TRAINING REGULATIONS

MANUAL METAL ARC WELDING (MMAW) NC I

METALS AND ENGINEERING SECTOR

TECHNICAL EDUCATION AND SKILLS DEVELOPMENT AUTHORITY
East Service Road, South Luzon Expressway (SLEX), Taguig City, Metro Manila

(Republic Act No. 7796)

Section 22, "Establishment and Administration of the National Trade Skills Standards" of the RA 7796 known as the TESDA Act mandates TESDA to establish national occupational skill standards. The Authority shall develop and implement a certification and accreditation program in which private industry group and trade associations are accredited to conduct approved trade tests, and the local government units to promote such trade testing activities in their respective areas in accordance with the guidelines to be set by the Authority.

The Training Regulations (TR) serve as basis for the:

- Competency assessment and certification;

The Training Regulations (TR) serve as basis for the:

1 Registration and delivery of training programs; and
2 Development of curriculum and assessment instruments;
3 Competency assessment and certification;
.

Each TR has four sections:

Section 1 **Definition of Qualification** – describes the qualification and defines the competencies that comprise the qualification.

Section 2 **Competency Standards** was revised to include the Required Knowledge and Required Skills per element. These fields explicitly state the required knowledge and skills for competent performance of a unit of competency in an informed and effective manner. These also emphasize the application of knowledge and skills to situations where understanding is converted into a workplace outcome.

Section 3 **Training Arrangements** - contain information and requirements which serve as bases for training providers in designing and delivering competency-based curriculum for the qualification. The revisions to section 3 entail identifying the Learning Activities leading to achievement of the identified Learning Outcome per unit of competency.

Section 4 **Assessment and Certification Arrangements** - describe the policies governing assessment and certification procedures for the qualification.

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MANUAL METAL ARC WELDING (MMAW) NC I

SECTION 1 MANUAL METAL ARC WELDING (MMAW) NC I QUALIFICATION

The **Manual Metal Arc Welding** (**MMAW**) **NC I** Qualification consists of competencies that a person must achieve to weld carbon steel plates components as specified drawings, welding procedure specification or oral instructions using MMAW process. MMAW is also known as Shielded Metal Arc Welding (SMAW).

This Qualification conforms with the latest edition of ISO 9606-1: Qualification testing of welders — Fusion welding — Part 1: Steels, AWS D 1.1 Structural Welding Code- Steel; ASME IX (Boiler and Pressure Vessel Code) Welding, Brazing, and Fusing Qualifications; and Asian Welding Federation- Common Welders Certification Scheme (AWF-CWCS).

This Qualification is packaged from the competency map of the Metals and Engineering Sector as shown in Annex A.

The units of competency comprising this qualification include the following:

CODE NO.	BASIC COMPETENCIES
400311101	Receive and respond to workplace communication
400311102	Work with others
400311103	Solve/address routine problems
400311104	Enhance self-management skills
400311105	Support innovation
400311106	Access and maintain information
400311107	Follow occupational safety and health policies and procedures
400311108	Apply environmental work standards
400311109	Adopt entrepreneurial mindset in the workplace

CODE NO.	COMMON COMPETENCIES
MEE721202	Interpret Drawings and Sketches
MEE721210	Perform Basic Workshop Measurements & Computations
MEE721211	Contribute to Quality Management System
MEE721205	Use Hand Tools
MEE721212	Prepare Materials and Consumables

CODE NO.	CORE COMPETENCIES
MEE721321	Set up Welding Equipment
MEE721322	Prepare / Fit up Welding Joints
MEE721323	Weld Carbon Steel Plates using MMAW

A person who has achieved this Qualification is competent to be a –

- Carbon Steel Plate/ Pipe Welder (MMAW)

SECTION 2 COMPETENCY STANDARDS

This section gives the details of the contents of the basic, common and core units of competency required in **MANUAL METAL ARC WELDING (MMAW) NC I.**

BASIC COMPETENCIES

UNIT OF COMPETENCY : RECEIVE AND RESPOND TO WORKPLACE COMMUNICATION

UNIT CODE : 400311101

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to receive, respond and act on verbal and written communication.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Follow routine spoken messages	1.1 Required information is gathered by listening attentively and correctly interpreting or understanding information/ instructions 1.2 Instructions/ information are recorded in accordance with workplace requirements 1.3 Instructions are acted upon immediately in accordance with information received 1.4 Clarification is sought from workplace supervisor on all occasions when any instruction/ information is not clear	1.1 Organizational policies/ guidelines in regard to processing internal/external information 1.2 Ethical work practices in handling communications 1.3 Overview of the Communication process 1.4 Effective note-taking and questioning techniques	1.1 Conciseness in receiving and clarifying messages/ information/ communication 1.2 Accuracy in recording messages/ information 1.3 Basic *communication skills* 1.4 Active-listening Skills 1.5 Note-taking skills 1.6 Clarifying and probing questions (questioning skills)
2. Perform workplace duties following written notices	2.1 ***Written notices and instructions*** are read and interpreted correctly in accordance with ***organizational guidelines*** 2.2 Routine written instructions are followed in sequence 2.3 Feedback is given to workplace supervisor based on the	2.1 Organizational guidelines in regard to processing internal/ external information 2.2 Ethical work practices in handling communications 2.3 Overview of the Communication process	2.1 Conciseness in receiving and clarifying messages/ information/ communication 2.2 Accuracy in recording messages/ information 2.3 Clarifying and probing questions

	instructions/ information received	2.4 Effective questioning techniques (clarifying and probing)	(Questioning Skills) 2.4 Skills in reading and recording and labeling data 2.5 Skills in locating information

RANGE OF VARIABLES

VARIABLE	RANGE
1. 2WS	May include: 1.1. Written work instructions 1.2. Internal memos/memorandum 1.3. Business letters 1.4. External communications 1.5. Electronic mail 1.6. Briefing notes 1.7. General correspondence 1.8. Marketing materials 1.9. Guidelines/Circulars
2. Organizational guidelines	May include: 2.1. Information documentation procedures 2.2. Company guidelines and procedures 2.3. Standard Operating Procedure (SOPs) 2.4. Organization manuals 2.5. Departmental Policies and Procedures Manual 2.6. Service manual

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Demonstrated knowledge and understanding of organizational procedures in handling verbal and written communications 1.2 Received and acted on verbal messages and instructions correctly and efficiently 1.3 Demonstrated ability in recording instructions/information 1.4 Utilized effective clarifying and probing techniques where necessary
2. Resource Implications	**The following resources should be provided:** 2.1 Pens 2.2 Note pads 2.3 Computer (if applicable)
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1 Demonstration on communication skills (e. g., role- playing) 3.3 Oral questioning/Interview 3.3 Written Test
4. Context for Assessment	4.1 Competency may be assessed individually in the actual workplace or in a simulated environment in TESDA-accredited institutions

UNIT OF COMPETENCY : WORK WITH OTHERS

UNIT CODE : 400311102

UNIT DESCRIPTOR : This unit covers the skills, knowledge and attitudes required in working as member of a team, interacting with co-members and performing one's role in the team.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Develop effective workplace relationships	1.1 ***Duties and responsibilities*** are done in a positive manner to promote cooperation and good relationship 1.2 Assistance is sought from ***workgroup*** when difficulties arise and addressed through discussions 1.3 ***Feedback*** provided by others in the team is encouraged, acknowledged and acted upon 1.4 Differences in personal values and beliefs are respected and acknowledged during interaction	1.1 One's role, duties and responsibilities in the workplace 1.2 Acknowledging/ receiving and giving feedback 1.3 Valuing respect and empathy in the workplace 1.4 Workplace communication protocols 1.5 Teamwork 1.6 Collaboration and teambuilding within the enterprise	1.1 Communication skills – oral and written (e. g., requesting advice, receiving feedback) 1.2 Ability to relate to/interact with people from a range of social and cultural backgrounds
2. Contribute to work group activities	2.1 ***Support is provided to team members*** to ensure workgroup goals are met 2.2 Constructive contributions to workgroup goals and tasks are made according to ***organizational requirements*** 2.3 Information relevant to work is shared with team members to ensure designated goals are met	2.1 Importance of creative collaboration, social perceptiveness and problem sensitivity in the workplace 2.2 Organizational Requirements 2.3 Importance of initiative and dedication in group process 2.4 Office and workplace technologies and machine (hardware, software systems)	2.1 Communication skills – oral and written (e. g., requesting advice, receiving feedback) 2.2 Organizing work priorities and arrangements 2.3 Team player skills 2.4 Technology skills including the ability to select and use technology appropriate to a task

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RANGE OF VARIABLES

VARIABLE	RANGE
1. Duties and responsibilities	May include: 1.1 Job description and employment arrangements 1.2 Organization's policy relevant to work role 1.3 Organizational structures 1.4 Supervision and accountability requirements including OHS 1.5 Enterprise code of conduct
2. Work group	May include: 2.1 Supervisor or manager 2.2 Peers/work colleagues and clients 2.3 Other members of the organization
3. Feedback	May include: 3.1 Formal/Informal performance appraisal 3.2 Obtaining feedback from supervisors and colleagues and clients 3.3 Personal, reflective behavior strategies 3.4 Routine organizational methods for monitoring service delivery
4. Providing support to team members	May include: 4.1 Explaining/clarifying 4.2 Helping colleagues 4.3 Providing encouragement 4.4 Providing feedback to another team member 4.5 Undertaking extra tasks if necessary
5. Organizational requirements	May include: 5.1 Goals, objectives, plans, system and processes 5.2 Legal and organization policy/guidelines 5.3 OHS policies, procedures and programs 5.4 Ethical standards 5.5 Defined resources parameters 5.6 Quality and continuous improvement processes and standards

EVIDENCE GUIDE

1. Critical aspects of competency	**Assessment requires evidence that the candidate:** 1.1. Provided support to team members to ensure goals are met 1.2. Acted on feedback from clients and colleagues 1.3. Demonstrated quality/active participation in team meetings and activities
2. Resource Implications	**The following resources should be provided:** 2.1. Access to relevant workplace or appropriately simulated environment where assessment can take place 2.2. Materials relevant to the proposed activity or task
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1 Written Test 3.2 Role play 3.3 Interview/Oral questioning 3.4 Structured and unstructured activity
4. Context for Assessment	4.1. Competency assessment may occur in workplace or any appropriately simulated environment 4.2. Assessment shall be observed while task is being undertaken whether individually or in group

UNIT OF COMPETENCY : SOLVE/ADDRESS ROUTINE PROBLEMS

UNIT CODE : 400311103

UNIT DESCRIPTOR : This unit of covers the knowledge, skills and attitudes required to solve problems in the workplace including the application of problem solving techniques and to determine and resolve the root cause of routine problems.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify the problem	1.1 Desired operating/output parameters and expected quality of products/services are identified. 1.2 The nature of the problem by observation on routines are defined. 1.3 ***Problems*** are stated and specified clearly.	1.1 Competence includes mastery of knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations 1.2 Competence to include the ability to apply and explain fundamental causes of problems routine problems and to determine the corrective actions. 1.3 Relevant equipment and operational processes 1.4 Enterprise goals, targets and measures 1.5 Enterprise quality OHS and environmental requirement 1.6 Enterprise information systems and data collation 1.7 Industry codes and standards	1.1 Using range of formal problem-solving techniques (e.g., planning, attention, simultaneous and successive processing of information). 1.2 Identifying and clarifying the nature of the problem.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Assess fundamental causes of the problem	2.1 Problem-solving tool appropriate to the problem and the context is selected 2.2 Possible causes based on experience and the use of problem-solving tools/***basic analytical techniques*** are identified 2.3 Possible fundamental causes of problems are specified.	2.1 Competence includes a thorough knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations 2.2 Competence to include the ability to apply and explain fundamental causes of problems routine problems and to determine the corrective actions. 2.3 Relevant equipment and operational processes 2.4 Enterprise goals, targets and measures 2.5 Enterprise quality OHS and environmental requirement 2.6 Enterprise information systems and data collation 2.7 Industry codes and standards	2.1 Using range of formal problem-solving techniques (e.g., planning, attention, simultaneous and successive processing of information). 2.2 Identifying extent and causes of procedural problems.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3. Determine corrective action	3.1 All possible options are considered for resolution of the routine problem. 3.2 Corrective actions are determined to resolve the problem and possible future causes 3.3 ***Action plans*** are developed identifying measurable objectives, resource needs and timelines in accordance with safety and operating procedures	3.1 Competence includes a thorough knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations 3.2 Competence to include the ability to apply and explain, sufficient for the identification of fundamental cause, determining the corrective action and provision of recommendations 3.3 Relevant equipment and operational processes 3.4 Enterprise goals, targets and measures 3.5 Enterprise quality OHS and environmental requirement 3.6 Principles of decision making strategies and techniques 3.7 Enterprise information systems and data collation 3.8 Industry codes and standards	3.1 Using range of formal problem-solving techniques. 3.2 Identifying and clarifying the nature of the problem. 3.3 Devising and applying the best possible solution to a problem. 3.4 Evaluating the solution
4. Communicate action plans and recommendations to routine problems	4.1 Report on recommendations are prepared 4.2 Recommendations are presented to ***appropriate person***. 4.3 Recommendations are followed-up, if required	4.1 Competence includes a thorough knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations	4.1 Using range of formal problem solving techniques 4.2 Identifying and clarifying the nature of the problem 4.3 Devising the best possible solution

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
		4.2 Competence to include the ability to apply and explain, sufficient for the identification of fundamental cause, determining the corrective action and provision of recommendations 4.3 Relevant equipment and operational processes 4.4 Enterprise goals, targets and measures 4.5 Enterprise quality, OHS and environmental requirement 4.6 Principles of decision making strategies and techniques 4.7 Enterprise information systems and data collation 4.8 Industry codes and standards	to a routine problem 4.4 Evaluating the solution 4.5 Developing action plans to resolving and managing routine problems.

RANGE OF VARIABLES

VARIABLES	RANGE
1. Problem	May include: 1.1. Routine/non – routine processes and quality problems 1.2. Equipment selection, availability and failure 1.3. Teamwork and work allocation problem 1.4. Safety and emergency situations and incidents
2. Basic analytical techniques	May include: 2.1. Brainstorming 2.2. Case Analysis 2.3. Cause and effect diagrams 2.4. Pareto analysis 2.5. SWOT analysis 2.6. Gant chart, Pert CPM and graphs 2.7. Scatter grams
3. Action plans	May include: 3.1. Priority requirements 3.2. Measurable objectives 3.3. Resource requirements 3.4. Timelines 3.5. Co-ordination and feedback requirements 3.6. Safety requirements 3.7. Risk assessment 3.8. Environmental requirements
4. Appropriate person	May include: 4.1 Supervisor or manager 4.2 Peers/work colleagues 4.3 Other members of the organization

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1. Identified the problem. 1.2. Determined the fundamental causes of the problem. 1.3. Determined the correct / preventive action. 1.4. Developed action plans in managing routine problems. These aspects may be best assessed using project-based learning mode of assessment and case formulation.
2. Resource Implications	Assessment will require access to a workplace over an extended period, or a suitable method of gathering evidence of operating ability over a range of situations.
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1. Case Formulation 3.2. Life Narrative Inquiry (Interview) 3.3. Standardized test The unit will be assessed in a holistic manner as is practical and may be integrated with the assessment of other relevant units of competency. Assessment will occur over a range of situations, which will include disruptions to normal, smooth operation. Simulation may be required to allow for timely assessment of parts of this unit of competency. Simulation should be based on the actual workplace and will include walk through of the relevant competency components. These assessment activities should include a range of problems, including new, unusual and improbable situations that may have happened.
4. Context for Assessment	4.1 Competency may be assessed individually in the actual workplace or simulation environment in TESDA accredited institutions

UNIT OF COMPETENCY : ENHANCE SELF-MANAGEMENT SKILLS

UNIT CODE : 400311104

UNIT DESCRIPTOR : This unit covers the knowledge, skills, and attitudes in applying the ability to regulate actions, make good decisions, and show appropriate behavior based on self-awareness.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Set personal and career goals	1.1 The difference between ***personal*** and ***career goals*** are described 1.2 Clear and concise personal and career goals are developed 1.3 Characteristics of motivational goals according to Locke &Latham are identified	1.1 Definition of personal goals and career goals 1.2 SMART Model for goal setting 1.3 Five principle of goal setting according to Locke & Latham (Clarity, Challenge, Commitment, Feedback, and Task complexity)	1.1 Setting of personal and career goals 1.2. Defining, creating, and mapping personal and career goals using SMART Model for goal setting 1.3 Applying goal setting principles to personal and career goals
2. Recognize emotions	2.1 Influence that people, situations and events have on ***emotions*** are described 2.2 Importance of responding with appropriate emotions are explained 2.3 Influences on and consequences of emotional responses in a ***social and work-related*** **contexts** are examined	2.1 Common positive and negative emotions manifested in the workplace 2.2 Professional and non-professional behaviors in the workplace 2.3 Triggers and implications of positive and negative emotions in the workplace	2.1 Identifying sensitively the positive and negative emotions in the workplace 2.2. Responding with appropriate emotions in the workplace 2.3Identifying possible consequences of inappropriate emotional responses in a social and work-related context

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3. Describe oneself as a learner	3.1 Factors and strategies that assist learning are identified and described 3.2 Preferred ***learning styles*** according to VAK Learning Style Model and Kolb's Theory of Learning Styles are identified 3.3 Range ***learning strategies*** appropriate to specific tasks and describe work practices that assist their learning are identified and chosen	3.1 Kolb's Theory of Learning Styles (Converger, Diverger, Assimilator, Accommodator) 3.2VAK Learning Style Model (Visual, Auditory, Kinesthetic) 3.3 Range of learning strategies appropriate to specific tasks and describe work practices that assist their learning	3.1 Identifying factors and strategies that assist learning 3.2 Applying learning styles to positively influence school/work performance 3.3Using appropriate learning strategies to improve study habits and learning

RANGE OF VARIABLES

VARIABLE	RANGE
1. Personal goals	May include: 1.1 Graduate from Tech-Voc training 1.2 Buy a car 1.3 Travel around the world
2. Career goals	May include : 2.1 Graduate from Tech-Voc training 2.2 Graduate from college 2.3 Buy a car 2.4 Retire at 50 years' old
3. Emotions	Positive emotions may include: 3.1 Joy 3.2 Gratitude 3.3 Hope 3.4 Serenity Negative emotions may include: 3.5 Anger 3.6 Fear 3.7 Disgust 3.8 Sadness
4. Social and work-related contexts	May include professional behavior such as: 4.1 Committed to developing and improving their skills 4.2 Professionals get the job done 4.3 They keep their word and deliver what they promise. May include non-professional behavior such as– 4.4 They engage in office politics 4.5 Bluffing and misrepresenting their skills 4.6 Blaming a colleague
5. Learning styles	May include: 5.1 Visual 5.2 Auditory 5.3 Kinesthetic 5.4 Converger 5.5 Diverger 5.6 Assimilator 5.7 Accommodator
6. Learning strategies	May include: 6.1 Explain and describe ideas with many details 6.2 Switch between ideas while studying 6.3 Use specific examples to understand abstract ideas

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Developed SMART personal and career goals 1.2 Applied goal setting principles 1.3 Identified sensitively the positive and negative emotions in the workplace 1.4 Responded with appropriate emotions in the workplace 1.5 Identified possible consequences of inappropriate emotional responses in a social and work-related context 1.6 Applied learning styles to positively influence school/work performance 1.7 Developed reflective practice through realization of limitations, likes/ dislikes; through showing of self-confidence
2. Resource Implications	**The following resources for should be provided**: 2.1 Access to workplace and resources
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1 Demonstration or simulation with oral questioning (ex. how to recognize emotions) 3.2 Case problems involving workplace diversity issues 3.3 Third-party report
4. Context for Assessment	3.1 Competency assessment may occur in workplace or any appropriately simulated environment

UNIT OF COMPETENCY : SUPPORT INNOVATION

UNIT CODE : 400311105

UNIT DESCRIPTOR : This unit of covers the knowledge, skills and attitudes required to identify, recognize and support innovation.

ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify the need for innovation in one's area of work	1.1 The value of ***innovative practices*** in the workplace is recognized 1.2 Creativity in ***innovation*** in one's scope of work is applied 1.3 The need for innovation in own scope of work is recognized	1.1 Clear-cut definition of innovation 1.2 Current practice in own scope of work 1.3 Workplace procedures	1.1 Contributing in brainstorming session 1.2 Examining current practice in one's scope of work 1.3 Identifying issues and concerns of one's scope of work
2. Recognize innovative and creative ideas	2.1 Opportunities within the team are identified to develop innovation 2.2 Creative ideas of coworkers pertaining to work practices are analyzed 2.3 Environment conducive for learning and innovating is maintained	2.1 Support required to generate creative ideas 2.2 Difference between innovation and creativity 2.3 Innovative climate in one's scope of work	2.1 Identifying resources required for creativity and innovation 2.2 Examining potential obstacles to and opportunities for creativity and innovation 2.3 Communicating creative ideas of co-workers

ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3. Support individuals' access to flexible and innovative ways of working	3.1 Individuals and key people are reinforced to identify innovative ideas to achieve outcomes 3.2 Sharing of best practices using flexible and innovative ways of working is accomplished 3.3 Obstacles to progress in implementing flexible and innovative ways of working are recognized	3.1 The role of employees/workers in the improvement of practices in the organization 3.2 Best practices using flexible and innovative ways of working 3.3 Obstacles in implementing innovation in one's scope of work	3.1 Encouraging co-workers to generate and develop ideas 3.2 Evaluating potential obstacles to and opportunities for creativity and innovation 3.3 Sharing of best practices related to innovation and creativity

RANGE OF VARIABLES

VARIABLE	RANGE
1. Innovative practices	May include: 1.1 Self-directed support 1.2 Community based services 1.3 Working within a collaborative arrangement 1.4 Making scope of work more efficient
2. Innovation	May include: 2.1 New ideas 2.2 Original ideas 2.3 Different ideas 2.4 Methods or tools

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Identified need for innovation in the area of work 1.2 Recognized innovative and creative ideas 1.3 Pursed agreement for flexible and innovative ways of working 1.4 Supported individuals and people to access flexible and innovative ways of working
2. Resource Implications	**Specific resources for assessment** 2.1. Evidence of competent performance should be obtained by observing an individual in an information management role within the workplace or operational or simulated environment.
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1. Written Test 3.2. Interview The unit will be assessed in a holistic manner as is practical and may be integrated with the assessment of other relevant units of competency. Assessment will occur over a range of situations, which will include disruptions to normal, smooth operation. Simulation may be required to allow for timely assessment of parts of this unit of competency. Simulation should be based on the actual workplace and will include walk through of the relevant competency components.
4. Context for Assessment	4.1 Competency may be assessed individually in the actual workplace or simulation environment in TESDA accredited institutions

UNIT OF COMPETENCY : ACCESS AND MAINTAIN INFORMATION

UNIT CODE : 400311106

UNIT DESCRIPTOR : This unit of covers the knowledge, skills and attitudes required to identify, gather, interpret and maintain information.

ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify and gather needed information	1.1. Required ***information*** is identified based on requirements. 1.2. Sources to produce required information are identified and accessed 1.3. Report information is collected, organized and recorded 1.4. Organize information is collected in a way that enables easy access and retrieval by other staff	1.1. Policies, procedures and guidelines relating to information handling in the public and private sector, including confidentiality, privacy, security, freedom of information 1.2. Data collection and management procedures 1.3. Cultural aspects of information and meaning 1.4. Sources of public sector work-related information 1.5. Public/private sector standards	1.1.Handling policies, procedures and guidelines relating to information handling in the public sector, including confidentiality, privacy, security, freedom of information 1.2.Collecting data and managing procedures 1.3.Practicing cultural aspects of information and meaning 1.4.Using public/private sector standards
2. Search for information on the internet or an intranet	2.1. Engine is search to find and select appropriate information 2.2. Suitable techniques are used to make it easier to find useful information and to pass it on to others Records are use where useful information came from 2.3. Results are used for searches of useful information 2.4. ***Search engine*** is chosen appropriate	2.1. Find and select appropriate information 2.2. Techniques in finding useful information Records are use where useful information came from 2.3. Search engines for information	2.1. Finding and selecting search engine to find and select appropriate information 2.2. Using suitable techniques to find useful information easier 2.3. Using records 2.4. Carrying out Searches

ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	for the information that is needed 2.5. Searches are carry out as per requirements		
3. Examine information	3.1. Information and its ***sources*** are evaluated for relevance and validity to business and/or client requirements. 3.2. Information is examined as required to identify key issues. 3.3. Detailed evaluation of information is carried out as required using relevant techniques including mathematical calculations.	3.1. Data evaluation procedures 3.2. Cultural aspects of information and meaning 3.3. Sources of public sector work-related information 3.4. Public sector standards	3.1. Evaluating data 3.2. Practicing cultural aspects of information and meaning 3.3. Using public sector standards
4. Secure information	4.1. Basic file-handling techniques are used for the software 4.2. Techniques is used to handle, organize and secure information	4.1. Policies, procedures and guidelines relating to information handling in the public sector, including confidentiality, privacy, security, freedom of information 4.2. Basic file-handling techniques 4.3. Techniques in handling, organizing and saving files 4.4. Electronic and manual filing systems	4.1. Handling policies, procedures and guidelines relating to information handling in the public sector, including confidentiality, privacy, security, freedom of information 4.2. Using basic file-handling techniques is used for the software 4.3. Using different techniques in handling, organizing and saving files

ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
			4.4. Using electronic and manual filing systems
5. Manage information	5.1. Information and records are maintained to ensure data and system integrity using a range of standard and complex information systems and operations. 5.2. Routine data and records are reconciled as required. 5.3. Inadequacies in system/s relating to information retrieval are identified and corrected or reported to relevant staff as required.	5.1. Policies, procedures and guidelines relating to information handling in the public sector, including confidentiality, privacy, security, freedom of information 5.2. Data collection and management procedures 5.3. Organizational information handling and storage procedures 5.4. Cultural aspects of information and meaning 5.5. Sources of public sector work-related information 5.6. Public sector standards 5.7. Databases and data storage systems	5.1. Handling policies, procedures and guidelines relating to information handling in the public sector, including confidentiality, privacy, security, freedom of information 5.2. Collecting data and managing procedures 5.3. Handling organizational information and storage procedures 5.4. Practicing cultural aspects of information and meaning 5.5. Using public sector standards 5.6. Managing databases and data storage systems

RANGE OF VARIABLES

VARIABLE	RANGE
1. Information	May include: 1.1. Property 1.2. Organizational 1.3. Technical reference
2. Search engine	May include: 2.1. Crawler-based search engine 2.1.1. Google 2.1.2. All the Web 2.1.3. Alta Vista 2.2. Human-powered directories 2.2.1. Yahoo directory 2.2.2. Open directory 2.2.3. Look smart
3. Sources	May include: 3.1. Other IT systems 3.2. Manually created 3.3. Within own organization 3.4. Outside own organization 3.5. Geographically remote

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Identified and gathered needed information 1.2 Searched for information on the internet or an intranet 1.3 Studied and interpreted information 1.4 Handled files 1.5 Maintained information
2. Resource Implications	Specific resources for assessment 2.1. Evidence of competent performance should be obtained by observing an individual in an information management role within the workplace or operational or simulated environment.
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1. Written Test 3.2. Interview 3.3. Portfolio The unit will be assessed in a holistic manner as is practical and may be integrated with the assessment of other relevant units of competency. Assessment will occur over a range of situations, which will include disruptions to normal, smooth operation. Simulation may be required to allow for timely assessment of parts of this unit of competency. Simulation should be based on the actual workplace and will include walk through of the relevant competency components.
4. Context for Assessment	4.1. In all workplace, it may be appropriate to assess this unit concurrently with relevant teamwork or operation units.

UNIT OF COMPETENCY: FOLLOW OCCUPATIONAL SAFETY AND HEALTH POLICIES AND PROCEDURES

UNIT CODE : 400311107

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes to identify relevant occupational safety and health policies and procedures, perform relevant occupational safety and health procedures, and comply with relevant occupational safety and health policies and standards

ELEMENTS	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify relevant occupational safety and health policies and procedures	1.1 Related ***occupational safety and health risks and hazards*** are recognized based on ***OSH work standards*** 1.2 ***OSH requirements/ regulations*** **towards** work are determined in accordance to workplace policies and procedures 1.3 ***Incident/ Emergency procedures*** relevant to workplace are identified based on relevant OSH work standards	1.1. Occupational safety and health risks and hazards 1.2. OSH work standards 1.3. Government approved Occupational Safety and Health Policies and regulations 1.4. Terms related to occupational safety and health 1.5. Workplace process and procedures 1.6. Standard emergency plan and procedures	1.1 Observation skills 1.2 Critical thinking skills 1.3 Communication skills

ELEMENTS	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Perform relevant occupational safety and health procedures	2.1 Safety devices are checked in accordance with workplace OSH work standards 2.2 ***OSH Work instructions*** are followed in accordance with workplace policies and procedures* 2.3 ***Personal protective equipment*****,** materials, tools, machinery, and equipment are utilized according to OSH work standards	2.1 OSH Work Instructions Personal protective equipment 2.2 Safe handling procedures of tools, equipment and materials 2.3 Standard emergency plan and procedures 2.4 Different OSH control measures 2.5 Standard accident and illness reporting procedures	2.1 Communication skills 2.2 Knowledge management 2.3 Organizing skills 2.4 Observation skills
3. Comply with relevant occupational safety and health policies and standards	3.1 ***Preventive Control Measures*** are identified in accordance with OSH work standards 3.2 OSH requirements are obeyed in accordance with workplace policies and procedures 3.3 Incident/ Emergency procedures are executed based on OSH Procedures	3.1 OSH Preventive Control Measures 3.2 Principles of 5S 3.3 Environmental requirements relative to industrial wastes disposal 3.4 OSH requirements relative to safe handling and disposal of materials 3.5 Personal hygiene practices	3.1 Communication skills 3.2 Knowledge management 3.3 Organizing skills 3.4 Critical thinking skills 3.5 Observation skills

RANGE OF VARIABLES

VARIABLE	RANGE
1. Occupational Safety and Health Risks and Hazards	May include: 1.1 Physical hazards – impact, illumination, pressure, noise, vibration, extreme temperature, radiation 1.2 Biological hazards- bacteria, viruses, plants, parasites, mites, molds, fungi, insects 1.3 Chemical hazards – dusts, fibers, mists, fumes, smoke, gasses, vapors 1.4 Ergonomics 1.5 Psychological factors – over exertion/ excessive force, awkward/static positions, fatigue, direct pressure, varying metabolic cycles 1.6 Physiological factors – monotony, personal relationship, work out cycle 1.7 Safety hazards (unsafe workplace condition) – confined space, excavations, falling objects, gas leaks, electrical, poor storage of materials and waste, spillage, waste and debris 1.8 Unsafe workers' act (Smoking in off-limited areas, Substance and alcohol abuse at work)
2. OSH Work Standards	May include: 2.1 OSHS Rule 1090 Hazardous Materials 2.2 OSHS Rule Gas & Electric Welding and Cutting Operations 2.3 OSHS Rule 1120 Hazardous Work Processes 2.4 OSHS Rule 1150 Materials Handling & Storage 2.5 OSHS Rule 1180 Internal Combustion Engine 2.6 OSHS Rule 1210 Electrical Safety 2.7 OSHS Rule 1420 Logging 2.8 OSHS Rule 1410 Construction Safety 2.9 OSHS Rule 1950 Pesticides & Fertilizers
3. OSH Requirements/ Regulations	May include: 3.1 Clean Air Act 3.2 Building code 3.3 National Electrical and Fire Safety Codes 3.4 Waste management statutes and rules 3.5 Permit to Operate 3.6 Philippine Occupational Safety and Health Standards 3.7 Department Order No. 13 (Construction Safety and Health) 3.8 ECC regulations 3.9 Republic Act No. 11058 – An Strengthening Compliance with Occupational Safety and Health
4. Incident and Emergency Procedures	May include: 4.1 Chemical spills 4.2 Equipment/vehicle accidents 4.3 Explosion

	4.4 Fire Drill 4.5 Gas leak 4.6 Injury to personnel 4.7 Structural collapse 4.8 Earthquake drill 4.9 Toxic and/or flammable vapors emission 4.10 Evacuation 4.11 Isolation 4.12 Basic life support/CPR 4.13 Decontamination 4.14 Calling designed emergency personnel
5. OSH Work Instructions	May include: 5.1 Worker's Participation Policies 5.2 Company Environment Safety and Health Policies 5.3 Continual OSH Improvement Instructions 5.4 Education and Training 5.5 Safety and Health Policy Statements 5.6 Mission and Vision Statements 5.7 Operating Instructions and Policies
6. Personal Protective Equipment	May include: 6.1 Arm/Hand guard, gloves 6.2 Eye protection (goggles, shield) 6.3 Hearing protection (ear muffs, ear plugs) 6.4 Hair Net/cap/bonnet 6.5 Hard hat 6.6 Face protection (mask, shield) 6.7 Apron/Gown/coverall/jump suit 6.8 Anti-static suits 6.9 High-visibility reflective vest
7. Preventive Control Measures	May include: 7.1 Eliminate the hazard (i.e., get rid of the dangerous machine 7.2 Isolate the hazard (i.e. keep the machine in a closed room and operate it remotely; barricade an unsafe area off) 7.3 Substitute the hazard with a safer alternative (i.e., replace the machine with a safer one) 7.4 Use administrative controls to reduce the risk (i.e. give trainings on how to use equipment safely; OSH-related topics, issue warning signage's, rotation/shifting work schedule) 7.5 Use engineering controls to reduce the risk (i.e. use safety guards to machine) 7.6 Use personal protective equipment 7.7 Safety, Health and Work Environment Evaluation 7.8 Periodic and/or special medical examinations of workers

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1. Recognize related occupational safety and health risks and hazards based on OSH work standards 1.2. Identify incident/emergency procedures relevant to workplace based on relevant OSH work standards 1.3. Follow the OSH work instructions in accordance with workplace policies and procedures 1.4. Utilize personal protective equipment, materials, tools, machinery, and equipment according to OSH work standards 1.5. Obey OSH requirements in accordance with workplace policies and procedures 1.6. Executed incident/ emergency procedures based on OSH Procedures
2. Resource Implications	**The following resources should be provided:** 2.1 Facilities, materials tools and equipment necessary for the activity
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1 Observation/Demonstration with oral questioning 3.2 Third party report
4. Context for Assessment	4.1 Competency may be assessed in the work place or in a simulated work place setting

UNIT OF COMPETENCY : APPLY ENVIRONMENTAL WORK STANDARDS

UNIT CODE : 400311108

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitude to identify environmental work hazards, follow environment work procedures and comply with environmental requirements

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify environmental work hazards	1.1 Related ***environmental hazards*** are recognized based on ***environmental work standards*** 1.2 Environmental work standards are interpreted in accordance to relevant policies 1.3 ***Required resources*** to minimize effect of environmental hazards are prepared based on relevant environmental work standards	1.1 Environmental Hazards 1.2 Environmental Work Standards 1.3 Required Resources 1.4 OSH Standards 1.5 Fight against poverty rights 1.6 Environmental Protection 1.7 Respect of Human Rights	1.1. Critical thinking 1.2. Problem solving 1.3. Observation Skills
2. Follow environmental work procedures	2.1 ***Environmental protection*** pre-cautionary activities are practiced based on environmental work procedures ***2.2*** Work activities are executed in accordance with ***Environmental Work Procedures*** 2.3 Environmental Protection Post-Activities are accomplished based on environmental work procedures*	2.1 Environmental Protection 2.2 Environmental Work Procedures 2.3 Renewable Energies	2.1 Critical thinking 2.2 Problem solving 2.3 Observation Skills

3. Comply with environmental work requirements	3.1. Required resources are utilized in accordance with workplace environmental policies 3.2. ***Environmental hazardous and non-hazardous*** *materials* are stored in accordance with ***environmental regulations*** 3.3. Hazardous and Non-hazardous Wastes disposed according to environmental regulations	3.1 Environmental Work Procedures 3.2 Environmental Laws 3.3 Environmental Hazardous and Non-Hazardous Materials	3.1 Critical thinking 3.2 Problem solving 3.3 Observation Skills

RANGE OF VARIABLES

VARIABLE	RANGE
1. Environmental Hazards	May include: 1.1 Tobacco Smoke 1.2 Asbestos 1.3 Lead 1.4 Combustion Gases 1.5 Chemicals 1.6 Pesticides 1.7 Pollutants 1.8 Contaminated Drinking Water 1.9 Noise 1.10 Dust
2. Environmental Work Standards	May include: 2.1 Air Quality Standards 2.2 Emission Standards 2.3 ISO 14001: Environmental Management System 2.4 Environmental Statements 2.5 Environmental Quality Standards 2.6 Work Environment Measurement Standard
3. Required Resources	May include: 3.1 Electric 3.2 Water 3.3 Fuel 3.4 Telecommunications 3.5 Supplies and Materials 3.6 Trash Cans 3.7 Relevant Data Sheets 3.8 Barriers or Barricades
4. Environmental Protection	May include protection against 4.1 Overconsumption of Resources 4.2 Destruction of Ecosystems 4.3 Habitat Destructions 4.4 Extinction of Wildlife 4.5 Pollutions 4.6 Water Degradation
5. Environmental Work Procedures	May include: 5.1 Environmental pollution control measures 5.2 Oil and Fuel use 5.3 Disposal and Reuse 5.4 Herbicide applications 5.5 Breed Bird Mitigation 5.6 Tree Removal Works 5.7 Erosion Protection 5.8 Scrub Clearance 5.9 Bankside sediment clearance

6.	Environmental Hazardous and Non-Hazardous Materials	May include: 6.1 Acids 6.2 Adhesives 6.3 Aerosols 6.4 Asbestos 6.5 Batteries 6.6 Chemicals 6.7 Compact fluorescent lamps 6.8 Drugs 6.9 Dyes 6.10 E-Waste 6.11 Gasoline 6.12 Grease 6.13 Lead 6.14 Motor Oil 6.15 Solvents 6.16 Weed Killers
7.	Environmental Regulations	May include: 7.1 Clean Air Act 7.2 Clean Water Act 7.3 Endangered Species Act 7.4 Resource Conservation and Recovery Act 7.5 Cave Resources and Management Act 7.6 Fisheries Code 7.7 Forestry Code 7.8 Mining Act

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1. Interpreted the Environmental Work Standards in accordance to relevant policies 1.2. Prepared required resources to minimize effects of environmental hazards based on relevant environmental work standards 1.3. Practiced environmental protection pre-cautionary activities based on environmental work procedures 1.4. Executed work activities in accordance with environmental work procedures 1.5. Accomplished environmental protection post-activities based on environmental work procedures 1.6. Stored environmental hazardous and non-hazardous materials in accordance with environmental regulations 1.7. Disposed hazardous and non-hazardous wastes according to environmental regulations
2. Resource Implications	**The following resources should be provided:** 2.1. Workplace with storage facilities 2.2. Tools, materials and equipment relevant to the tasks (ex. Cleaning tools, cleaning materials, trash bags, etc.) 2.3. PPE 2.4. Manuals and references
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1. Demonstration 3.2. Oral questioning 3.3. Written examination
4. Context for Assessment	4.1. Competency assessment may occur in workplace or any appropriately simulated environment 4.2. Assessment shall be observed while task is being undertaken whether individually or in-group

UNIT OF COMPETENCY : **ADOPT ENTREPRENEURIAL MINDSET IN THE WORKPLACE**

UNIT CODE : **400311109**

UNIT DESCRIPTOR : This unit covers the outcomes required to support and internalize an entrepreneurial mindset and observe basic entrepreneurial practices in the workplace.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Determine entrepreneurial mindset	1.1 ***Entrepreneurial mindset*** in the workplace is determined from enterprise practices and policies. 1.2 Entrepreneurial mindset in the workplace is studied and affirmed based on current enterprise practices 1.3 Clarification from reliable ***sources*** is sought regarding entrepreneurial mindset and corporate culture.	1.1 Workplace policies and practices relating to entrepreneurship 1.2 Elements of corporate culture 1.3 Entrepreneurial mindset 1.4 Entrepreneurial practices in the workplace 1.5 Desirable attitudes: - Patience - Willingness to learn - Attention to details	1.1 Identifying entrepreneurial mindset 1.2 Studying and affirming entrepreneurial mindset 1.3 Selecting and emulating desirable entrepreneurial practices 1.4 Communication skills

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Identify entrepreneurial practices	2.1 Entrepreneurial practices are determined based on enterprise requirements 2.2 Entrepreneurial practices are performed following workplace and client requirements. 2.3 Cost-effective measures are complied with reference to workplace best practices	2.1 Quality assurance practices 2.2 Workplace and client requirements 2.3 Types of cost-effective measures 2.4 Workplace quality policy 2.5 Attitude: - Patience - Attention to details	2.1 Performing quality assurance practices 2.2 Complying quality assurance requirements 2.3 Complying to cost-effective measures 2.4 Communication skills

RANGE OF VARIABLES

VARIABLE	RANGE
1. Entrepreneurial mindset	May include workplace thinking relating to: 1.1 Economy in the use of resources 1.2 Waste management 1.3 Quality-consciousness 1.4 Cost-consciousness 1.5 Safety- and health- consciousness
2. Quality assurance practices	May include: 2.1 Use of quality procedures manual 2.2 Quality policy 2.3 Best/Good practices 2.4 Continuous improvement program
3. Reliable sources	May include: 3.1 Supervisors 3.2 Colleagues 3.3 Clients/Partners

EVIDENCE GUIDE

1. Critical aspects of competency	**Assessment requires evidence that the candidate:** 1.1 Demonstrated affirmation of entrepreneurial mindset 1.2 Observed entrepreneurial practices 1.3 Complied with cost effective measures
2. Resource Implications	**The following resources should be provided:** 2.1 Simulated or actual workplace Tools, materials and supplies needed to demonstrate the required tasks 2.2 References and manuals
3. Methods of Assessment	**Competency in this unit may be assessed through :** 3.1 Written examination 3.2 Demonstration/observation with oral questioning 3.3 Third-party report
4. Context of Assessment	4.1 Competency may be assessed in workplace or in a simulated workplace setting 4.2 Assessment shall be observed while tasks are being undertaken whether individually or in-group

COMMON COMPETENCIES

UNIT OF COMPETENCY : INTERPRET DRAWINGS AND SKETCHES

UNIT CODE : MEE721202

UNIT DESCRIPTOR : This unit covers the competencies required to read and interpret drawings and sketches.

ELEMENT	PERFORMANCE CRITERIA *Italicized* terms are elaborated in the Range of Variable	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Interpret technical drawing	1.1 Dimensions identified as appropriate. 1.2 Instructions identified and followed as required. 1.3 Material requirements identified as required. 1.4 Symbols recognized as appropriate in the ***drawing/ sketch*.** 1.5 ***Tolerance***, limits and fits identified in the drawing.	1.1 Alphabet of lines 1.2 Projections 1.3 Drawing symbols 1.4 Dimensioning techniques 1.5 Tolerance, limits and fits 1.6 Engineering materials 1.7 Drawing tools and supplies 1.8 AWF-CWCS/ ISO 9606-1 / AWS D1.1 / ASME IX.	1.1 Identifying dimension 1.2 Identifying instruction 1.3 Identifying material 1.4 Recognizing symbols in the drawing 1.5 Identifying tolerance, limits and fits
2. Interpret details from freehand sketch	2.1 Dimensions identified as appropriate. 2.2 Instructions identified and followed as required. 2.3 Material requirements identified as required. 2.4 Symbols recognized as appropriate in the drawing.	2.1 Alphabet of lines 2.2 Projections 2.3 Drawing symbols 2.4 Dimensioning techniques 2.5 Tolerance, limits and fits 2.6 Engineering materials 2.7 Drawing tools and supplies 2.8 AWF-CWCS/ ISO 9606-1 / AWS D1.1 / ASME IX.	2.1 Identifying dimensions 2.2 Identifying instruction 2.3 Identifying material requirements 2.4 Recognizing symbols

RANGE OF VARIABLES

VARIABLE	RANGE
1. Drawing/sketch	May include: 1.1 Perspective 1.2 Joint design 1.3 Welding symbols
2. Tolerance	May include: 2.1 General tolerance 2.2 Groove Angle 2.3 Root Face 2.4 Root Opening

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate interpreted: 1.1 Drawings 1.2 Sketches.
2. Resource implications	The following resources must be provided: 2.1 Drawings or plans 2.2 Sketches 2.3 Measuring tools
3. Method of assessment	Competency must be assessed through: 3.1 Direct observation 3.2Written or oral short answer questions 3.3 Demonstration
4. Context for assessment	4.1 Competency may be assessed in the workplace or in simulated workplace environment or at the designated TESDA Accredited Assessment Center.

UNIT OF COMPETENCY : PERFORM BASIC WORKSHOP MEASUREMENTS & COMPUTATIONS

UNIT CODE : MEE721210

UNIT DESCRIPTOR : This unit covers the competencies required to perform proper measurement and simple calculations using the four fundamental operations.

ELEMENTS	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Select and use measuring tools	1.1 ***Measuring tools*** are selected according to the requirement. 1.2 Measuring tools are used according to the requirement 1.3 Measuring technique used is correct and appropriate to the device used.	1.1 Types, purposes and accuracy of measuring instruments 1.2 Capability of measuring instruments 1.3 Part dimensions and tolerances 1.4 Techniques for measuring dimensions	1.1 Selecting measuring tools 1.2 Obtaining accurate measurements 1.3 Determining measuring technique
2. Clean and store measuring tools	2.1 Cleaning of devices undertaken according to standard operating procedures. 2.2 Care of devices undertaken according to manufacturer's specifications. 2.3 Storage of devices undertaken according to standard operating procedures.	2.1 Types, purposes and accuracy of measuring instruments 2.2 Capability of measuring instruments 2.3 Part dimensions and tolerances 2.4 Techniques for measuring dimensions 2.5 Care and storage procedure of measuring tools	2.1 Determining proper care and storage of measuring tools.
3. Perform four fundamental operations.	3.1 Simple calculations are performed using ***four fundamental operations***. 3.2 Correct formula are applied to isolate the variable required. 3.3 Simple transposition of variables in the formulae is carried out. 3.4 Unknown variables are solved correctly.	3.1 Linear measurement 3.2 Geometrical measurement 3.3 Ratio and proportion 3.4 Area	3.1 Performing Calculation

4. Perform conversion of units	4.1 Familiarity to English system of measurement is required 4.2 Understanding to the metric system is necessary. 4.3 ***Units*** are converted to the required figure using the given formulae	4.1 English Systems of Measurement 4.2 Metric System of Measurement 4.3 Conversion of units from English to metric and/or vice versa	4.1 Performing Calculation

RANGE OF VARIABLES

VARIABLE	RANGE
1. Measuring tools	May include: 1.1 Try square 1.2 Steel rule 1.3 Welding gauges
2. Four fundamental operations	May include: 2.1 Addition 2.2 Subtraction 2.3 Multiplication 2.4 Division
3 Units	May include: 3.1 English System 3.2 Metric System

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Selected and used measuring tools. 1.2 Cleaned and stored using measuring tools 1.3 Used four fundamental operations 1.4 Performed conversion of units
2. Resource implications	The following resources must be provided 2.1 Tools and facilities appropriate to processes or activity 2.2 Materials relevant to the proposed activity
3. Method of assessment	Competency must be assessed through: 3.1 Written or oral short answer questions 3.2 Practical exercises
4. Context for assessment	4.1 Competency may be assessed in the workplace or in simulated workplace environment or at the designated TESDA Accredited Assessment Center.

UNIT OF COMPETENCY : CONTRIBUTE TO QUALITY MANAGEMENT SYSTEM (QMS)

UNIT CODE : MEE721211

UNIT DESCRIPTOR : This unit involves competence required to contribute to quality management system towards work

ELEMENTS	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Apply quality management system (QMS)	1.1 Appropriate ***quality systems and procedures*** are applied throughout the production/fabrication process. 1.2 Documented information are properly controlled 1.3 QMS are properly implemented and maintained	1.1 Awareness on applicable quality management system / standards	1.1Conforming to QMS
2.Apply quality standards to work	2.1 Inspections are conducted throughout the production processes to ensure quality standards are maintained. 2.2 Appropriate quality standards are applied throughout the production/fabrication processes. 2.3 All activities are coordinated throughout the workplace to ensure efficient quality work outcomes. 2.4 Records of work quality are maintained according to the company requirements.	2.1 Awareness on applicable quality management system / standards	2.1 Conforming to QMS
3.Protect company property and customer interests	3.1 Possible damage to ***company property*** is avoided by adherence to company quality procedures. 3.2 Quality of work is reviewed to ensure customer requirements	3.1 Awareness on applicable quality management system / standards	3.1 Conforming to QMS

	and company standards are met. 3.3 Customer feedback system is established.		

RANGE OF VARIABLES

VARIABLE	RANGE
1. Quality system and procedures	Quality system and procedures may be contained in: 1.1 Work instructions 1.2 Procedures manual 1.3 Safe work procedures 1.4 Equipment maintenance schedules 1.5 Product technical procedures adopted or specifically prepared standards 1.6 Company/industry rules
2. Company property	Company property includes: 2.1 production and/or fabrication equipment 2.2 hand and power tools 2.3 OH&S paraphernalia 2.4 facilities

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Contributed to QMS towards work 1.2 Applied quality standards to work 1.3 Protected company property and customer interests
2 Resource implications	The following resources should be provided 2.1 Quality manuals / procedures 2.2 Applicable Codes, Standards and Specifications 2.3 Company / Industry rules
3. Method of assessment	Competency should be assessed through: 3.1 Demonstration 3.2 Written or oral short answer questions
4. Context for assessment	4.1 Competency may be assessed in the workplace or in simulated workplace environment or at the designated TESDA Accredited Assessment Center.

UNIT OF COMPETENCY : USE HAND TOOLS

UNIT CODE : MEE721205

UNIT DESCRIPTOR : This unit covers the competencies required to use hand tools.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms are elaborated* in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1.Identify and use of Personal Protective Equipment (PPE)	1.1 ***Personal protective equipment (PPE)*** is used in accordance with Rule 1080 of Occupational Safety and Health Standards 1.2 Proper Care and Maintenance of PPEs are performed in accordance with OSHS 1.3 Storage and Disposal of PPE are followed according to OSHS	1.1 OSH rule 1080 work standard 1.2 Company/ workplace policies/ guidelines 1.3 Standards and safety requirements of work process and procedures	1.1 Applying safety procedures 1.2 Communication skill 3.3 Observation skills
2. Select and use of tools and equipment	2.1 ***Hand tools*** selected are appropriate to the requirements of the ***task*.** 2.2 Tools and equipment are inspected according to manufacturer's recommendation 2.3 Tools and equipment are used as per operation manual instructions.	2.1 Tools and equipment Instruction manual 2.2 Adherence to work requirements	2.1 Communication skills 2.2 Handling of tools and equipment
3.Perform simple maintenance of tools and equipment	3.1Tools and equipment are cleaned and lubricated ***(routine maintenance)*** according to manufacturer's recommendation. 3.2 Unsafe or defective tools are identified and marked for repair/ decommission according to procedure. 3.3 Minor tools and equipment repair are performed according	3.1 Proper cleaning and oiling. 3.2 Equipment inspection and maintenance. 3.3 Simple repairs of hand tools	3.1Cleaning and lubricating. 3.2 Conducting simple check –up and remedies 3.3 Performing minor repairs

	to manufacturer's instruction or worksite procedure.		

RANGE OF VARIABLES

VARIABLE	RANGE
1. Personal protective Equipment (PPE)	May include: 1.1 Welding Mask 1.2 Welding apron/jacket 1.3 Welding gloves (long) 1.4 Safety goggles 1.5 Respirator (as per NIOSH) 1.6 Safety shoes 1.7 Oxy-acetylene Goggles
2. Hand tools	May include: 2.1 Chipping Hammer 2.2 Steel brush 2.3 Pliers/ tongs 2.4 Files-bastard cut 2.5 Portable disc grinder 2.6 Try square 2.7 Steel rule 2.8 Files-half round 2.9 Welding gauges 2.10 Adjustable wrench 2.11 C- Clamps
3. Task	May include: 3.1 Testing / Inspection 3.2 Adjusting 3.3 Dismantling 3.4 Assembling
4. Routine maintenance	May include: 4.1 Cleaning 4.2 Lubricating 4.3 Adjusting 4.4 Simple tool repair

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Selected and used hand tools appropriate to the job 1.2 Performed routine maintenance and storage of hand tools
2 Resource implications	The following resources should be provided 2.1 Tools, equipment and facilities appropriate to the process or activity 2.2 Materials relevant to the proposed activity
3. Method of assessment	Competency should be assessed through: 3.1 Demonstration 3.2 Written or oral short answer questions 3.3 Practical exercises
4. Context for assessment	4.1 Competency may be assessed in the workplace or in simulated workplace environment or at the designated TESDA Accredited Assessment Center.

UNIT TITLE : PREPARE MATERIALS AND CONSUMABLES

UNIT CODE : MEE721212

DESCRIPTOR : This unit covers the skills, knowledge and attitudes in preparing welding materials.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** *are elaborated* in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify and use of Personal Protective Equipment (PPE)	1.1 *Personal protective equipment (PPE)* is used in accordance with Rule 1080 of Occupational Safety and Health Standards 1.2 Proper Care and Maintenance of PPEs are performed in accordance with OSHS 1.3 Storage and Disposal of PPE are followed according to OSHS	1.1 OSH rule 1080 work standard 1.2 Company/ workplace policies/ guidelines 1.3 Standards and safety requirements of work process and procedures	1.1 Applying safety procedures 1.2 Communication skill 1.3 Observation skills
2. Set up cutting equipment and materials	2.1 ***Cutting equipment*** should be operational and conformed to acceptable standards 2.2 Setting-up of equipment and ***materials*** are performed according to standard operating procedure 2.3 Task performed in accordance with company or industry requirements and ***safety practices.***	2.1 ANSI Z49.1 or equivalent safety standards 2.2 Work instructions (written and verbal). 2.3 Noise Pollution 2.4 Air pollution	2.1 Identifying Material requirements 2.2 Conducting equipment and material set-ups 2.3Applying safety procedures
3.Cut and prepare edge of materials	3.1 Materials are cut to specified dimension/ specifications. 3.2 Edges are prepared in accordance to specified shapes and configurations. 3.3 Task performed in accordance with company or industry requirements and safety procedure.	3.1 ANSI Z49.1 or equivalent safety standards 3.2Work instructions (written and verbal). 3.3Noise Pollution 3.4 Air pollution 3.5 5S and Proper Housekeeping 3.6 Waste Segregation/ 3R	3.1 Obtaining accurate measurement 3.2 Applying safety procedures 3.3 Communication skill 3.4 Observation skills

		3.7AWF-CWCS/ ISO 9606-1 / AWS D1.1 / ASME IX.	
4.Clean surfaces and edges	4.1 ***Cleaning methods*** of the surfaces are required as per specifications. 4.2 Surfaces and edges are properly cleaned and free from contaminants. 4.3 Task performed in accordance with company or industry requirements and safety practices.	4.1 Cutting Methods 4.2 OSH Standards 4.3 Work instructions (written and verbal). 4.4Types / purposes and accuracy of edge preparation 4.5 5S and Proper Housekeeping 4.6 Waste Segregation/ 3R 4.7 AWF-CWCS/ ISO 9606-1 / AWS D1.1 / ASME IX.	4.1Determining proper care and cleanliness of the material. 4.2 Applying safety procedures 4.3 Communication skill 4.4 Observation skills
5.Prepare welding consumables	5.1***Consumable***s are prepared in accordance with required specifications 5.2 Recommended manufacturer's instructions are observe 5.3Task performed in accordance with company or industry requirements and safety practices.	5.1 Selection of proper welding consumables 5.2 Work instructions (written and verbal). 5.3 OSH rule 1080-Personal Protective equipment and device. 5.4 OSH rule no. 1150-Materials Handling Storage. 5.5 RA 6969-Toxic substances and hazardous and nuclear wastes control act of 1990. 5.6 Material Safety Data Sheet (MSDS)/ Safety Data Sheet (SDS) 5.7 5S and Proper Housekeeping 5.8 Waste Segregation/ 3R 5.9 AWF-CWCS/ ISO 9606-1 / AWS D1.1 / ASME IX.	5.1 Selecting of appropriate welding consumables 5.2 Applying safety procedures 5.3 Communication skill 5.4 Observation skills

RANGE OF VARIABLE

VARIABLE	RANGE
1. Cutting Equipment	May include: 1.1 Oxy-fuel gas cutting equipment (manual and /or automatic) 1.2 Plasma cutting equipment 1.3 Shearing machine 1.5 Cut-off Wheel
2. Materials	May include: 2.1 Mild steel / Carbon Steel Plates 2.2 Run on/run off tabs
3. Safety practices:	May be include: 3.1 Wearing of required PPE 3.2 Handling and storage of materials and equipment 3.3 Safety Data Sheet (SDS) 3.4 Safety standards and procedures 3.5 Checking electrical equipment and devices 3.6 House keeping
4. Cleaning Methods	Surfaces and edges may be cleaned by 4.1 Grinding 4.2 Filing 4.3 Steel Brushing
5 Consumables	May include: 5.1 Cutting gases 5.2 Welding Electrodes 5.3 Grinding/cutting discs

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Perform edge preparation in accordance with WPS and safety procedures 1.2 Use edge preparation equipment and tools in accordance with the requirements or manufacturer's instructions
2.Resource implications	The following resources must be provided: 2.1 Relevant documentation such as WPS and working drawing 2.2 Materials and consumables 2.3 Cutting equipment and accessories 2.4 Cleaning tools and equipment 2.2 Measuring tools 2.3 PPE 2.4 Firefighting equipment
3. Method of assessment	Competency may be assessed through: 3.1 Observation/evaluation 3.2 Oral questioning 3.3 Practical exercises
4 Context of assessment	4.1 Competency to be assessed while a task is being undertaken in the workplace or in a simulated workplace setting or at the designated TESDA Accredited Assessment Center.

CORE COMPETENCIES

UNIT TITLE : SET UP WELDING EQUIPMENT

UNIT CODE : MEE721321

DESCRIPTOR : This unit covers the skills, knowledge and attitudes in preparing equipment for welding.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms are elaborated* in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1.1 Set up welding machine	1.1 Selected ***welding machine*** is prepared in accordance with job requirements, welding procedures and specifications, drawings, sketches and manufacturer's instructions. 1.2 Welding machine is connected to an independent power supply and set to the ***polarity***-required in the welding procedures / specifications. 1.3 Current is adjusted consistent with job requirements to produce acceptable weld. 1.4 Task is completed without causing damage to the equipment, tools and materials and injury to self and others. 1.5 Task is performed in accordance with company or industry requirements and safety procedure. 1.6 Required output is completed as per WPS and verified by immediate supervisor 1.7 Safety requirements are complied as per welding machine	1.1 Basic electricity 1.2 Welding machine Instruction manual (including maintenance, validation, calibration) 1.3 Arc welding Processes 1.4 Welding Procedure Specification 1.5 OSH Standards 1.6 Work Instructions (written and verbal). 1.7 Productivity work measurements 1.8 Adherence to work requirements 1.10 5S and Proper Housekeeping 1.11 Waste Segregation/ 3R 1.12 AWF-CWCS/ ISO 9606-1 / AWS D1.1 / ASME IX. 1.13 DOLE DO 198s2018 policies on OSH as applicable 1.14 DOH guidelines on safety and health as applicable	1.1 Setting-up of welding machines 1.2Understanding and applying welding procedure 1.3 Applying safety procedures

	manufacturers recommendations		
2. Set up welding accessories	2.1 Welding accessories are identified in accordance with job requirements, welding procedure specifications, drawings, sketches and manufacturer's instructions. 2.2 Welding ***accessories*** are set up in accordance with job requirements, welding procedure specifications and manufacturer's instructions and safety requirements. 2.3 Task is performed in accordance with company or industry requirements and safety procedure 2.4 Required output is verified correct by immediate supervisor	2.1 Identification of Welding Accessories 2.2 Understanding Welding machine Instruction manual 2.3 OSH Standards 2.4 Work instructions (written and verbal). 2.5 Productivity work measurements 2.6 Adherence to work requirements 2.7 5S and Proper Housekeeping 2.8 Waste Segregation/ 3R 2.9 AWF-CWCS/ ISO 9606-1 / AWS D1.1 / ASME IX. 2.10 DOLE DO 198s2018 policies on OSH as applicable 2.11 DOH guidelines on safety and health as applicable	2.1Setting-up welding accessories 2.2 Applying safety procedures
3. Set up welding positioner, jigs and fixtures	3.1 Braces, stiffeners, and other jigs are provided and in conformity with job requirements. 3.2 Task is performed in accordance with company or industry requirements and safety procedure 3.3 Required output is verified correct by immediate supervisor	3.1 Understanding drawing and sketches 3.2 Familiarity in different positioners, jigs and fixtures 3.3 OSH Standards 3.4 Work instructions (written and verbal). 3.5 Productivity work measurements 3.6 Adherence to work requirements 3.7 5S and Proper Housekeeping 3.8 Waste Segregation/ 3R 3.9 AWF-CWCS/ ISO 9606-1 / AWS D1.1 / ASME IX. 3.10 DOLE DO 198s2018	3.1 Installation of positioners, jigs and fixtures 3.2 Applying safety procedures

		policies on OSH as applicable 3.11 DOH guidelines on safety and health as applicable	

RANGE OF VARIABLE

VARIABLE	RANGE
1. Welding machine	Different types of power sources used in MMAW/SMAW process: 1.1 Rectifier 1.2 Transformer 1.3 Transformer – Rectifier 1.4 Generator 1.5 Inverter
2. Welding Polarity	Different types of polarity may be used: 2.1 Direct Current –Electrode DCEN) 2.2 Direct Current – Electrode DCEP) 2.3 Alternating Current (AC)
3. Accessories	May include: 3.1 Welding cables 3.2 Electrode holders 3.3 Return clamps 3.4 Male and female connectors

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Set up and install welding machine, accessories, welding positioners, jigs and fixtures within allotted time and in accordance with OH&S rules and accessible and convenient location. 1.2 Observed safety measures applicable to worksite operation 1.3 Communicated effectively with others to ensure effective work 1.4 Observed and complied with the productivity requirements 1.5 Complied with attitudinal work requirements
2.Resource implications	The following resources must be provided: 2.1 Well ventilated work area/shop with appropriate welding, machines, accessories, positioners, jigs and fixtures 2.2 PPE
3.Method of assessment	Competency must be assessed through: 3.1 Observation/evaluation 3.2 Oral questioning
4.Context of assessment	Competency to be assessed while a task is being undertaken in the workplace or in a simulated workplace setting or at the designated TESDA Accredited Assessment Center.

UNIT TITLE : PREPARE / FIT UP WELDING JOINTS

UNIT CODE : MEE721322

DESCRIPTOR : This unit covers the skills, knowledge and attitudes in preparing/ fitting up welding joints.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** *are elaborated* in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1.Set up root opening and alignment	1.1 ***Root opening*** and alignment is set up 1.2 Root opening is set up in accordance with the requirements of WPS. 1.3 Welding joint is aligned within the range of acceptability of code and standard. 1.4 Task is performed in accordance with company or industry requirements and safety procedure 1.5 Required output is completed as per WPS and verified by immediate supervisor	1.1 Basic welding joints 1.2 Parts of welding joint 1.3 Welding joint design 1.4 Dimensional Measurement 1.5 OSH Standards 1.6 Work Instructions (written and verbal). 1.7 Productivity work measurements 1.8 Adherence to work requirements. 1.9 5S and Proper Housekeeping 1.9 Waste Segregation/ 3R 1.10 AWF-CWCS/ ISO 9606-1 / AWS D1.1 / ASME IX. 1.11 DOLE DO 198s2018 policies on OSH as applicable 1.12 DOH guidelines on safety and health as applicable	1.1 Setting up root opening and alignment 1.2 Performing measurements 1.3 Applying safety procedures 1.4 Applying productive methods and techniques in setting up root opening and alignment
2. Perform tack welding	2.1 ***Tack welds*** are performed on the welding joints in accordance with the requirements of WPS or jobs requirement. 2.2 Backing plate, stiffeners, running plates are installed as required.	2.1 Basic welding joints 2.2 Parts of welding joint 2.3 Welding joint design 2.4 Dimensional Measurement 2.5 Tack welding 2.6 OSH Standards	2.1 Performing Tack Welding 2.2Performing measurements 2.3Applying safety procedures 2.4Applying productive methods and techniques in

	2.3 Fitted welding joints are freed from rust, paints, slags and other contaminants. 2.4 Fitted welding joints are ***visually and dimensionally acceptable*.** 2.5 Task is performed in accordance with company or industry requirements and safety procedure 2.6 Required output is completed as per WPS and verified by immediate supervisor	2.7 Work instructions (written and verbal). 2.8 Productivity work measurements 2.9 Adherence to work requirements 2.10 5S and Proper Housekeeping 2.11 Waste Segregation/ 3R 2.12 AWF-CWCS/ ISO 9606-1 / AWS D1.1 / ASME IX. 2.13 DOLE DO 198s2018 policies on OSH as applicable 2.14 DOH guidelines on safety and health as applicable	performing tack welding
3.Set up fitted welding joints	3.1 Fitted welding joints are positioned and secured according to the requirements. 3.2 Task is performed in accordance with company or industry requirements and safety procedure 3.3 Required output is completed as per WPS and verified by immediate supervisor	3.1 Different Welding Position 3.2 OSH Standards 3.3 work instructions (written and verbal). 3.3 Productivity work measurements 3.4 Adherence to work requirements 3.5 5S and Proper Housekeeping 3.6 Waste Segregation/ 3R 3.7 AWF-CWCS/ ISO 9606-1 / AWS D1.1 / ASME IX. 3.8 DOLE DO 198s2018 policies on OSH as applicable 3.9 DOH guidelines on safety and health as applicable	3.1 Positioning of fitted welding joints 3.2 Applying safety procedures 3.3 Applying productive methods and techniques in setting up fitted welding joints

RANGE OF VARIABLE

VARIABLE	RANGE
1. Root opening	Specification is based on: 1.1 WPS requirements 1.2 Client requirements
2.Tack welds	Kinds of tack welds 2.1 Bridge 2.2 Permanent 2.3 Temporary
3. Visually and dimensionally acceptable	May include: 3.1 Fully fused to the base metal 3.2 Free from defects 3.3 Evenly distributed

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Performed tack welding 1.2 Checked root opening and alignment 1.3 Positioned fitted weld joint 1.4 Observed safety measures applicable to worksite operation 1.5 Communicated effectively with others to ensure effective work 1.6 Observed and complied with the productivity requirements 1.7 Complied with attitudinal work requirements
2. Resource implications	The following resources must be provided: 2.1 Drawing and 2.2 Well ventilated work area/shop with appropriate welding machines, accessories, positioners, jigs and fixtures. 2.3 PPE
3. Method of assessment	Competency must be assessed through: 3.1 Observation/evaluation 3.2 Oral questioning
4. Context of assessment	4. Competency to be assessed while a task is being undertaken in the workplace or in a simulated workplace setting or at the designated TESDA Accredited Assessment Center.

UNIT OF COMPETENCY : WELD CARBON STEEL PLATES USING MMAW

UNIT CODE : MEE721301

DESCRIPTOR : This unit covers the skills, knowledge and attitudes in welding carbon steel plates using MMAW process.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** *are elaborated* in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Perform single pass fillet weld	1.1 Root pass is performed in accordance with ***WPS*** or job requirement. 1.2 Task is performed in accordance with company or industry requirement and safety procedure. 1.3 Weld is cleaned free from slag and other impurities 1.4 Weld is visually checked for ***defects*** and repaired, as required 1.5 Weld is visually acceptable in accordance with applicable codes and standards. 1.6 Required output is completed as per WPS and verified by immediate supervisor	1.1 OSH Standards 1.2 Work instructions (written and verbal). 1.3 Welding techniques 1.4 Hand tools and Power tools 1.5 Welding defects, causes and remedies 1.6 Visual Inspection 1.7 Productivity work measurements 1.8 Adherence to work requirements 1.9 5S and Proper Housekeeping 1.10 Waste Segregation/ 3R 1.11 AWF-CWCS/ ISO 9606-1 / AWS D1.1 / ASME IX. 1.12 DOLE DO 198s2018 policies on OSH as applicable 1.13 DOH guidelines on safety and health as applicable	1.1Communication skill 1.2 Applying Welding techniques 1.3 Applying Welding repair Techniques 1.4 Performing Welding Inspection 1.5Applying safety procedures 1.6 Applying productive methods and techniques in performing single pass fillet weld
2. Perform multiple pass fillet welds	2.1 Multiple pass fillet welds are performed in accordance with WPS or job requirement. 2.2 Task is performed in accordance with company or industry requirement and safety procedure. 2.3 Welds are cleaned free from slag and other impurities	2.1 OSH Standards 2.2 work instructions (written and verbal). 2.3 Welding techniques 2.4 Had tools and Power tools 2.5 Welding defects, causes and remedies 2.6 Visual Inspection 2.7 Productivity work measurements	2.1 Communication skill 2.2 Applying Welding techniques 2.3 Applying Welding repair Techniques 3.3 Performing Welding Inspection 3.4 Applying safety procedures 3.5 Applying productive

	2.4 Weld is visually checked for defects and repaired, as required. 2.5 Weld is visually acceptable in accordance with applicable codes and standards 2.6 Required output is completed as per WPS and verified by immediate supervisor	2.8 Adherence to work requirements 2.9 5S and Proper Housekeeping 2.10 Waste Segregation/ 3R 2.11 AWF-CWCS/ ISO 9606-1 / AWS D1.1 / ASME IX. 2.12 DOLE DO 198s2018 policies on OSH as applicable 2.13 DOH guidelines on safety and health as applicable	methods and techniques in welding multiple pass fillet welds
3. Perform root pass on groove/ butt joint	3.1 Root pass is performed in accordance with WPS or job requirement 3.2 Task is performed in accordance with company or industry requirement and safety procedure. 3.3 Weld is cleaned free from slag and other impurities 3.4 Weld is visually checked for defects and repaired, as required 3.5 Weld is visually acceptable in accordance with applicable codes and standards 3.6 Required output is completed as per WPS and verified by immediate supervisor	3.1 OSH Standards 3.2 work instructions (written and verbal). 3.3 Welding techniques 3.4 Hand tools and Power tools 3.5 Welding defects, causes and remedies 3.6 Visual Inspection 3.7 Productivity work measurements 3.8 Adherence to work requirements 3.9 5S and Proper Housekeeping 3.10 Waste Segregation/ 3R 3.11 AWF-CWCS/ ISO 9606-1 / AWS D1.1 / ASME IX. 3.12 DOLE DO 198s2018 policies on OSH as applicable 3.13 DOH guidelines on safety and health as applicable	3.1Communication skill 3.2Applying Welding techniques 3.3Applying Welding repair Techniques 3.4 Performing Welding Inspection 3.5 Applying safety procedures 3.6 Applying productive methods and techniques in performing capping
4. Weld subsequent fill passes on groove/ butt joint	4.1 Subsequent~~/~~ fill~~ing~~ passes are performed in accordance with approved WPS and/or client specifications 4.2 Welds are cleaned free from slag and other impurities	4.1 OSH Standards 4.2 work instructions (written and verbal). 4.3 Welding techniques 4.4 Hand tools and Powertools 4.5 Welding defects, causes and remedies	4.1 Communication skill 4.2 Applying Welding techniques 4.3 Applying Welding repair Techniques 4.4 Performing Welding Inspection

	4.3 Welds are visually checked for defects and repaired, as required 4.4 Welds are visually acceptable in accordance with applicable codes and standards 4.5 Task is performed in accordance with company or industry requirement and safety procedure. 4.6 Required output is completed as per WPS and verified by immediate supervisor	4.6 Visual Inspection 4.7 Productivity work measurements 4.8 Adherence to work requirements 4.9 5S and Proper Housekeeping 4.10 Waste Segregation/ 3R 4.11 AWF-CWCS/ ISO 9606-1 / AWS D1.1 / ASME IX. 4.12 DOLE DO 198s2018 policies on OSH as applicable 4.13 DOH guidelines on safety and health as applicable	4.5 Applying safety procedures 4.6 Applying productive methods and techniques in performing capping
5. Perform capping on groove / butt joint	5.1 Capping is performed in accordance with approved WPS and/or client specifications 5.2 Weld is cleaned free from slag and other impurities 5.3 Weld is visually checked for defects and repaired, as required 5.4 Weld is visually acceptable in accordance with applicable codes and standards 5.5 Task is performed in accordance with company or industry requirement and safety procedure. 5.6 Required output is completed as per WPS and verified by immediate supervisor	5.1 OSH Standards 5.2 Work instructions (written and verbal). 5.3 Welding techniques 5.4 Handtools and Powertools 5.5 Welding defects, causes and remedies 5.6 Visual Inspection 5.7 Productivity work measurements 5.8 Adherence to work requirements 5.9 5S and Proper Housekeeping 5.10 Waste Segregation/ 3R 5.11 AWF-CWCS/ ISO 9606-1 / AWS D1.1 / ASME IX 5.12 .DOLE DO 198s2018 policies on OSH as applicable 5.13 DOH guidelines on safety and health as applicable	5.1 Communication skill 5.2 Applying Welding techniques 5.3 Applying Welding repair Techniques 5.4 Performing Welding Inspection 5.5 Applying safety procedures 5.6 Applying productive methods and techniques in performing capping
6. Perform final visual Inspection	6.1 Weld is visually acceptable in accordance with applicable codes and standard.	6.1 Visual Inspection (e.g bead profile, weld size, reinforcement)	6.1 Communication skill 6.2 Performing Welding Inspection

	6.2 Task is performed in accordance with company or industry requirement and safety procedure. 6.3 Required output is completed as per WPS and verified by immediate supervisor	6.2 Dimensional Measurement 6.3 Productivity work measurements 6.4 Adherence to work requirements 6.5 5S and Proper Housekeeping 6.6 Waste Segregation/ 3R 6.7 AWF-CWCS/ ISO 9606-1 / AWS D1.1 / ASME IX. 6.8 DOLE DO 198s2018 policies on OSH as applicable 6.9 DOH guidelines on safety and health as applicable	6.3 Applying safety procedures 6.4 Applying productive methods and techniques in performing final visual inspection

RANGE OF VARIABLE

VARIABLE	RANGE
1. WPS	WPS Requirements are the following: 1.1 Welding positions 1.1.1 PA(1F), PC(2F),PF(3F),PE(4F) 1.1.2 PA(1G), PC (2G), PF(3G) 1.2 Material thickness(s) 1.2.1 3≤s ‹12(plate) 1.3 Type of material 1.3.1 Carbon steel 1.4 Welding Electrodes (Type and Size) 1.5 Welding Parameters (Amperage, Polarity,Travel speed) 1.6 Joint preparation
2. Defects	May include: 2.1 Porosity/Pinholes/Blowholes 2.2 Undercut 2.3 Arc Strike 2.4 Spatters 2.5 Slag inclusion 2.6 Concavity/convexity 2.7 Excessive reinforcement 2.8 Burn Through/ Melt Through 2.9 Crater cracks 2.10 Cracks 2.11 Lack of Fusion 2.12 Under Fill 2.13 Overlap 2.14 Misalignment 2.15 Distortion

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Welded carbon steel plates in PC(2G) and PF(3G) positions to acceptable standard following the approved WPS. 1.2 Observed safety measures applicable to worksite operation 1.3 Communicated effectively with others to ensure effective work 1.4 Observed and complied with the productivity requirements 1.5 Complied with attitudinal work requirements
2. Resource implications	The following resources must be provided: 2.1 Well ventilated work area/shop with appropriate welding machines,accessories, oven, tools,positioners, jigs and fixtures 2.2 Supplies and materials 2.3 PPE, 2.4 Relevant documentation such as WPS and working drawing 2.5 Fire Extinguishers
3. Method of assessment	Competency must be assessed through: 3.1 Observation and interview 3.2 Demonstration and interview 3.3 Written test 3.4 Portfolio 3.5 Nondestructive (NDT) and/or Destructive testing(DT) of test coupon
4. Context of assessment	4.1 Competency to be assessed while a task is being undertaken in the workplace or in a simulated workplace setting or at the designated TESDA Accredited Assessment Center.

SECTION 3 TRAINING ARRANGEMENTS

These standards are set to provide technical and vocational education and training (TVET) providers with information and other important requirements to consider when designing training programs for **MANUAL METAL ARC WELDING (MMAW) NC I.**

3.1 CURRICULUM DESIGN

TESDA shall provide the training on the development of competency-based curricula to enable training providers develop their own curricula with the components mentioned below.

Delivery of knowledge requirements for the basic, common and core units of competency specifically in the areas of mathematics, science/technology, communication/language and other academic subjects shall be contextualized. To this end, TVET providers shall develop a Contextual Learning Matrix (CLM) to accompany their curricula.

Course Title: **MANUAL METAL ARC WELDING (MMAW)** **NC Level** **NC I**

Nominal Training Duration:

47 Hours (Basic Competencies)
40 Hours (Common Competencies)
181 Hours (Core Competencies)
268 Hours
80 Supervised Industry Learning (SIL)
348 TOTAL HOURS

Course Description:

This course is designed to provide the learner with knowledge, practical skills and attitude, applicable in performing work activities involved in applying safety practices, interpreting drawings and sketches, performing basic workshop measurements and computing industry calculations, contributing to Quality System, using hand tools, preparing weld materials and consumables, setting up welding equipment, preparing/fit up welding joints fit up weld materials, repairing welds and welding carbon steel plates using MMAW. This includes classroom learning activities and practical work in actual work site or simulation area.

Upon completion of the course, the learners are expected to demonstrate the above-mentioned competencies to be employed. To obtain this, all units prescribed for this qualification must be achieved.

BASIC COMPETENCIES
(47 HOURS)

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
1. Receive and respond to workplace communication	1.1 Follow routine spoken messages	• Exercise Conciseness in receiving and clarifying messages/ information/ communication	• Group discussion • Interaction • Reportorial • Modular	• Interviews/ • Questioning • Practical/ • Performance Test • Observation	4 Hours
	1.2 Perform workplace duties following written notices	• Practice Accuracy in following written/ oral instruction/ information • Practice written and oral communication skills • Case Study in handling written communication • Practice relaying/ disseminating messages/ information • Analyze different messages	• Lecture/ • Discussion • Demonstration • Case Study	• Written • Practical • Written • Demonstration	4 Hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
2. Work with others	2.1 Develop effective workplace relationships	• Read job description and organizations policies relevant to work role • Read personnel code of conduct and discipline • Role play on cooperation and good relationship • Study table of organization and identify team members • Role play on team work. • Role play on receiving feedback from supervisor • Role play on providing feedback. • Listen to lecture on Valuing and exemplifying respect and empathy in the workplace	• Individual Work • Discussion • Role Play • Lecture	• Role Play • Structured activity • Written Test	2 Hours
	2.2 Contribute to work group activities	• Discussion on creative collaboration, social perceptiveness and problem sensitivity • Role play on creative collaboration, social perceptiveness and problem sensitivity. • Participate in a goal setting activity • Participate in planning and implementation of a group activity. • Participate in evaluation of the group activity	• Lecture/ Discussion • Role Play • Group Work	• Role Play • Structured activity • Written Test	1 Hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
3. Solve/address routine problems	3.1 Identify the problem	• Show mastery of the current industry hardware and software products and services - Show mastery of knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations - Relevant equipment and operational processes - Enterprise goals, targets and measures - Enterprise quality OHS and environmental requirement - Enterprise information systems and data collation - Industry codes and standards • Use range of formal problem-solving techniques (e.g., planning, attention, simultaneous and successive processing of information) • Identify and clarify the nature of the problem	• Interactive Lecture • Appreciative Inquiry • Demonstration	• Case Formulation • Life Narrative Inquiry (Interview) • Standardized test	1 Hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
	3.2 Assess fundamental causes of problem	• Show mastery of the current industry hardware and software products and services - Show mastery of knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations - Relevant equipment and operational processes - Enterprise goals, targets and measures - Enterprise quality OHS and environmental requirement - Enterprise information systems and data collation - Industry codes and standards • Use range of formal problem-solving techniques (e.g., planning, attention, simultaneous and successive processing of information) • Identify and clarify the nature of the problem	• Group discussion • Lecture • Demonstration • Role play	• Case Formulation • Life Narrative Inquiry (Interview) • Standardized test	1 Hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
	3.3 Determine corrective action	• Show mastery of the current industry hardware and software products and services - Show mastery of knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations - Relevant equipment and operational OHS and environmental requirement - Enterprise information processes - Enterprise quality systems and data collation - Industry codes and standards • Use range of formal problem-solving techniques (e.g., planning, attention, simultaneous and successive processing of information) • Identify and clarify the nature of the problem	• Group discussion • Lecture • Demonstration • Role play	• Case Formulation • Life Narrative Inquiry (Interview) • Standardized test	1 Hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
	3.4 Communicate action plans and recommendations to routine problems	• Show mastery of the current industry hardware and software products and services - Show mastery of knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations - Relevant equipment and operational processes - Enterprise goals, targets and measures - Enterprise quality OHS and environmental requirement - Enterprise information systems and data collation - Industry codes and standards • Use range of formal problem-solving techniques (e.g., planning, attention, simultaneous and successive processing of information) • Identify and clarify the nature of the problem	• Group discussion • Lecture • Demonstration • Role playing	• Case Formulation • Life Narrative Inquiry (Interview) • Standardized test	1 Hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
4. Enhance Self-Management Skills	4.1 Set personal and career goals	• Define and set personal goals and career goals • Describe the SMART Model for goal setting • Create personal and career goals using SMART Model for goal setting • Explain and apply the principles of goal setting according to Locke & Latham	• Discussion • Making of personal and career goals by students • Brainstorming	• Demonstration or simulation with oral questioning • Case problems involving workplace diversity issues	1 Hour
	4.2 Recognize emotions	• Identify common positive and negative emotions manifested in the workplace • Distinguish professional and non-professional behaviors in the workplace • Recognize triggers and implications of positive and negative emotions in the workplace • Respond with appropriate emotions and identify possible consequences of inappropriate emotional responses in a social and work-related context	• Discussion • Interactive Lecture • Brainstorming	• Demonstration or simulation with oral questioning • Case problems involving workplace diversity issues	1 Hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
	4.3 Describe oneself as a learner	3.1.1 Review Kolb's Theory of Learning Styles 3.1.2 Describe VAK Learning Style Model (Visual, Auditory, Kinesthetic) 3.1.3 Cite learning strategies appropriate to specific tasks and describe work practices that assist learning 3.1.4 Identify factors and strategies that assist learning 3.1.5 Apply learning styles to positively influence school/work performance 3.1.6 Use appropriate learning strategies to improve study habits and learning	• Discussion • Interactive Lecture • Brainstorming • Simulation	• Demonstration or simulation with oral questioning • Case problems involving workplace diversity issues	1 Hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
5. Support Innovation	5.1 Identify the need for innovation in one's area of work	• Show mastery of the clear-cut definition of innovation and its characteristics • Identify the need for innovation in one's work area • Identify work procedures needing change • Contribute to brainstorming sessions with co-workers on identifying tasks needing change	• Interactive Lecture • Appreciative Inquiry • Demonstration • Group work	• Psychological and behavioral Interviews • Performance Evaluation • Life Narrative Inquiry • Review of portfolios of evidence and third-party workplace reports of on-the-job performance. • Standardized assessment of character strengths and virtues applied	1 Hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
	5.2 Recognize innovative and creative ideas	• Identify resources needed for change and potential obstacles as well • Show positive attitudes and behaviors in accepting and in needing change in one's work area • Delineate differences between creativity and innovation	• Interactive Lecture • Appreciative Inquiry • Demonstration • Group work	• Psychological and behavioral Interviews • Performance Evaluation • Life Narrative Inquiry • Review of portfolios of evidence and third-party workplace reports of on-the-job performance. • Standardized assessment of character strengths and virtues applied	1 Hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
	5.3 Support individuals' access to flexible and innovative ways of working	• Identify different roles of employees/workers in the improvement of practices in the organization • Identify practices for flexible and innovative ways of working • Share information with co-workers • Detect potential problems in implementing flexible ways of working	• Interactive Lecture • Appreciative Inquiry • Demonstration • Group work	• Psychological and behavioral Interviews • Performance Evaluation • Life Narrative Inquiry • Review of portfolios of evidence and third-party workplace reports of on-the-job performance. • Standardized assessment of character strengths and virtues applied • Review of portfolios of evidence and third-party workplace reports of on-the-job performance. • Standardized assessment of character strengths and virtues applied	1 Hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
6. Access and maintain information	6.1 Identify and gather needed information	• Lecture and discussion on: - Policies, procedures and guidelines relating to information handling in the public and private sector, including confidentiality, privacy, security, freedom of information - Data collection and management procedures - Public/private sector standards • Identify sources to produce required information • Perform exercises on information gathering	• Lecture • Demonstration • Practical exercises	• Oral evaluation • Written Test • Observation	3 Hours
	6.2 Search for information on the internet or an intranet	• Lecture and discussion on: - Techniques in finding useful information - Search engines for information • Find and select appropriate information • Perform information searching on the internet using different search engines	• Group discussion • Lecture • Demonstration • Practical exercises	• Oral evaluation • Written Test • Observation • Presentation	2 Hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
	6.3 Examine information	• Lecture and discussion on: - Data evaluation procedures - Cultural aspects of information and meaning - Sources of public sector work-related information • Evaluation of searched information	• Group discussion • Lecture • Demonstration • Practical exercises	• Oral evaluation • Written Test • Observation • Presentation	2 Hours
	6.4 Secure information	• Lecture and discussion on: - Basic file-handling techniques - Techniques in handling, organizing and saving files - Electronic and manual filing systems • Performance of basic file-handling techniques • Application of electronic and manual filing systems	• Group discussion • Lecture • Demonstration • Role Play • Practical exercises	• Oral evaluation • Written Test • Observation • Presentation	3 Hours
	6.5 Manage information	• Lecture and discussion on: - Organizational information handling and storage procedures - Databases and data storage systems • Managing databases and data storage systems	• Group discussion • Lecture • Demonstration • Practical exercises	• Oral evaluation • Written Test • Observation • Presentation	2 Hours
7. Follow Occupational Safety And Health Policies And Procedures	7.1 Identify relevant occupational safety and health policies and procedures	• Discussion of Risks and Hazards • Risk and Hazard Identification	• Lecture • Group Discussion	• Written Exam • Demonstration • Observation • Interviews / Questioning	2 Hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
	7.2 Perform relevant occupational safety and health procedures	• Demonstration of proper use of Personal Protective Equipment and Materials Handling • Practice Emergency Plan	• Lecture • Group Discussion	• Written Exam • Demonstration • Observation • Interviews / Questioning	2 Hours
	7.3 Comply with relevant occupational safety and health policies and standards	• Discussion on Personal Hygiene and Preventive Control Measures • Practice 5S and waste segregation	• Lecture • Group Discussion	• Written Exam • Demonstration • Observation • Interviews / Questioning	4 Hours
8. Apply Environmental Work Standards	8.1 Identify environmental work hazards	• Discussions in - Reduction in greenhouse gas emissions, - Increase the share of renewables of gross final energy consumption, - Long-term reduction of energy consumption, - Release of materials into the environment should, in the long run, not exceed the adaptability of the eco-system, - Dangers and unjustifiable risks to human health - Energy and natural resource consumption and the provision of transport services	• Lecture • Group Discussion	• Written Exam • Demonstration • Observation • Interviews / Questioning	1 Hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
	8.2 Follow environmental work procedures	• Discussions Protection against - Human Dangers - Overconsumption of Resources - Destruction of Ecosystems - Habitat Destructions - Extinction of Wildlife - Pollutions - Water Degradation	• Lecture • Group Discussion • Demonstration	• Written Exam • Demonstration • Observation • Interviews / Questioning	1 Hour
	8.3 Comply with environmental work requirements	• Discussions Environmental Regulations and its requirements relevant to the industry and work activities • Demonstration and Practice Environmental Compliance	• Lecture • Group Discussion • Demonstration	• Written Exam • Demonstration • Observation • Interviews / Questioning	1 Hour
9. Adopt Entrepreneurial Mindset in the Workplace	9.1 Determine entrepreneurial mindset	• Discussion on Entrepreneurial Mindset • Games to develop entrepreneurial mind set	• Lecture discussion • Games	• Written Test • Role play	2 Hours
	9.2 Identify entrepreneurial practices	• Case study- quality assurance practices • Discussion on cost effective measures • Discussion on Workplace Quality Policy	• Case study • Lecture discussion	• Written Test • Case Study	1 Hour

COMMON COMPETENCIES
(40 HOURS)

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
1. Interpret drawings and sketches	1.1 Identify standard alphabet of lines	• Determine dimensions of weld preparation • Determine critical dimension	• Lecture-Discussion • Demonstration • Practical application	• Oral questioning • Written Exam	• 1 Hour
	1.2 Identify orthographic/ isometric views	• Determine dimensions of weld preparation • Determine critical dimension • Explain standard welding and NDT symbols in the drawings / sketches	• Lecture-Discussion • Demonstration • Practical application	• Oral questioning • Written Exam	• 1 Hour
	1.3 Interpret standard drawing/ sketches and symbols.	• Determine dimensions of weld preparation • Determine critical dimension • Explain standard and NDT welding symbols in the drawings / sketches	• Lecture-Discussion • Demonstration • Practical application	• Oral questioning • Written Exam	• 2 Hours

2.Perform Basic Workshop Measurements and Computations	2.1 Use of appropriate measuring tools	• Determine Appropriate Measuring technique • Know and Obtain measurement according to specification.	• Lecture-Discussion • Demonstration	• Oral questioning • Written Examination	• 2 Hours
	2.2 Perform four fundamental operations	• Know and Obtain measurement according to specification. • Know how to calculate four fundamental operations • Perform basic simple calculation	• Lecture-Discussion • Demonstration • Practical application	• Oral questioning • Written Examination	• 2 Hours
	2.3 Perform conversion of units	• Know how to calculate four fundamental operations • Know how to calculate conversion of units • Perform basic simple calculation	• Lecture-Discussion • Demonstration • Practical application	• Oral questioning • Written Examination	• 3 Hours

3 Contribute to Quality Management System (QMS)	3.1 Inspect work done	• Comply to QMS standards, welding codes and standards	• Lecture-Discussion • Demonstration • Practical application	• Oral questioning • Written Examination	• 2 Hours
	3.2 Apply quality standards to work	• Describe organizational policy on quality and safety • Comply to QMS standards, welding codes and standards	• Lecture-Discussion • Demonstration • Practical application	• Oral questioning • Written Examination	• 1 Hour
	3.3 Protect company property and customer interest	• Describe organizational policy on quality and safety • Comply to QMS standards, welding codes and standards	• Lecture-Discussion • Demonstration • Practical application	• Oral questioning • Written Examination	• 1 Hour

4.Use hand tools	4.1 Identify and use of personal protective equipment (PPE)	• Determine proper usage of personal protective equipment (PPE) • Proper usage of personal protective equipment (PPE)	• Lecture-Discussion • Demonstration • Practical application	• Oral questioning • Written • Demonstration	• 2 Hours
	4.2 Select and use of tools and equipment	• Determine proper usage of hand tools and equipment • Proper usage of tools and equipment	• Lecture-Discussion • Demonstration • Practical application	• Oral questioning • Written • Demonstration	• 3 Hours
	4.3 Perform simple maintenance of tools and equipment	• Determine proper usage of hand tools and equipment • Proper usage of tools and equipment • Simple preventive maintenance of tools and equipment	• Lecture-Discussion • Demonstration • Practical application	• Oral questioning • Written • Demonstration	• 2 Hours
5. Prepare Materials and Consumables	5.1 Prepare welding safety and protective equipment	• Determine proper PPE in accordance with safety standards • Know and Identify welding safety hazards	• Lecture-Discussion • Demonstration • Practical application	• Observation • Demonstration and oral questioning • Written test	• 3 Hours
	5.2 Set up cutting equipment and materials	• Determine proper PPE in accordance with safety standards • Know and Identify welding safety hazards • Determine Proper set-up of equipment and materials	• Lecture-Discussion • Demonstration • Practical application	• Observation • Demonstration and oral questioning • Written test	• 3 Hours

	5.3 Cut and prepare edge of materials	• Determine proper PPE in accordance with safety standards • Know and Identify welding safety hazards • Know how to cut materials according to specifications.	• Lecture-Discussion • Demonstration • Practical application	• Observation • Demonstration and oral questioning • Written test	• 8 Hours
	5.4 Clean surfaces and edges	• Determine proper PPE in accordance with safety standards • Know and Identify welding safety hazards • Know how to clean materials according to specifications.	• Lecture-Discussion • Demonstration • Practical application	• Observation • Demonstration and oral questioning • Written test	• 2 Hours
	5.5 Prepare welding consumables	• Determine proper PPE in accordance with safety standards • Know and Identify welding safety hazards • Know how to select and prepare proper welding consumables.	• Lecture-Discussion • Demonstration • Practical application	• Observation • Demonstration and oral questioning • Written test	• 2 Hours

CORE COMPETENCIES
(181 HOURS)

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
1. Set-up Welding Equipment	1.1 Set up welding machine	• Explain and demonstrate how to set-up welding equipment. • Explain and demonstrate how to set-up welding accessories. • Explain and demonstrate how to set-up welding positioners, jigs and fixtures.	• Lecture Discussion • Demonstration • Practical application	• Observation and oral questioning • Demonstration and oral questioning • Written test	• 2 Hours
	1.2 Set up welding accessories	• Explain and demonstrate how to set-up welding equipment. • Explain and demonstrate how to set-up welding accessories. • Explain and demonstrate how to set-up welding positioners, jigs and fixtures.	• Lecture Discussion • Demonstration • Practical application	• Observation and oral questioning • Demonstration and oral questioning • Written test	• 1 Hour
	1.3 Set up welding positioners, jigs and fixtures	• Explain and demonstrate how to set-up welding equipment. • Explain and demonstrate how to set-up welding accessories. • Explain and demonstrate how to set-up welding positioners, jigs and fixtures.	• Lecture Discussion • Demonstration • Practical application	• Observation and oral questioning • Demonstration and oral questioning • Written test	• 1 Hour

2. Prepare / Fit up Welding Joints	2.1 Set-up root opening and alignment	• Explain and demonstrate how to set-up root opening and alignment. • Obtain tack welds. • Explain and obtain correct fitted welding joints	• Lecture-Discussion • Demonstration • Practical application	• Observation and oral questioning • Demonstration and oral questioning • Written test	• 4 Hours
	2.2 Perform tack welding	• Explain and demonstrate how to set-up root opening and alignment. • Obtain tack welds. • Explain and obtain correct fitted welding joints	• Lecture-Discussion • Demonstration • Practical application	• Observation and oral questioning • Demonstration and oral questioning • Written test	• 8 Hours
	2.3 Set-up fitted welding joints	• Explain and demonstrate how to set-up root opening and alignment. • Obtain tack welds. • Explain and obtain correct fitted welding joints	• Lecture-Discussion • Demonstration • Practical application	• Observation and oral questioning • Demonstration and oral questioning • Written test	• 4 Hours

3. Weld Carbon Steel Plates Using MMAW	3.1 Perform single pass fillet welds in different positions- PA (1F), PC(2F), PF(3F),PE(4F)	• Explain and obtain single pass fillet welds in different positions in accordance to welding codes and standards.	• Lecture-Discussion • Demonstration • Practical application	• Observation and oral questioning/ Interview • Demonstration and oral questioning/ Interview • Written test • Nondestructive Testing (NDT) e.g. Visual Testing, Dye Penetrant Testing and Destructive testing (DT) e.g. Break Test of test coupon	• 44 Hours
	3.2 Perform multiple pass fillet welds in different positions- PA(1F), PC(2F), PF(3F), PE(4F)	• Explain and obtain multiple pass fillet welds in different positions in accordance to welding codes and standards	• Lecture-Discussion • Demonstration • Practical application	• Observation and oral questioning/ Interview • Demonstration and oral questioning/ Interview • Written test • Nondestructive Testing (NDT) e.g. Visual Testing, Dye Penetrant Testing of test coupon	• 44 Hours

	3.3 Perform root passes in different positions- PA(1G), PC (2G), PF (3G)	• Explain and obtain-root passes weld in different positions in accordance to welding codes and standards.	• Lecture-Discussion • Demonstration • Practical application	• Observation and oral questioning/ Interview • Demonstration and oral questioning/ Interview • Written test • Nondestructive Testing (NDT) of test coupon	• 20-Hours
	3.4 Perform subsequent fill passes on groove/butt jointin different positions PA(1G), PC (2G), PF (3G)	• Explain and obtain subsequent fill passes in different positions in accordance to welding codes and standards.	• Lecture-Discussion • Demonstration • Practical application	• Observation and oral questioning/ Interview • Demonstration and oral questioning/ Interview • Written test • Nondestructive Testing (NDT) of test coupon	• 30 Hours

	3.5 Perform capping on groove/ butt joint in different positions- PA(1G), PC (2G), PF (3G)	• Explain and obtain capping in different positions in accordance to welding codes and standards.	• Lecture-Discussion • Demonstration • Practical application	• Observation and oral questioning/ Interview • Demonstration and oral questioning/ Interview • Written test • Nondestructive Testing (NDT) of test coupon	• 15 Hours
	3.6 Perform final visual Inspection in all test coupon in different positions	• Explain and obtain final visual Inspection in different positions in accordance to welding codes and standards.	• Lecture-Discussion • Demonstration • Practical application	• Observation and oral questioning/ Interview • Demonstration and oral questioning/ Interview • Written test • Nondestructive Testing (NDT) of test coupon	• 8 hours

3.2 TRAINING DELIVERY

1. The delivery of training shall adhere to the design of the curriculum. Delivery shall be guided by the principles of competency-based TVET.

    a. Course design is based on competency standards set by the industry or recognized industry sector; (**Learning system is driven by competencies written to industry standards**)

    b. Training delivery is learner-centered and should accommodate individualized and self-paced learning strategies;

    c. Training can be done on an actual workplace setting, simulation of a workplace and/or through adoption of modern technology.

    d. Assessment is based in the collection of evidence of the performance of work to the industry required standards;

    e. Assessment of competency takes the trainee's knowledge and attitude into account but requires evidence of actual performance of the competency as the primary source of evidence.

    f. Training program allows for recognition of prior learning (RPL) or current competencies;

    g. Training completion is based on satisfactory completion of all specified competencies not on the specified nominal duration of learning.

2. The competency-based TVET system recognizes various types of delivery modes, both on-and off-the-job as long as the learning is driven by the competency standards specified by the industry. The following training modalities and their variations/components may be adopted singly or in combination with other modalities when designing and delivering training programs:

2.1 Institution- Based:

- Dual Training System (DTS)/Dualized Training Program (DTP) which contain both in-school and in-industry training or fieldwork components. Details can be referred to the Implementing Rules and Regulations of the DTS Law and the TESDA Guidelines on the DTP;

- Distance learning is a formal education process in which majority of the instruction occurs when the students and instructor are not in the same place. Distance learning may employ correspondence study, audio, video, computer technologies or other modern technology that can be used to facilitate learning and formal and non-formal training. Specific guidelines on this mode shall be issued by the TESDA Secretariat.

- Supervised Industry Learning (SIL) or on-the-job training (OJT) is an approach in training designed to enhance the knowledge and skills of the trainee through actual experience in the workplace to acquire specific competencies as prescribed in the training regulations. It is imperative that the deployment of trainees in the workplace is adhered to training programs agreed by the institution and enterprise and status and progress of trainees are closely monitored by the training institutions to prevent opportunity for work exploitation.

- The classroom-based or in-center instruction uses of learner-centered methods as well as laboratory or field-work components.

2.2 Enterprise-Based:

- Formal Apprenticeship - Training within employment involving a contract between an apprentice and an enterprise on an approved apprenticeable occupation.

- Informal Apprenticeship - is based on a training (and working) agreement between an apprentice and a master craftsperson wherein the agreement may be written or oral and the master craftsperson commits to training the apprentice in all the skills relevant to his or her trade over a significant period of time, usually between one and four years, while the apprentice commits to contributing productively to the work of the business.

Training is integrated into the production process and apprentices learn by working alongside the experienced craftsperson.

- Enterprise-based Training- where training is implemented within the company in accordance with the requirements of the specific company. Specific guidelines on this mode shall be issued by the TESDA Secretariat.

2.3 Community-Based

- Community-Based – short term programs conducted by non-government organizations (NGOs), LGUs, training centers and other TVET providers which are intended to address the specific needs of a community. Such programs can be conducted in informal settings such as barangay hall, basketball courts, etc. These programs can also be mobile training program (MTP).

3. Republic Act. No. 11551, "An Act Integrating Labor Education in the Tertiary Education Curriculum" seeks to integrate labor education in the Technical Vocational Education and Training (TVET) curriculum. As provided in Section 3.b., "Labor education refers to the teaching of basic knowledge on labor rights and other skills relating to negotiation, fostering smooth interpersonal relations in the workplace, and mechanisms for redress of grievances and other concerns."

   The Implementing Rules and Regulations for RA 11551 is still being drafted by the TWG as of the date when this proposed TR is being presented to the TESDA Board for approval and promulgation. In the meantime, that TESDA is finalizing the labor education framework that will serve as a basis in developing the labor education curriculum for TVET, the process of integration shall be done by integrating labor education concepts in the Competency Based Curriculum (CBC) that will be developed by the TVIs that intends to register the TVET program. The labor education concepts to be integrated in the CBC shall be derived from the definition of labor education provided in Republic Act. No. 11551

3.3 TRAINEE ENTRY REQUIREMENTS

Trainees or students wishing to enroll in this program must possess the following requirements:

- Must possess good communication skills
- Physically fit (including differently-abled person)

- Can perform basic mathematical computation

3.4 TOOLS, MATERIALS AND EQUIPMENT

Recommended list of tools, materials and equipment for the training of 20 trainees for Manual Metal Arc Welding NC I.

Up-to-date tools, materials, and equipment of equivalent functions can be used as alternatives. This also applies in consideration of community practices and their availability in the local market.

A. (Full Qualification)

TOOLS	
QTY	**Description**
20 pcs.	Chipping Hammer
60 pcs.	Steel brush
20 prs.	Plier/tongs
20 pcs.	Files-bastard cut
20 pcs.	Welding Mask
20 pcs	Welding apron/jacket
40 prs.	Welding gloves(long)
20 prs.	Safety goggles, wide vision, clear
5 prs.	Oxy-acetylene Goggles
20 pcs.	Try square 300 mm. Long
20 pcs.	Steel rule300mm. long
20 pcs.	Files-half round
20 pcs.	Welding gauges
60 pcs	Respirator (as per NIOSH)
20 prs	Safety Shoes (High-cut)
10 pcs	Adjustable wrench 12 inch

10 pcs	C- Clamps (8inch)
1 unit	Clamp Ammeter (Optional)

MATERIALS (Per Participants)	
QTY	**Description**
5 kgs.	Electrodes 3.2mm (ISO /E6011)
20 kgs.	Electrodes 3.2mm (ISO /E7018)
5 kgs.	Electrodes 3.2mm (ISO /E6013)
2 pcs	Softstone / Chalk Marker
3 pcs	Dark glass lens
25 pcs	Clear glass lens
40 pcs.	Cutting disc 3/32” X 5/8” X 4”
20 pcs	Grinding disc 1/4” X 5/8” X 4”
38 pcs.	Carbon steel plate 10mm X 150mm X 200mm
40 pcs.	Carbon steel plate 6mm X 100mm X 200mm

EQUIPMENT	
QTY	**Description**
10 units	MMAW/SMAW machine AC/DC 250-300 Amps. and accessories
10pcs.	Welding table with welding positioners
1 unit	Electrode oven (Big)
10 units	Portable disc grinder
1 set	Ventilation System
2 units	Work bench w/ bench vise on 4 corners
2 sets	Oxy-fuel cutting outfit
2 units	Pedestal /bench grinding machine
2 units	Industrial fan
5 units	Portable Oven (quiver)
4 Units	Fire Extinguishers
3 units	Waste Bins
1 Unit	Scrap Bin
2 sets	Liquid Penetrant Test (PT) kit
1 Unit	Mechanical Press (break/bend test)
1 unit	Plate and pipe beveling cutting equipment (Mechanical or Automatic)

3.5 TRAINING FACILITIES

The welding workshop must be of concrete structure. Based on class size of 20 students/trainees the space requirements for the teaching/learning and circulation areas are as follows:

SPACE REQUIREMENT	SIZE IN METERS	AREA IN SQ. METERS	QTY.	TOTAL AREA IN SQ. METERS
Contextual Learning Area (Lecture Room)	3 x 4	12	1	**12**
Distance Learning (Laboratory/Workshop/ Activity area)		56		**56**
- Welding Booth*	2 X 1.5 = 3 3 x 10 booths	30	10	30
- Grinding Booth*	2 X 1.5	3	2	6
- Materials/Preparation Area*	2 X 2.5	5	2	10
- Bench work Area*	2 X 2.5	5	2	10
Storage Area (Tool room & S/M storage area)	4 X 5	20	1	**20**
Learning Resource Area*	5 X 7	35	1	**35**
Wash Area /Comfort Room *(male & female)*	2.5 X 4	10	1	**10**
Circulation Area**				**(27.3)**
Total Workshop Area				**(160.3~160)**

NOTE: Access to and use of equipment /facilities can be provided through cooperative arrangements or MOA with other partner companies

3.6 TRAINER'S QUALIFICATIONS FOR MANUAL METAL ARC WELDING (MMAW) NC I

- Holder of National TVET Trainer Certificate Level I (NTTC Level I) in Manual Metal Arc Welding (MMAW) NC II or higher
- Must be physically fit **(**including differently-abled person)
- Must have at least 2 years welding job/industry/ teaching experience

3.7 INSTITUTIONAL ASSESSMENT

Institutional Assessment is gathering of evidences to determine the achievements of the requirements of the qualification to enable the trainer make judgement whether the trainee is competent or not competent.

SECTION 4 ASSESSSMENT AND CERTIFICATION ARRANGEMENT

Competency Assessment is the process of collecting evidence and making judgments whether competency has been achieved. The purpose of assessment is to confirm that an individual can perform to the standards expected at the workplace as expressed in relevant competency standards.

The assessment process is based on evidence or information gathered to prove achievement of competencies. The process may be applied to an employable unit(s) of competency in partial fulfillment of the requirements of the national qualification.

4.1 NATIONAL ASSESSMENTAND CERTIFICATION ARRANGEMENTS

4.1.1 A National Certificate (NC) is issued when a candidate has demonstrated competence on all unit/s of competency in a qualification with a promulgated Training Regulations.

4.1.2 Individuals wanting to be certified will have to be assessed in accordance with the requirements identified in the evidence guide of the relevant unit/s of competency.

4.1.3 The industry shall determine assessment and certification requirements for each qualification with promulgated Training Regulations: It includes the following:

a. Entry requirements for candidates
b. Evidence gathering methods
c. Qualification requirements of competency assessors
d. Specific assessment and certification arrangements as identified by industry

4.1.4 Recognition of Prior Learning (RPL). Candidates who have gained competencies through informal training, previous work and/or life experiences may apply for recognition in a particular qualification through competency assessment:

4.1.5 For all Shielded Metal Arc Welding NC I holder, the individual/holder will have to undergo assessment in the amended TR for Manual Metal Arc Welding (MMAW) NC I.

4.2 COMPETENCY ASSESSMENT REQUISITE

4.2.1 **Self-Assessment Guide.** The self-assessment guide (SAG) is accomplished by the candidate prior to actual competency assessment. SAG is a pre-assessment tool to help the candidate and the assessor determine what evidence is available, where gaps exist, including readiness for assessment.

This document can:

a. Identify the candidate's skills and knowledge
b. Highlight gaps in candidate's skills and knowledge
c. Provide critical guidance to the assessor and candidate on the evidence that need to be presented
d. Assist the candidate to identify key areas in which practice is needed or additional information or skills that should be gained prior `

4.2.2 **Accredited Assessment Center.** Only Assessment Center accredited by TESDA is authorized to conduct competency assessment. Assessment centers undergo a quality assured procedure for accreditation before they are authorized by TESDA to manage the assessment for National Certification.

4.2.3 **Accredited Competency Assessor.** Only accredited competency assessor is authorized to conduct assessment of competence. Competency assessors undergo a quality assured system of accreditation procedure before they are authorized by TESDA to assess the competencies of candidates for National Certification.

ANNEX A

COMPETENCY MAP –
METALS AND ENGINEERING SECTOR
MANUAL METAL ARC WELDING (MMAW) NC I

BASIC COMPETENCIES

Receive and respond to workplace communication	Work with others	Solve/address routine problems	Enhance self-management skills	Support Innovation	Access and maintain information	Follow occupational safety and health policies and procedures	Apply environmental work standards	Adopt entrepreneurial mindset in the workplace
Participate in workplace communication	Work in Team Environment	Solve/address general workplace problems	Develop career and life decisions	Contribute to workplace innovation	Present relevant information	Practice occupational safety and health policies and procedures	Exercise efficient and effective sustainable practices in the workplace	Practice entrepreneurial skills in the workplace
Lead workplace communication	Lead small teams	Apply critical thinking and problem-solving techniques in the workplace	Work in a diverse environment	Propose methods of applying learning and innovation in the organization	Use information systematically	Evaluate occupational safety and health work practices	Evaluate environmental work practices	Facilitate entrepreneurial skills for micro-small-medium enterprises (MSMEs)

BASIC COMPETENCIES

Utilize specialize specialized communication skill	Develop and lead teams	Perform higher order thinking processes and apply techniques in the workplace	Contribute to the practice of social justice in the workplace	Manage innovative work instructions	Manage and evaluate usage of information	Lead in improvement of Occupational Safety and Health Program, Policies and Procedures	Lead towards improvement of environmental work programs, policies and procedures	Sustain entrepreneurial skills
Manage and sustain effective communication strategies	Manage and sustain high performing teams	Evaluate higher order thinking skills and adjust problem solving techniques	Advocate strategic thinking for global citizenship	Incorporate innovation into work procedures	Develop systems in managing, and maintaining information	Manage implementation of OSH programs in the workplace	Manage implementation of environmental program in the workplace	Develop and sustain a high-performing enterprise

COMMON COMPETENCIES

Interpret drawings and sketches	Perform basic workshop measurements & computations	Contributes to quality management system	Use hand tools	Prepare materials and consumables

CORE COMPETENCIES						
Weld carbon steel plates using MMAW	Weld carbon steel plates using GMAW	Weld carbon steel pipes using GMAW	Weld carbon steel plates using GTAW	Weld carbon steel pipes using GTAW	Weld carbon steel plates using FCAW	Weld carbon steel pipes using FCAW
Prepare/ fit up welding joints	Weld alloy steel plates using GMAW	Weld alloy steel pipes using GMAW	Weld alloy steel plates using GTAW	Weld alloy steel pipes using GTAW	Weld alloy steel plates using FCAW	Weld alloy steel pipes using FCAW
Set up welding equipment	Weld carbon steel plates and pipes using MMAW	Weld alloy steel plates using MMAW	Weld alloy steel pipes using MMAW	Perform gas welding in carbon steel plates and tubes	Perform gas welding in alloy steel plates and tubes	Weld plates using SAW

GLOSSARY OF TERMS

base metal	(aka: parent metal) the metal that is to be worked, cut or welded
bead	a weld deposit resulting from a single welding pass
bend test	A destructive testing method that calls for a test specimen taken from a test coupon to be bent to a specified bend radius. This test is used to evaluate the soundness and ductility of the welded joint
break test	A destructive testing method in which a fillet weld test is loaded so that the weld root is in tension until it breaks. Once broken, soundness of the welded joint is evaluated by examining the fractured surface for incomplete fusion, porosity, and other internal discontinuities. This test is primarily used for welders qualification.
discontinuity	An interruption of the typical structure of a material, such as lack of homogeneity in its mechanical, metallurgical or physical characteristics. A discontinuity is not necessarily a defect.
destructive testing (DT)	is undertaken in order to understand a specimen's performance or material behavior. These procedures are carried out to the test specimen's failure. DT methods are commonly used for materials characterization, fabrication validation, failure investigation, and can form a key part of engineering critical assessments.
fillet weld	A weld of approximately triangular cross section joining two surfaces approximately at right angles to each other in a lap joint, T-joint, or corner joint.
jig	(aka: Fixture) A device designed to hold and maintain parts in proper relation to each other. Jig and fixture have essentially the same meaning. They both function to facilitate assembly of parts and to hold a work piece assembly in proper alignment and position during handling and welding.
joint	The junction of members or the edges of the base metal that are to be joined or have been joined by welding
liquid penetrant testing (PT)	A non-destructive testing method in which a penetrating agent is used to detect weld defects and other possible flaws in non-magnetic and non-porous material
MMAW	(A.k.a SMAW) An arc welding process with an arc between a covered electrode and the weld pool. The process is used with shielding from the decomposition of the electrode covering, without the application of pressure, and with filler metal from the electrode.

non-destructive testing *(*NDT)	is a testing and analysis technique used by the industry to evaluate the properties of a material, component, structure or system for characteristic differences or welding defects and discontinuities without causing damage to the original part.
Occupational Safety and Health (OSH)	refers to a set of rules issued by DOLE which mandates the adoption and use of appropriate practices, means, methods, reasonably standards operations or processes, and working conditions necessary to ensure safe and healthful employment.
quiver	(Aka:portable oven, hotbox) . A temperature controlled electrode container used during welding in order to maintain the required holding temperature after baking. This ensures electrode drynessbefore use and prevents moisture absorption in the flux covering due to humidity conditions
shearing machine	are multipurpose devices used in the cutting of alloys and other sheet metal. Some shearing machines use a scissor-like, angular shear action to cut metal into sheets or strips. Other, larger machines use a straight shear action with the blade fixed at an angle as opposed to the angular movement.
visual inspection	when an object is inspected by the eye directly.
weld defects	A discontinuity or discontinuities accumulated effect that render a welded part or product unable to meet minimum applicable acceptance standard or specification.
welding	A joining process that causes materials to fuse and merge by heating them to the welding temperature, with or without the application of pressure or by the application of pressure alone, and with or without using filler metal.
welding electrode	A component of the welding circuit through which current is run and that ends at the arc, in a molten conductive slag, or in the base metal. The flux covered consumable filler in MMAW/SMAW
welding torch	a gas mixing and burning tool for the welding of metals
weldment	an assembly or structure whose component parts are joined by welding
Welding Procedure Specification (WPS)	A document providing the required welding variables for a specific application to assure repeatability by properly trained welders and welding operators.

REFERENCES:

1. Training Regulations for Shielded Metal Arc Welding (SMAW) NC I
2. Asian Welding Federation (AWF) - Common Welder Certification Scheme (CWCS); aligned to ISO 9606-1 Standard
3. ISO 9606-1: Qualification testing of welders — Fusion welding — Part 1: Steels
4. AWS D 1.1 Structural Welding Code- Steel
5. ASME IX (Boiler and Pressure Vessel Code) Welding, Brazing, and Fusing Qualifications

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