gas Metal Arc Welding in 4g, 4f, 5g, 5f, 6g, 6gr on structural elements (rolled section, tubular section, plate section and other casting) for various material (carbon steel, stainless steel, steel alloys, aluminum other metals) of thickness ranging from (3.15mm to 100mm) as per requirement in fabrication workshop or construction site (for structures of height up to 100 meters and in confined spaces

Scope

The scope covers the following:

- Carry out Gas metal arc welding in 4g,4f, 5g,5f,6g,6gr positions for structural elements of thickness 3.15mm to 100 mm as per national and international standards.
- Carry out visual inspection during and post welding

Elements and Performance Criteria

Carry out Gas metal arc welding in 4g,4f,5g,5f,6g,6gr positions for structural elements of thickness 3.15mm to 100 mm as per national and international standards

To be competent, the user/individual on the job must be able to:

PC1.	identify the position of weld and choose the most comfortable posture for welding accordingly
PC2.	ignite the arc through striking as per standard procedure
PC3.	decide the pattern and sequence of welding so as to avoid distortion of elements
PC4.	ensure that elements are properly clamped to avoid distortion as per requirements
PC5.	maintain correct body posture as per requirement of weld
PC6.	adjust the electrode stick out and regulate the gas flow rate accordingly
PC7.	adjust the current settings as per heat input requirements
PC8.	ensure that the arc is tight during welding in overhead position
PC9.	check the inter pass temperature and take necessary action
PC10.	hold the welding gun at proper angle as per requirement
PC11.	make required number of passes
PC12.	make steady passes of weld to ensure proper heat generation and penetration
PC13.	coordinate with co welders for synchronized welding while welding large pipe sections
PC14.	disconnect the equipment correctly and store the same as per manufacture guidelines and site safety parameters
PC15.	clean the welded joint

Carry out visual inspection during and post welding

To be competent, the user/individual on the job must be able to:

PC16. ensure proper penetration of weld

PC17. ensure that gas flow does not causes turbulences in the molten metal during welding

PC18. ensure that the weld is proper shielded

PC19. ensure proper heat input through arc

PC20. reduce the spatter spray during the welding

PC21. check the root pass for cracks

PC22. visually check for spatters, craters, undercuts

PC23. visually check the welded joint for cracks

PC24. check the connections for porosity visually

PC25. avoid over reinforcing the connections

PC26. check the conformance profile of final connection with the specifications

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. standard practices for welding work

KU2. safety rules and regulations for handling and storing required tools, equipment and materials for welding works

KU3. personal protection including the use of the related safety gears andequipment

KU4. service request procedures for tools, materials and equipment

KU5. statutory compliance requirements related to working at height

KU6. statutory compliance requirement related to workmen engagement

KU7. operational standards, maintenance of tools and equipment

KU8. how to read and interpret fabrication drawing relevant to task

KU9. how to interpret manuals and specifications relevant to task

KU10. basic principal of measurement, arithmetic and geometric calculations

KU11. technical specifications, standards relevant to work

KU12. terminology used in welding works

KU13. linear conversion of units

KU14. units of measurement

KU15. basic computer literacy

KU16. different patterns and sequences of welding

KU17. what is distortion, its effects on welded components

KU18. causes of distortion

KU19. how to avoid distortion

KU20. importance of proper body posture while welding

KU21. what is inter-pass temperature, preheat temperature etc. their relevance and use

KU22. application of forehand and back hand welding techniques

KU23. how to identify the neutral axis of the weld
KU24. how and where to employ back-step welding, its advantages in reducing distortion
KU25. what is alternate welding sequence, its applications and advantages
KU26. how to maintain a tight arc during overhead welding
KU27. use of welding gauges for checking the completed welding
KU28. different defects in welding, their causes and how to avoid the same
KU29. knowledge of other procedures involved in fabrication such as gas cutting and using the heating torch
KU30. grinding, different types of portable and installed grinders, their applications and different types of blades available in the market
KU31. process of drilling and various equipments used in grinding work other methods of cutting a metal section such as shearing procedure of installing bolts, importance of washers and torquerequirements procedure of installing rivets, different equipment used in the process
KU32. selection of different measuring instruments and tools based upon the work requirements
KU33. the correct procedure for measuring and marking the sections
KU34. how to check the workability of the clamps and fixtures
KU35. what are the ideal conditions for an anchor point
KU36. different types of jacks(based upon mechanics, principle of functioning,manufacture and capacity), their application and use
KU37. how to operate different jacks, vices, clamps and other fixtures
KU38. different equipments used for load lifting and shifting

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. write in at least two language, preferably in the local language of the site and basic English
GS2. provide clear and simple instructions, details & sketches to sub-ordinate
GS3. record and documents daily productivity report, daily labour attendance & details regarding work
GS4. prepare basic status updates for the superiors in the prescribed format
GS5. read one or more language, preferably in the local language of the site
GS6. read drawing, welding specification and standards
GS7. read key documents including quality standards, standards working methods & applicable tolerance limits
GS8. read various, sign boards, safety rules and safety tags, instructions related to exit routes during emergency at the workplace
GS9. speak in one or more language, preferably in one of the local language of the site
GS10. listen and follow instructions clearly given by the superior
GS11. provide clear instructions to subordinates for completion of task as per work plan, time schedule and quality
GS12. decide the body position to ensure comfort while performing welding
GS13. decide the settings off the equipment to avoid the defects

GS14. decide sequence of weld to avoid distortion and to comply with work requirements

GS15. decide the angle and pattern for welding

GS16. plan work & organize required resource in coordination with team membersand superior

GS17. plan work targets, allocate time schedule to sub-ordinates and organize completion of task within allocated time

GS18. ensure completion of work as per agreed time schedule and quality

GS19. identify causes of various defects of welding and take appropriate steps to avoid the same

GS20. report to superiors in case of any hindrances and deviations from planned work schedule

GS21. check the settings of welding connections and make adjustments as per requirements

GS22. analyze the actions of self and coworkers that may result in wastage of materials and consumables so as to optimize their use

GS23. identify and assess actions of self and coworkers that may lead to unsafe conditions

GS24. check the configuration of electrodes and confirm their compatibility with base metal

GS25. identify correctly and pinpoint the causes of defects

GS26. assess complexity of the tasks and provide guidance for carrying out corrective action as per requirement

GS27. observe the welding process and take all corrective actions to avoid defects in welds

GS28. understand the requirement of providing reinforcement and profile to the finished weld and comply with work requirements

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Carry out Gas metal arc welding in 4g,4f,5g,5f,6g,6gr positions for structural elements of thickness 3.15mm to 100 mm as per national and international standards	**19**	**29**	**-**	**-**
PC1. identify the position of weld and choose the most comfortable posture for welding accordingly	1	2	-	-
PC2. ignite the arc through striking as per standard procedure	1	1	-	-
PC3. decide the pattern and sequence of welding so as to avoid distortion of elements	1	2	-	-
PC4. ensure that elements are properly clamped to avoid distortion as per requirements	2	2	-	-
PC5. maintain correct body posture as per requirement of weld	2	4	-	-
PC6. adjust the electrode stick out and regulate the gas flow rate accordingly	2	4	-	-
PC7. adjust the current settings as per heat input requirements	2	3	-	-
PC8. ensure that the arc is tight during welding in overhead position	1	2	-	-
PC9. check the inter pass temperature and take necessary action	1	1	-	-
PC10. hold the welding gun at proper angle as per requirement	1	2	-	-
PC11. make required number of passes	1	1	-	-
PC12. make steady passes of weld to ensure proper heat generation and penetration	1	1	-	-
PC13. coordinate with co welders for synchronized welding while welding large pipe sections	1	2	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC14. disconnect the equipment correctly and store the same as per manufacture guidelines and site safety parameters	1	1	-	-
PC15. clean the welded joint	1	1	-	-
Carry out visual inspection during and post welding	**21**	**31**	**-**	**-**
PC16. ensure proper penetration of weld	2	3	-	-
PC17. ensure that gas flow does not causes turbulences in the molten metal during welding	2	3	-	-
PC18. ensure that the weld is proper shielded	2	3	-	-
PC19. ensure proper heat input through arc	2	3	-	-
PC20. reduce the spatter spray during the welding	2	3	-	-
PC21. check the root pass for cracks	2	3	-	-
PC22. visually check for spatters, craters, undercuts	2	3	-	-
PC23. visually check the welded joint for cracks	2	3	-	-
PC24. check the connections for porosity visually	2	3	-	-
PC25. avoid over reinforcing the connections	2	3	-	-
PC26. check the conformance profile of final connection with the specifications	1	1	-	-
NOS Total	**40**	**60**	**-**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	CON/N1261
NOS Name	Carry out Gas Metal Arc Welding in 4g, 4f, 5g, 5f, 6g, 6gr on structural elements as per work requirements
Sector	Construction
Sub-Sector	Real Estate and Infrastructure construction
Occupation	Fabrication
NSQF Level	5
Credits	TBD
Version	1.0
Next Review Date	25/10/2019

CON/N1262: Conduct preparatory works for welding connections using Gas Tungsten Arc Welding

Description

This unit describes the skills and knowledge required to conduct preparatory works for welding connections using gas tungsten arc welding

Scope

The scope covers the following:

- Work according to standard health and safety requirements
- Confirm proper joint preparation for base metal thickness of 3.15 -100 mm
- Set up and prepare welding equipment for carrying out required work
- Interpret and understand weld requirements and specifications

Elements and Performance Criteria

Work according to standard health and safety requirements

To be competent, the user/individual on the job must be able to:

PC1. use and identify proper personal protective equipment such as hand gloves, nose mask, ear plugs, head protection, safety harness etc

PC2. use appropriate welding masks

PC3. check for any gas leakages prior to striking arc

PC4. check the electrical connections for tightness and termination

PC5. inspect the lighting arrangement for adequacy

PC6. inspect and clear the work area of any flammable objects like boxes, plastic etc

PC7. ensure that subordinates are following safety norms

PC8. attend any and all perp talks and tool box talks organized on site

PC9. participate in all safety drills organized on site

PC10. use appropriate fire safety equipment and procedure in case of fire

PC11. identify and report any other unsafe act or condition to appropriate authority

Confirm proper joint preparation for base metal thickness of 3.15 -100 mm

To be competent, the user/individual on the job must be able to:

PC12. confirm the joint profiles against the welding requirements and specifications

PC13. ensure that surface is cleaned before commencing the welding operations

PC14. check that appropriate root gap is available

PC15. check the bevel angle before commencing the welding operations

PC16. make sure that surface is smooth and free of irregularities

PC17. ensure that the surface is free from any oxides, dust or foreign particles and is not painted or galvanized

PC18. ensure that there is no moisture near the segments during the welding operations

PC19. report any anomalies in joint to the superiors

Set up and prepare welding equipment for carrying out required work

To be competent, the user/individual on the job must be able to:

PC20. ensure that the shielding gas cylinders in upright position only

PC21. confirm that shielding gas is purely inert e. g argon

PC22. set the shielding gas flow rate as per convenience or requirement initially

PC23. check the pipes, valves/ regulator and flow meter is securely connected

PC24. taper the tungsten rod and sharpen the point of the electrode for better arc stability

PC25. clean the electrode prior to use to remove any foreign matter

PC26. adjust the tungsten stick out as per requirement based upon type of joint, base metal properties etc

PC27. estimate the quantity of consumables required and stack the same before starting the weld

PC28. clean the filler rod to remove any foreign particles in order to avoid weld contamination

PC29. ensure that filler material are compatible with base metal and as per weld specifications

PC30. ensure that work clamps are adequately secured and in correct polarity (+ ve on welding bed and -ve on electrode)

PC31. ensure that electrical connections are tight, secure and compatible with the equipment

Interpret and understand weld requirements and specifications

To be competent, the user/individual on the job must be able to:

PC32. identify the joints to be welded, their location and position of welding

PC33. prioritize the sequence of welding joints as per work requirements

PC34. extract the weld specifications like type of joint, throat for fillet, number of passes required, specifications of filler rod, required heat input, preheat temperature etc. form relevant charts and drawings

PC35. estimate the number or length of filler material required to complete the weld

PC36. estimate the requirements of pre heating

PC37. check the weld location for proper access and space for welding

PC38. check the compliance of clamping and anchoring arrangements installed in place for distortion control against work requirements

PC39. confirm that shrinkage allowances are considered while assembling the job

PC40. read and interpret the welding requirements from technical specifications and drawings

PC41. interpret standard welding symbols used in drawings and speculations correctly

PC42. reproduce technical drawings as simplified hand sketches for explaining and providing clear instructions to subordinates

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. standard practices for construction welding work

KU2. safety rules and regulations for handling and storing required tools, equipment and materials for welding works

KU3. personal protection including the use of the related safety gears and equipment

KU4. service request procedures for tools, materials and equipment
KU5. statutory compliance requirements related to working at height
KU6. statutory compliance requirement related to workmen engagement
KU7. how to read, interpret, understand, simplify and reproduce fabrication shop drawings
KU8. how to read and understand the welding specifications and requirements
KU9. how to estimate the quantity of consumables required for welding
KU10. how to check the bevel angles, root gap and root face
KU11. effects of unclean and rough joints on connections
KU12. effects of moisture on the surface of joint
KU13. effects of reversing the polarity and its applications
KU14. different types of consumables, their specifications, conditions of use and storage and their compatibility with base materials
KU15. Selection of required tungsten electrode and filler material compatible to the material to be welded
KU16. various parameters of welding, their adjustments, importance, application
KU17. the number of joints for welding
KU18. how to prioritize the joints for welding
KU19. different terms used in welding, their definitions, importance, andapplications
KU20. how to weld in enclosed or restricted space
KU21. distortion:- its types, causes, effects, different procedures implied to reduce distortion
KU22. fire protection and prevention methods, equipments and their use
KU23. use of welding mask
KU24. understand the safety evacuation plan for concerned relevance
KU25. various hazards involved in welding
KU26. different types of personnel protective equipments and their application
KU27. importance of proper lighting and ventilation
KU28. different occupational disease, their causes and remedies

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. write in at least two language, preferably in the local language of the site and basic English
GS2. provide clear and simple instructions, details & sketches to sub-ordinate
GS3. record and documents daily productivity report, daily labour attendance & details regarding work
GS4. prepare basic status updates for the superiors in the prescribed format
GS5. read one or more language, preferably in the local language of the site
GS6. read drawing, welding specification and standards
GS7. read key documents including quality standards, standards working methods& applicable tolerance limits

GS8. read various, sign boards, safety rules and safety tags, instructions related to exit routes during emergency at the workplace

GS9. speak in one or more language, preferably in one of the local language of the site

GS10. listen and follow instructions clearly given by the superior

GS11. provide clear instructions to subordinates for completion of task as per work plan, time schedule and quality

GS12. decide upon the initial setting of the welding equipment

GS13. decide the priority of the weld based upon welding sequence

GS14. decide if the space available for welding is sufficient for welding in desired position

GS15. decide if the anchorage provided is sufficient to avoid distortion

GS16. plan work & organize required resource in coordination with team members and superior

GS17. interpret the technical drawings and welding symbols to understand the weld requirement

GS18. prioritize the weld sequence as per the weld requirement

GS19. ensure completion of work as per agreed time schedule and quality

GS20. inspect electric connections and make suitable adjustments as per requirements

GS21. inspect electric connections and make suitable adjustments as per requirements

GS22. check and confirm proper functioning of welding equipment

GS23. report to seniors in case of any ambiguity regarding joint preparation, weld specification, issued consumables and equipment etc

GS24. assess quantity of materials for day work

GS25. analyze the actions of self and coworkers that may result in wastage of materials and consumables so as to optimize their use

GS26. identify and assess actions of self and coworkers that may lead to unsafe conditions

GS27. understand the relationship between various welding variables and adjustments and employ the same to avoid defects in welding

GS28. assess complexity of the tasks and provide guidance for carrying out corrective action as per requirement

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Work according to standard health and safety requirements	**6**	**7**	**-**	**-**
PC1. use and identify proper personal protective equipment such as hand gloves, nose mask, ear plugs, head protection, safety harness etc	1	1	-	-
PC2. use appropriate welding masks	0.5	0.5	-	-
PC3. check for any gas leakages prior to striking arc	0.5	0.5	-	-
PC4. check the electrical connections for tightness and termination	0.5	0.5	-	-
PC5. inspect the lighting arrangement for adequacy	0.5	0.5	-	-
PC6. inspect and clear the work area of any flammable objects like boxes, plastic etc	1	1	-	-
PC7. ensure that subordinates are following safety norms	-	1	-	-
PC8. attend any and all perp talks and tool box talks organized on site	-	0.5	-	-
PC9. participate in all safety drills organized on site	1	0.5	-	-
PC10. use appropriate fire safety equipment and procedure in case of fire	0.5	0.5	-	-
PC11. identify and report any other unsafe act or condition to appropriate authority	0.5	0.5	-	-
Confirm proper joint preparation for base metal thickness of 3.15 -100 mm	**7**	**8**	**-**	**-**
PC12. confirm the joint profiles against the welding requirements and specifications	1	1	-	-
PC13. ensure that surface is cleaned before commencing the welding operations	1	1	-	-
PC14. check that appropriate root gap is available	1	1	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC15. check the bevel angle before commencing the welding operations	-	1	-	-
PC16. make sure that surface is smooth and free of irregularities	1	1	-	-
PC17. ensure that the surface is free from any oxides, dust or foreign particles and is not painted or galvanized	1	1	-	-
PC18. ensure that there is no moisture near the segments during the welding operations	1	1	-	-
PC19. report any anomalies in joint to the superiors	1	1	-	-
Set up and prepare welding equipment for carrying out required work	**14**	**19**	**-**	**-**
PC20. ensure that the shielding gas cylinders in upright position only	1	1	-	-
PC21. confirm that shielding gas is purely inert e. g argon	-	1	-	-
PC22. set the shielding gas flow rate as per convenience or requirement initially	1	1	-	-
PC23. check the pipes, valves/ regulator and flow meter is securely connected	1	1	-	-
PC24. taper the tungsten rod and sharpen the point of the electrode for better arc stability	1	2	-	-
PC25. clean the electrode prior to use to remove any foreign matter	1	1	-	-
PC26. adjust the tungsten stick out as per requirement based upon type of joint, base metal properties etc	2	2	-	-
PC27. estimate the quantity of consumables required and stack the same before starting the weld	1	1	-	-
PC28. clean the filler rod to remove any foreign particles in order to avoid weld contamination	2	4	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC29. ensure that filler material are compatible with base metal and as per weld specifications	2	2	-	-
PC30. ensure that work clamps are adequately secured and in correct polarity (+ ve on welding bed and -ve on electrode)	1	1	-	-
PC31. ensure that electrical connections are tight, secure and compatible with the equipment	1	2	-	-
Interpret and understand weld requirements and specifications	**13**	**26**	**-**	**-**
PC32. identify the joints to be welded, their location and position of welding	1	2	-	-
PC33. prioritize the sequence of welding joints as per work requirements	1	2	-	-
PC34. extract the weld specifications like type of joint, throat for fillet, number of passes required, specifications of filler rod, required heat input, preheat temperature etc. form relevant charts and drawings	2	4	-	-
PC35. estimate the number or length of filler material required to complete the weld	1	2	-	-
PC36. estimate the requirements of pre heating	1	1	-	-
PC37. check the weld location for proper access and space for welding	1	2	-	-
PC38. check the compliance of clamping and anchoring arrangements installed in place for distortion control against work requirements	2	3	-	-
PC39. confirm that shrinkage allowances are considered while assembling the job	1	3	-	-
PC40. read and interpret the welding requirements from technical specifications and drawings	1	3	-	-
PC41. interpret standard welding symbols used in drawings and speculations correctly	1	3	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC42. reproduce technical drawings as simplified hand sketches for explaining and providing clear instructions to subordinates	1	1	-	-
NOS Total	**40**	**60**	**-**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	CON/N1262
NOS Name	Conduct preparatory works for welding connections using Gas Tungsten Arc Welding
Sector	Construction
Sub-Sector	Real Estate and Infrastructure construction
Occupation	Fabrication
NSQF Level	5
Credits	TBD
Version	1.0
Next Review Date	25/10/2019

CON/N1263: Carry out Gas Tungsten Arc Welding in 4g, 4f, 5g, 5f, 6g, 6gr on structural elements as per work requirements

Description

This unit describes the skills and knowledge required to carry out shielded metal arc welding on structural elements (rolled section, tubular section, plate section and other casting) of materials (carbon steel, stainless steel, alloy steel, aluminum other metals)of thickness ranging from 3.15mm to 100mm as per requirement in fabrication workshop or construction site for structures of height up to 100 meters and also in confined spaces

Scope

The scope covers the following:

- Carry out Gas tungsten Arc welding in 4g,4f,5g,5f,6g,6gr positions for structural elements of thickness 3.15 mm to 100 mm as per national and international standard
- Carry out visual inspection during and post welding

Elements and Performance Criteria

Carry out Gas tungsten Arc welding in 4g,4f,5g,5f,6g,6gr positions for structural elements of thickness 3.15 mm to 100 mm as per national and international standard

To be competent, the user/individual on the job must be able to:

PC1.	identify the position of weld and choose the most comfortable posture for welding accordingly
PC2.	ignite the arc through striking as per standard procedure
PC3.	decide the pattern and sequence of welding so as to avoid distortion of elements
PC4.	ensure that elements are properly clamped to avoid distortion as per requirements
PC5.	maintain correct body posture as per requirement of weld
PC6.	adjust the electrode stick out and regulate the gas flow rate accordingly
PC7.	adjust the current settings as per heat input requirements
PC8.	avoid touching the tungsten rod to the base metal
PC9.	ensure that the filler rod is always inside the shielding gas cover to avoid contamination during welding operation
PC10.	ensure that the arc is tight during welding in overhead position
PC11.	check the inter pass temperature and take necessary action
PC12.	hold the welding gun at proper angle as per requirement
PC13.	ensure that the Arc length is not too large and is as per heat requirement
PC14.	adjust the travel speed of weld to ensure proper penetration
PC15.	make required number of passes
PC16.	make steady passes of weld to ensure proper heat generation and penetration

PC17. coordinate with co welders for synchronized welding while welding large pipe sections

PC18. disconnect the equipment correctly and store the same as per manufacture guidelines and site safety parameters

PC19. clean the welded joint

Carry out visual inspection during and post welding

To be competent, the user/individual on the job must be able to:

PC20. ensure proper penetration of weld

PC21. ensure that gas flow does not causes turbulences in the molten metal during welding

PC22. ensure that the weld is proper shielded

PC23. ensure proper heat input through arc

PC24. reduce the spatter spray during the welding

PC25. check the root pass for cracks

PC26. visually check for spatters, craters, undercuts

PC27. visually check the welded joint for cracks

PC28. check the connections for porosity visually

PC29. avoid over reinforcing the connections

PC30. check the conformance profile of final connection with the specifications

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. standard practices for welding work

KU2. safety rules and regulations for handling and storing required tools, equipment and materials for welding works

KU3. personal protection including the use of the related safety gears and equipment

KU4. service request procedures for tools, materials and equipment

KU5. statutory compliance requirements related to working at height

KU6. statutory compliance requirement related to workmen engagement

KU7. operational standards, maintenance of tools and equipment

KU8. how to read and interpret fabrication drawing relevant to task

KU9. different patterns and sequences of welding

KU10. what is distortion, its effects on welded components

KU11. causes of distortion

KU12. how to avoid distortion

KU13. importance of proper body posture while welding

KU14. what is inter-pass temperature, preheat temperature etc. their relevance and use

KU15. application of forehand and back hand welding techniques

KU16. how to identify the neutral axis of the weld

KU17. how and where to employ back-step welding, its advantages in reducing distortion

KU18. what is alternate welding sequence, its applications and advantages
KU19. how to maintain a tight arc during overhead welding
KU20. use of welding gauges for checking the completed welding
KU21. different defects in welding, their causes and how to avoid the same
KU22. other procedures involved in fabrication such as gas cutting and using the heating torch grinding, different types of portable and installed grinders, their applications and different types of blades available in the market
KU23. process of drilling and various equipments used in grinding work other methods of cutting a metal section such as shearing procedure of installing bolts, importance of washers and torque requirements procedure of installing rivets, different equipment used in the process
KU24. selection of different measuring instruments and tools based upon the work requirements
KU25. the correct procedure for measuring and marking the sections
KU26. how to check the workability of the clamps and fixtures
KU27. what are the ideal conditions for an anchor point
KU28. different types of jacks(based upon mechanics, principle of functioning, manufacture and capacity), their application and use
KU29. how to operate different jacks, vices, clamps and other fixtures
KU30. different equipment used for load lifting and shifting

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. write in at least two language, preferably in the local language of the site and basic English
GS2. provide clear and simple instructions, details & sketches to sub-ordinate
GS3. record and documents daily productivity report, daily labour attendance & details regarding work
GS4. prepare basic status updates for the superiors in the prescribed format
GS5. read one or more language, preferably in the local language of the site
GS6. read drawing, welding specification and standards
GS7. read key documents including quality standards, standards working methods & applicable tolerance limits
GS8. read various, sign boards, safety rules and safety tags, instructions related to exit routes during emergency at the workplace
GS9. speak in one or more language, preferably in one of the local language of the site
GS10. listen and follow instructions clearly given by the superior
GS11. provide clear instructions to subordinates for completion of task as per work plan, time schedule and quality
GS12. decide the body position to ensure comfort while performing welding
GS13. decide the settings off the equipment to avoid the defects
GS14. decide sequence of weld to avoid distortion and to comply with work requirements
GS15. decide the angle and pattern for welding
GS16. plan work & organize required resource in coordination with team members and superior

GS17. plan work targets, allocate time schedule to sub-ordinates and organize completion of task within allocated time

GS18. ensure completion of work as per agreed time schedule and quality

GS19. identify causes of various defects of welding and take appropriate steps to avoid the same

GS20. report to superiors in case of any hindrances and deviations from planned work schedule

GS21. check the settings of welding connections and make adjustments as per requirements

GS22. analyze the actions of self and coworkers that may result in wastage of materials and consumables so as to optimize their use

GS23. identify and assess actions of self and coworkers that may lead to unsafe conditions

GS24. check the configuration of electrodes and confirm their compatibility with base metal

GS25. identify correctly and pinpoint the causes of defects

GS26. assess complexity of the tasks and provide guidance for carrying out corrective action as per requirement

GS27. observe the welding process and take all corrective actions to avoid defects in welds

GS28. understand the requirement of providing reinforcement and profile to the finished weld and comply with work requirements

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Carry out Gas tungsten Arc welding in 4g,4f,5g,5f,6g,6gr positions for structural elements of thickness 3.15 mm to 100 mm as per national and international standard	**26**	**34**	**-**	**-**
PC1. identify the position of weld and choose the most comfortable posture for welding accordingly	1	2	-	-
PC2. ignite the arc through striking as per standard procedure	1	2	-	-
PC3. decide the pattern and sequence of welding so as to avoid distortion of elements	2	2	-	-
PC4. ensure that elements are properly clamped to avoid distortion as per requirements	2	2	-	-
PC5. maintain correct body posture as per requirement of weld	2	4	-	-
PC6. adjust the electrode stick out and regulate the gas flow rate accordingly	2	2	-	-
PC7. adjust the current settings as per heat input requirements	2	2	-	-
PC8. avoid touching the tungsten rod to the base metal	2	2	-	-
PC9. ensure that the filler rod is always inside the shielding gas cover to avoid contamination during welding operation	2	3	-	-
PC10. ensure that the arc is tight during welding in overhead position	1	1	-	-
PC11. check the inter pass temperature and take necessary action	1	1	-	-
PC12. hold the welding gun at proper angle as per requirement	1	1	-	-
PC13. ensure that the Arc length is not too large and is as per heat requirement	1	2	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC14. adjust the travel speed of weld to ensure proper penetration	2	2	-	-
PC15. make required number of passes	-	1	-	-
PC16. make steady passes of weld to ensure proper heat generation and penetration	1	1	-	-
PC17. coordinate with co welders for synchronized welding while welding large pipe sections	1	1	-	-
PC18. disconnect the equipment correctly and store the same as per manufacture guidelines and site safety parameters	1	1	-	-
PC19. clean the welded joint	1	2	-	-
Carry out visual inspection during and post welding	**13**	**26**	**-**	**-**
PC20. ensure proper penetration of weld	1	2	-	-
PC21. ensure that gas flow does not causes turbulences in the molten metal during welding	1	2	-	-
PC22. ensure that the weld is proper shielded	1	2	-	-
PC23. ensure proper heat input through arc	2	4	-	-
PC24. reduce the spatter spray during the welding	2	3	-	-
PC25. check the root pass for cracks	1	2	-	-
PC26. visually check for spatters, craters, undercuts	1	2	-	-
PC27. visually check the welded joint for cracks	1	2	-	-
PC28. check the connections for porosity visually	1	2	-	-
PC29. avoid over reinforcing the connections	1	2	-	-
PC30. check the conformance profile of final connection with the specifications	1	3	-	-
NOS Total	**39**	**60**	**-**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	CON/N1263
NOS Name	Carry out Gas Tungsten Arc Welding in 4g, 4f, 5g, 5f, 6g, 6gr on structural elements as per work requirements
Sector	Construction
Sub-Sector	Real Estate and Infrastructure construction
Occupation	Fabrication
NSQF Level	5
Credits	TBD
Version	1.0
Next Review Date	25/10/2019

CON/N1264: Conduct preparatory works for welding connections using Shielded Metal ArcWelding

Description

This unit describes the skills and knowledge required to carry out preparatory works for welding connections using Shielded Metal Arc Welding

Scope

The scope covers the following:

- Work according to standard health and safety requirements
- Confirm proper joint preparation of base metal thickness 3.15 mm to 100 mm
- Setup and prepare welding equipment for carrying out required work
- Interpret and understand weld requirements and specifications

Elements and Performance Criteria

Work according to standard health and safety requirements

To be competent, the user/individual on the job must be able to:

PC1. use and identify proper personal protective equipment such as hand gloves, nose mask, ear plugs, head protection, safety harness etc

PC2. use appropriate welding masks

PC3. check the electrical connections for tightness and termination

PC4. inspect the lighting arrangement for adequacy

PC5. inspect and clear the work area of any flammable objects like boxes, plastic etc

PC6. ensure that subordinates are following safety norms

PC7. attend any and all perp talks and tool box talks organized on site

PC8. participate in all safety drills organized on site

PC9. use appropriate fire safety equipment and procedure in case of fire

PC10. identify and report any other unsafe act or condition to appropriate authority

Confirm proper joint preparation for base metal thickness of 3.15 mm to100 mm

To be competent, the user/individual on the job must be able to:

PC11. confirm the joint profiles against the welding requirements and specifications

PC12. ensure that surface is cleaned before commencing the welding operations

PC13. check that appropriate root gap is available

PC14. check the bevel angle before commencing the welding operations

PC15. make sure that surface is smooth and free of irregularities

PC16. ensure that the surface is free from any oxides, dust or foreign particles and is not painted or galvanized

PC17. ensure that there is no moisture near the segments during the welding operations

PC18. report any anomalies in joint to the superiors

PC19. ensure that the temperature at joint is as per specifications

Setup and prepare welding equipment for carrying out required work

To be competent, the user/individual on the job must be able to:

PC20. clean the electrode prior to use to remove any foreign matter

PC21. estimate the quantity of consumables required and stack the same before starting the weld

PC22. ensure that filler material are compatible with base metal and as per weld specifications

PC23. ensure that work clamps are adequately secured and in required polarity

PC24. ensure that electrical connections are tight, secure and compatible with the equipment

PC25. store the electrodes correctly as per manufactures guidelines

Interpret and understand weld requirements and specifications

To be competent, the user/individual on the job must be able to:

PC26. identify the joints to be welded, their location and position of welding

PC27. prioritize the sequence of welding joints as per work requirements

PC28. extract the weld specifications like type of joint, throat for fillet, number of passes required, specifications of filler rod, required heat input, preheat temperature etc. form relevant charts and drawings

PC29. estimate the number or length of filler material required to complete the weld

PC30. estimate the requirements of pre heating

PC31. check the weld location for proper access and space for welding

PC32. check the compliance of clamping and anchoring arrangements installed in place for distortion control against work requirements

PC33. confirm that shrinkage allowances is considered while assembling the job

PC34. read and interpret the welding requirements from technical specifications and drawings

PC35. interpret standard welding symbols used in drawings and speculations correctly

PC36. reproduce technical drawings as simplified hand sketches for explaining and providing clear instructions to subordinates

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. standard practices for welding work

KU2. safety rules and regulations for handling and storing required tools, equipment and materials for welding works

KU3. personal protection including the use of the related safety gears and equipment

KU4. service request procedures for tools, materials and equipment

KU5. statutory compliance requirements related to working at height

KU6. statutory compliance requirement related to workmen engagement

KU7. operational standards, maintenance of tools and equipment

KU8. how to read and interpret fabrication drawing relevant to task

KU9. how to read, interpret, understand, simplify and reproduce fabrication shop drawings

KU10. how to read and understand the welding specifications and requirements

KU11. how to estimate the quantity of consumables required for welding
KU12. how to check the bevel angles
KU13. effects of unclean and rough joints on connections
KU14. effects of moisture on the surface of joint
KU15. effects of reversing the polarity and its applications
KU16. different types of consumables, their specifications, conditions of use and storage and their compatibility with base materials
KU17. various parameters of welding, their adjustments, importance, application
KU18. understand the number of joints for welding
KU19. how to prioritize the joints for welding
KU20. different terms used in welding, their definitions, importance, andapplications
KU21. how to weld in enclosed or restricted space
KU22. distortion:- its causes, effects, different procedures implied to reduce distortion
KU23. fire protection and prevention methods, equipments and their use
KU24. use of welding mask
KU25. understand the safety evacuation plan for concerned relevance
KU26. various hazards involved in welding
KU27. different types of personnel protective equipments and their application
KU28. importance of proper lighting and ventilation
KU29. different occupational disease, their causes and remedies

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. write in at least two language, preferably in the local language of the site and basic English
GS2. provide clear and simple instructions, details & sketches to sub-ordinate
GS3. record and documents daily productivity report, daily labour attendance & details regarding work
GS4. prepare basic status updates for the superiors in the prescribed format
GS5. read one or more language, preferably in the local language of the site
GS6. read drawing, welding specification and standards
GS7. read key documents including quality standards, standards working methods & applicable tolerance limits
GS8. read various, sign boards, safety rules and safety tags, instructions related to exit routes during emergency at the workplace
GS9. speak in one or more language, preferably in one of the local language of the site
GS10. listen and follow instructions clearly given by the superior
GS11. provide clear instructions to subordinates for completion of task as per work plan, time schedule and quality
GS12. decide upon the initial setting of the welding equipment
GS13. decide the priority of the weld based upon welding sequence

GS14. decide if the space available for welding is sufficient for welding in desired position

GS15. decide if the anchorage provided is sufficient to avoid distortion

GS16. plan work & organize required resource in coordination with team members and superior

GS17. interpret the technical drawings and welding symbols to understand the weld requirement prioritize the weld sequence as per the weld requirement

GS18. ensure completion of work as per agreed time schedule and quality

GS19. inspect electric connections and make suitable adjustments as per requirements

GS20. check and confirm proper functioning of welding equipment

GS21. report to seniors in case of any ambiguity regarding joint preparation, weld specification, issued consumables and equipment etc.

GS22. assess quantity of materials for day work

GS23. analyze the actions of self and coworkers that may result in wastage of materials and consumables so as to optimize their use

GS24. identify and assess actions of self and coworkers that may lead to unsafe conditions

GS25. understand the relationship between various welding variables and adjustments and employ the same to avoid defects in welding

GS26. assess complexity of the tasks and provide guidance for carrying out corrective action as per requirement

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Work according to standard health and safety requirements	**6**	**6**	**-**	**-**
PC1. use and identify proper personal protective equipment such as hand gloves, nose mask, ear plugs, head protection, safety harness etc	1	1	-	-
PC2. use appropriate welding masks	0.5	0.5	-	-
PC3. check the electrical connections for tightness and termination	0.5	0.5	-	-
PC4. inspect the lighting arrangement for adequacy	0.5	0.5	-	-
PC5. inspect and clear the work area of any flammable objects like boxes, plastic etc	0.5	0.5	-	-
PC6. ensure that subordinates are following safety norms	1	1	-	-
PC7. attend any and all perp talks and tool box talks organized on site	-	0.5	-	-
PC8. participate in all safety drills organized on site	-	0.5	-	-
PC9. use appropriate fire safety equipment and procedure in case of fire	1	-	-	-
PC10. identify and report any other unsafe act or condition to appropriate authority	1	1	-	-
Confirm proper joint preparation for base metal thickness of 3.15 mm to100 mm	**9**	**18**	**-**	**-**
PC11. confirm the joint profiles against the welding requirements and specifications	1	2	-	-
PC12. ensure that surface is cleaned before commencing the welding operations	1	2	-	-
PC13. check that appropriate root gap is available	1	2	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC14. check the bevel angle before commencing the welding operations	1	2	-	-
PC15. make sure that surface is smooth and free of irregularities	1	2	-	-
PC16. ensure that the surface is free from any oxides, dust or foreign particles and is not painted or galvanized	1	2	-	-
PC17. ensure that there is no moisture near the segments during the welding operations	1	2	-	-
PC18. report any anomalies in joint to the superiors	1	2	-	-
PC19. ensure that the temperature at joint is as per specifications	1	2	-	-
Setup and prepare welding equipment for carrying out required work	**9**	**12**	**-**	**-**
PC20. clean the electrode prior to use to remove any foreign matter	1	2	-	-
PC21. estimate the quantity of consumables required and stack the same before starting the weld	1	2	-	-
PC22. ensure that filler material are compatible with base metal and as per weld specifications	2	2	-	-
PC23. ensure that work clamps are adequately secured and in required polarity	2	2	-	-
PC24. ensure that electrical connections are tight, secure and compatible with the equipment	1	2	-	-
PC25. store the electrodes correctly as per manufactures guidelines	2	2	-	-
Interpret and understand weld requirements and specifications	**16**	**24**	**-**	**-**
PC26. identify the joints to be welded, their location and position of welding	1	1	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC27. prioritize the sequence of welding joints as per work requirements	2	2	-	-
PC28. extract the weld specifications like type of joint, throat for fillet, number of passes required, specifications of filler rod, required heat input, preheat temperature etc. form relevant charts and drawings	3	5	-	-
PC29. estimate the number or length of filler material required to complete the weld	2	2	-	-
PC30. estimate the requirements of pre heating	1	1	-	-
PC31. check the weld location for proper access and space for welding	1	1	-	-
PC32. check the compliance of clamping and anchoring arrangements installed in place for distortion control against work requirements	1	2	-	-
PC33. confirm that shrinkage allowances is considered while assembling the job	1	2	-	-
PC34. read and interpret the welding requirements from technical specifications and drawings	2	4	-	-
PC35. interpret standard welding symbols used in drawings and speculations correctly	1	2	-	-
PC36. reproduce technical drawings as simplified hand sketches for explaining and providing clear instructions to subordinates	1	2	-	-
NOS Total	**40**	**60**	**-**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	CON/N1264
NOS Name	Conduct preparatory works for welding connections using Shielded Metal ArcWelding
Sector	Construction
Sub-Sector	Real Estate and Infrastructure construction
Occupation	Fabrication
NSQF Level	5
Credits	TBD
Version	1.0
Next Review Date	25/10/2019

CON/N1265: Carry out shielded metal arc welding in 4G, 4F, 5G, 5F, 6G, 6GR positions onstructural elements as per work requirement

Description

This unit describes the skills and knowledge required to carry out shielded metal arc welding on structural elements rolled section, tubular section, plate section and other casting) of materials (carbon steel, stainless steel, alloy steel, aluminum and other non-ferrous metals) of thickness ranging from (3.15mm to 100mm) as per requirement in fabrication workshop or construction site for structures of height up to 100 meters and also in confined spaces

Scope

The scope covers the following:

- Carry out shielded metal arc welding in 4G,4F,5G,5F,6G,6GR position onstructural elements as per national and international standards
- Carry out visual inspection during and post welding

Elements and Performance Criteria

Carry out shielded metal arc welding in 4G,4F,5G,5F,6G,6GR position on structural elements as per national and international standards

To be competent, the user/individual on the job must be able to:

PC1. identify the position of weld and choose the most comfortable posture for welding accordingly

PC2. ignite the arc by striking the electrode on the base metal

PC3. decide the pattern and sequence of welding so as to avoid distortion of elements

PC4. ensure that elements are properly clamped to avoid distortion as per requirements

PC5. maintain correct body posture as per requirement of weld

PC6. push or drag the arc as per requirement

PC7. ensure that the Arc length is not too large and is as per heat requirement

PC8. adjust the travel speed of weld to ensure proper penetration

PC9. adjust the current settings as per heat input requirements

PC10. ensure that the arc is tight during welding in overhead position

PC11. check the inter pass temperature and take necessary action

PC12. hold the welding gun at proper angle as per requirement

PC13. make required number of passes

PC14. clean the weld after each pass to scrap out the slag formed on the surface of weld

PC15. make steady passes of weld to ensure proper heat generation and penetration

PC16. coordinate with co welders for synchronized welding while welding large sections

PC17. disconnect the equipment correctly and store the same as per manufacture guidelines and site safety parameters

PC18. clean the welded joint

PC19. check the profile of the weld for conformity with specifications

Carry out visual inspection during and post welding

To be competent, the user/individual on the job must be able to:

PC20. ensure proper penetration of weld
PC21. ensure that the weld is proper shielded
PC22. ensure proper heat input through arc
PC23. reduce the spatter spray during the welding
PC24. check the root pass for cracks
PC25. visually check for spatters, craters, undercuts
PC26. visually check the welded joint for cracks
PC27. check the connections for porosity visually
PC28. avoid over reinforcing the connections
PC29. check the conformance profile of final connection with the specifications

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. standard practices for welding work
KU2. safety rules and regulations for handling and storing required tools, equipment and materials for welding works
KU3. personal protection including the use of the related safety gears and equipment
KU4. service request procedures for tools, materials and equipment
KU5. statutory compliance requirements related to working at height
KU6. statutory compliance requirement related to workmen engagement
KU7. basic principal of measurement, arithmetic and geometric calculations
KU8. linear conversion of units
KU9. different patterns and sequences of welding
KU10. what is distortion, its effects on welded components
KU11. causes of distortion
KU12. how to avoid distortion
KU13. importance of proper body posture while welding
KU14. what is inter-pass temperature, preheat temperature etc. their relevance and use
KU15. application of forehand and back hand welding techniques
KU16. how to identify the neutral axis of the weld
KU17. how and where to employ back-step welding, its advantages in reducing distortion
KU18. what is alternate welding sequence, its applications and advantages
KU19. how to maintain a tight arc during overhead welding
KU20. use of welding gauges for checking the completed welding
KU21. different defects in welding, their causes and how to avoid the same

KU22. knowledge of other procedures involved in fabrication such as gas cutting and using the heating torch grinding, different types of portable and installed grinders, their applications and different types of blades available in the market

KU23. process of drilling and various equipment used in grinding work other methods of cutting a metal section such as shearing procedure of installing bolts, importance of washers and torque requirements procedure of installing rivets, different equipment used in the processt used in the process

KU24. selection of different measuring instruments and tools based upon the work requirements

KU25. the correct procedure for measuring and marking the sections

KU26. how to check the workability of the clamps and fixtures

KU27. what are the ideal conditions for an anchor point

KU28. different types of jacks(based upon mechanics, principle of functioning, manufacturer and capacity), their application and use

KU29. how to operate different jacks, vices, clamps and other fixtures

KU30. different equipment used for load lifting and shifting

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. write in at least two language, preferably in the local language of the site and basic English

GS2. provide clear and simple instructions, details & sketches to sub-ordinate

GS3. record and documents daily productivity report, daily labour attendance & details regarding work

GS4. prepare basic status updates for the superiors in the prescribed format

GS5. read one or more language, preferably in the local language of the site

GS6. read drawing, welding specification and standards

GS7. read key documents including quality standards, standards working methods & applicable tolerance limits

GS8. read various, sign boards, safety rules and safety tags, instructions related to exit routes during emergency at the workplace

GS9. speak in one or more language, preferably in one of the local language of the site

GS10. listen and follow instructions clearly given by the superior

GS11. provide clear instructions to subordinates for completion of task as per work plan, time schedule and quality

GS12. decide the body position to ensure comfort while performing welding

GS13. decide the settings off the equipment to avoid the defects

GS14. decide sequence of weld to avoid distortion and to comply with work requirements

GS15. decide the angle and pattern for welding

GS16. plan work & organize required resource in coordination with team members and superior

GS17. plan work targets, allocate time schedule to sub-ordinates and organize completion of task within allocated time

GS18. ensure completion of work as per agreed time schedule and quality

GS19. identify causes of various defects of welding and take appropriate steps to avoid the same

GS20. report to superiors in case of any hindrances and deviations from planned work schedule

GS21. check the settings of welding connections and make adjustments as per requirements

GS22. analyze the actions of self and coworkers that may result in wastage of materials and consumables so as to optimize their use

GS23. identify and assess actions of self and coworkers that may lead to unsafe conditions

GS24. check the configuration of electrodes and confirm their compatibility with base metal

GS25. identify correctly and pinpoint the causes of defects

GS26. assess complexity of the tasks and provide guidance for carrying out corrective action as per requirement

GS27. observe the welding process and take all corrective actions to avoid defects in welds

GS28. understand the requirement of providing reinforcement and profile to the finished weld and comply with work requirements

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Carry out shielded metal arc welding in 4G,4F,5G,5F,6G,6GR position on structural elements as per national and international standards	**26**	**38**	**-**	**-**
PC1. identify the position of weld and choose the most comfortable posture for welding accordingly	1	2	-	-
PC2. ignite the arc by striking the electrode on the base metal	1	2	-	-
PC3. decide the pattern and sequence of welding so as to avoid distortion of elements	2	2	-	-
PC4. ensure that elements are properly clamped to avoid distortion as per requirements	2	2	-	-
PC5. maintain correct body posture as per requirement of weld	1	2	-	-
PC6. push or drag the arc as per requirement	1	2	-	-
PC7. ensure that the Arc length is not too large and is as per heat requirement	2	2	-	-
PC8. adjust the travel speed of weld to ensure proper penetration	2	2	-	-
PC9. adjust the current settings as per heat input requirements	2	2	-	-
PC10. ensure that the arc is tight during welding in overhead position	1	2	-	-
PC11. check the inter pass temperature and take necessary action	1	2	-	-
PC12. hold the welding gun at proper angle as per requirement	1	2	-	-
PC13. make required number of passes	1	2	-	-
PC14. clean the weld after each pass to scrap out the slag formed on the surface of weld	1	2	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC15. make steady passes of weld to ensure proper heat generation and penetration	2	2	-	-
PC16. coordinate with co welders for synchronized welding while welding large sections	1	2	-	-
PC17. disconnect the equipment correctly and store the same as per manufacture guidelines and site safety parameters	2	2	-	-
PC18. clean the welded joint	1	2	-	-
PC19. check the profile of the weld for conformity with specifications	1	2	-	-
Carry out visual inspection during and post welding	**14**	**22**	**-**	**-**
PC20. ensure proper penetration of weld	1	2	-	-
PC21. ensure that the weld is proper shielded	1	2	-	-
PC22. ensure proper heat input through arc	1	2	-	-
PC23. reduce the spatter spray during the welding	2	2	-	-
PC24. check the root pass for cracks	2	2	-	-
PC25. visually check for spatters, craters, undercuts	2	3	-	-
PC26. visually check the welded joint for cracks	2	3	-	-
PC27. check the connections for porosity visually	1	2	-	-
PC28. avoid over reinforcing the connections	1	2	-	-
PC29. check the conformance profile of final connection with the specifications	1	2	-	-
NOS Total	**40**	**60**	**-**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	CON/N1265
NOS Name	Carry out shielded metal arc welding in 4G, 4F, 5G, 5F, 6G, 6GR positions onstructural elements as per work requirement
Sector	Construction
Sub-Sector	Real Estate and Infrastructure construction
Occupation	Fabrication
NSQF Level	5
Credits	TBD
Version	1.0
Next Review Date	25/10/2019

Assessment Guidelines and Assessment Weightage

Assessment Guidelines

1.Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) (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 center (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 these criteria.

5. In case of successfully passing only certain number of NOSs, the trainee is eligible to take subsequent assessment on the balance NOS's to pass the Qualification Pack.

6. In case of unsuccessful completion, the trainee may seek reassessment on the Qualification Pack

Minimum Aggregate Passing % at QP Level : 70

(**Please note**: Every Trainee should score a minimum aggregate passing percentage as specified above, to successfully clear the Qualification Pack assessment.)

Assessment Weightage

Compulsory NOS

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
CON/N1259.Carry out semi-automatic welding	40	60	-	-	100	10
CON/N8001.Work effectively in a team to deliver desired results at the workplace	40	60	-	-	100	5
CON/N8002.Plan and organize work to meet expected outcomes	40	60	-	-	100	20
CON/N9002.Manage workplace for safe and healthy work environment	40	60	-	-	100	15
Total	**160**	**240**	**-**	**-**	**400**	**50**

Elective: 1 Senior Construction Welder MIG

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
CON/N1260.Conduct preparatory works for welding connections using Gas Metal Arc Welding	40	60	-	-	100	25
CON/N1261.Carry out Gas Metal Arc Welding in 4g, 4f, 5g, 5f, 6g, 6gr on structural elements as per work requirements	40	60	-	-	100	25
Total	**80**	**120**	**-**	**-**	**200**	**50**

Elective: 2 Senior Construction Welder TIG

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
CON/N1262.Conduct preparatory works for welding connections using Gas Tungsten Arc Welding	40	60	-	-	100	25
CON/N1263.Carry out Gas Tungsten Arc Welding in 4g, 4f, 5g, 5f, 6g, 6gr on structural elements as per work requirements	40	60	-	-	100	25
Total	**40**	**60**	**-**	**-**	**100**	**50**

Elective: 3 Senior Construction Welder SMAW

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
CON/N1264.Conduct preparatory works for welding connections using Shielded Metal ArcWelding	40	60	-	-	100	25
CON/N1265.Carry out shielded metal arc welding in 4G, 4F, 5G, 5F, 6G, 6GR positions onstructural elements as per work requirement	40	60	-	-	100	25
Total	**80**	**120**	**-**	**-**	**200**	**50**

Acronyms

NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training

Glossary

Sector	Sector is a conglomeration of different business operations having similar business and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.
Sub-sector	Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
Occupation	Occupation is a set of job roles, which perform similar/ related set of functions in an industry.
Job role	Job role defines a unique set of functions that together form a unique employment opportunity in an organisation.
Occupational Standards (OS)	OS specify the standards of performance an individual must achieve when carrying out a function in the workplace, together with the Knowledge and Understanding (KU) they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts.
Performance Criteria (PC)	Performance Criteria (PC) are statements that together specify the standard of performance required when carrying out a task.
National Occupational Standards (NOS)	NOS are occupational standards which apply uniquely in the Indian context.
Qualifications Pack (QP)	QP comprises the set of OS, together with the educational, training and other criteria required to perform a job role. A QP is assigned a unique qualifications pack code.
Unit Code	Unit code is a unique identifier for an Occupational Standard, which is denoted by an 'N'
Unit Title	Unit title gives a clear overall statement about what the incumbent should be able to do.
Description	Description gives a short summary of the unit content. This would be helpful to anyone searching on a database to verify that this is the appropriate OS they are looking for.
Scope	Scope is a set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on quality of performance required.
Knowledge and Understanding (KU)	Knowledge and Understanding (KU) are statements which together specify the technical, generic, professional and organisational specific knowledge that an individual needs in order to perform to the required standard.

Organisational Context	Organisational context includes the way the organisation is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.
Technical Knowledge	Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
Core Skills/ Generic Skills (GS)	Core skills or Generic Skills (GS) are a group of skills that are the key to learning and working in today's world. These skills are typically needed in any work environment in today's world. These skills are typically needed in any work environment. In the context of the OS, these include communication related skills that are applicable to most job roles.
Electives	Electives are NOS/set of NOS that are identified by the sector as contributive to specialization in a job role. There may be multiple electives within a QP for each specialized job role. Trainees must select at least one elective for the successful completion of a QP with Electives.
Options	Options are NOS/set of NOS that are identified by the sector as additional skills. There may be multiple options within a QP. It is not mandatory to select any of the options to complete a QP with Options.