TRAINING REGULATIONS

MANUAL METAL ARC WELDING (MMAW) NC II

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:

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.

TABLE OF CONTENTS

MANUAL METAL ARC WELDING (MMAW) NC II

TRAINING REGULATIONS FOR
MANUAL METAL ARC WELDING (MMAW) NC II

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

The Manual Metal Arc Welding (**MMAW**) NC II Qualification consists of competencies that a person must achieve to weld carbon steel plates and pipe 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
400311210	Participate in workplace communication
400311211	Work in a team environment
400311212	Solve/address general workplace problems
400311213	Develop career and life decisions
400311214	Contribute to workplace innovation
400311215	Present relevant information
400311216	Practice occupational safety and health policies and procedures
400311217	Exercise efficient and effective sustainable practices in the workplace
400311218	Practice entrepreneurial skills 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
MEE721324	Weld Carbon Steel Plates and Pipes 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 II.**

BASIC COMPETENCIES

UNIT OF COMPETENCY: PARTICIPATE IN WORKPLACE COMMUNICATION

UNIT CODE: 400311210

UNIT DESCRIPTOR: This unit covers the knowledge, skills and attitudes required to gather, interpret and convey information in response to workplace requirements.

ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Obtain and convey workplace information	1.1 Specific and relevant information is accessed from ***appropriate sources*** 1.2 Effective questioning, active listening and speaking skills are used to gather and convey information 1.3 Appropriate ***medium*** is used to transfer information and ideas 1.4 Appropriate non-verbal communication is used 1.5 Appropriate lines of communication with supervisors and colleagues are identified and followed	1.1 Effective verbal and nonverbal communication 1.2 Different modes of communication 1.3 Medium of communication in the workplace 1.4 Organizational policies 1.5 Communication procedures and systems 1.6 Lines of Communication 1.7 Technology relevant to the enterprise and the individual's work responsibilities 1.8 Workplace etiquette	1.1 Following simple spoken language 1.2 Performing routine workplace duties following simple written notices 1.3 Participating in workplace meetings and discussions 1.4 Preparing work-related documents 1.5 Estimating, calculating and recording routine workplace measures 1.6 Relating/ Interacting with people of various levels in the workplace 1.7 Gathering and providing basic information in response to workplace requirements 1.8 Basic business writing skills

	1.6 Defined workplace procedures for the location and ***storage*** of information are used. 1.7 Personal interaction is carried out clearly and concisely .		19 Interpersonal skills in the workplace 2.0 Active-listening skills
2. Perform duties following workplace instructions	2.1 Written notices and instructions are read and interpreted in accordance with organizational guidelines 2.2 Routine written instruction are followed based on established procedures 2.3 Feedback is given to workplace supervisor based instructions/ information received 2.4 ***Workplace interactions*** are conducted in a courteous manner 2.5 Where necessary, clarifications about routine workplace procedures and matters concerning conditions of employment are sought and asked from ***appropriate sources*** 2.6 Meetings outcomes are interpreted and implemented	2.1 Effective verbal and non-verbal communication 2.2 Different modes of communication 2.3 Medium of communication in the workplace 2.4 Organizational/ Workplace policies 2.5 Communication procedures and systems 2.6 Lines of communication 2.7 Technology relevant to the enterprise and the individual's work responsibilities 2.8 Effective questioning techniques (clarifying and probing) 2.9 Workplace etiquette	2.1 Following simple spoken instructions 2.2 Performing routine workplace duties following simple written notices 2.3 Participating in workplace meetings and discussions 2.4 Completing work-related documents 2.5 Estimating, calculating and recording routine workplace measures 2.6 Relating/ Responding to people of various levels in the workplace 2.7 Gathering and providing information in response to workplace requirements 2.8 Basic questioning/querying 2.9 Skills in reading for information 2.10 Skills in locating

ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3. Complete relevant work- related documents	3.1 Range of ***forms*** relating to conditions of employment are completed accurately and legibly. 3.2 Workplace data is recorded on standard workplace forms and documents. 3.3 Errors in recording information on forms/ documents are identified and acted upon. 3.4 Reporting requirements to supervisor are completed according to organizational guidelines.	3.1 Effective verbal and non-verbal communication 3.2 Different modes of communication 3.3 Workplace forms and documents 3.4 Organizational/ Workplace policies 3.5 Communication procedures and systems 3.6 Technology relevant to the enterprise and the individual's work responsibilities.	3.1 Completing work-related documents 3.2 Applying operations of addition, subtraction, division and multiplication 3.3 Gathering and providing information in response to workplace requirements 3.4 Effective record keeping skills

RANGE OF VARIABLES

VARIABLE	RANGE
1. Appropriate sources	May include: 1.1. Team members 1.2. Supervisor/Department Head 1.3. Suppliers 1.4. Trade personnel 1.5. Local government 1.6. Industry bodies
2. Medium	May include: 2.1. Memorandum 2.2. Circular 2.3. Notice 2.4. Information dissemination 2.5. Follow-up or verbal instructions 2.6. Face-to-face communication 2.7. Electronic media (disk files, cyberspace)
3. Storage	May include: 3.1. Manual filing system 3.2. Computer-based filing system
4. Workplace interactions	May include: 4.1. Face-to-face 4.2. Telephone 4.3. Electronic and two-way radio 4.4. Written including electronic means, memos, instruction and forms 4.5. Non-verbal including gestures, signals, signs and diagrams
5. Forms	May include: 5.1. HR/Personnel forms, telephone message forms, safety reports

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1. Prepared written communication following standard format of the organization 1.2. Accessed information using workplace communication equipment/systems 1.3. Made use of relevant terms as an aid to transfer information effectively 1.4. Conveyed information effectively adopting formal or informal communication
2. Resource Implications	**The following resources should be provided:** 2.1. Fax machine 2.2. Telephone 2.3. Notebook 2.4. Writing materials 2.5. Computer with Internet connection
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1. Demonstration with oral questioning 3.2. Interview 3.3. Written test 3.4. Third-party report
4. Context for Assessment	4.1. Competency may be assessed individually in the actual workplace or through an accredited institution

UNIT OF COMPETENCY: WORK IN A TEAM ENVIRONMENT

UNIT CODE : 400311211

UNIT DESCRIPTOR: This unit covers the skills, knowledge and attitudes to identify one's roles and responsibilities as a member of a team.

ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Describe team role and scope	1.1 The ***role and objective of the team*** is identified from available ***sources of information*** 1.2 Team parameters, reporting relationships and responsibilities are identified from team discussions and appropriate external sources	1.1 Group structure 1.2 Group development 1.3 Sources of information	1.1 Communicating with others, appropriately consistent with the culture of the workplace 1.2 Developing ways in improving work structure and performing respective roles in the group or organization
2. Identify one's role and responsibility within a team	2.1 Individual roles and responsibilities within the team environment are identified. 2.2 Roles and objectives of the team is identified from available ***sources of information.*** 2.3 Team parameters, reporting relationships and responsibilities are identified based on team discussions and appropriate external sources.	2.1 Team roles and objectives 2.2 Team structure and parameters 2.3 Team development 2.4 Sources of information	2.1 Communicating with others, appropriately consistent with the culture of the workplace 2.2 Developing ways in improving work structure and performing respective roles in the group or organization

ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Work as a team member	3.1 Effective and appropriate forms of communications are used and interactions undertaken with team members based on company practices. 3.2 Effective and appropriate contributions made to complement team activities and objectives, based on ***workplace context.*** 3.3 Protocols in reporting are observed based on standard company practices. 3.4 Contribute to the development of team work plans based on an understanding of team's role and objectives	3.1 Communication Process 3.2 Workplace communication protocol 3.3 Team planning and decision making 3.4 Team thinking 3.5 Team roles 3.6 Process of team development 3.7 Workplace context	3.1 Communicating appropriately, consistent with the culture of the workplace 3.2 Interacting effectively with others 3.3 Deciding as an individual and as a group using group think strategies and techniques 3.4 Contributing to Resolution of issues and concerns

RANGE OF VARIABLES

VARIABLE	RANGE
1. Role and objective of team	May include: 1.1. Work activities in a team environment with enterprise or specific sector 1.2. Limited discretion, initiative and judgement maybe demonstrated on the job, either individually or in a team environment
2. Sources of information	May include: 2.1. Standard operating and/or other workplace procedures 2.2. Job procedures 2.3. Machine/equipment manufacturer's specifications and instructions 2.4. Organizational or external personnel 2.5. Client/supplier instructions 2.6. Quality standards 2.7. OHS and environmental standards
3. Workplace context	May include: 3.1. Work procedures and practices 3.2. Conditions of work environments 3.3. Legislation and industrial agreements 3.4. Standard work practice including the storage, safe handling and disposal of chemicals 3.5. Safety, environmental, housekeeping and quality guidelines

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1. Worked in a team to complete workplace activity 1.2. Worked effectively with others 1.3. Conveyed information in written or oral form 1.4. Selected and used appropriate workplace language 1.5. Followed designated work plan for the job
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 tasks
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1. Role play involving the participation of individual member to the attainment of organizational goal 3.3. Case studies and scenarios as a basis for discussion of issues and strategies in teamwork 3.4 Socio-drama and socio-metric methods 3.5 Sensitivity techniques 3.6 Written Test
4. Context for Assessment	4.1. Competency may be assessed in workplace or in a simulated workplace setting 4.2. Assessment shall be observed while task are being undertaken whether individually or in group

UNIT OF COMPETENCY : SOLVE/ADDRESS GENERAL WORKPLACE PROBLEMS

UNIT CODE : 400311212

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to apply problem-solving techniques to determine the origin of problems and plan for their resolution. It also includes addressing procedural problems through documentation, and referral.

ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify routine problems	1.1 Routine **problems or procedural problem** areas are identified 1.2 Problems to be investigated are defined and determined 1.3 Current conditions of the problem are identified and documented	1.1 Current industry hardware and software products and services 1.2 Industry maintenance, service and helpdesk practices, processes and procedures 1.3 Industry standard diagnostic tools 1.4 Malfunctions and resolutions	1.1 Identifying current industry hardware and software products and services 1.2 Identifying current industry maintenance, services and helpdesk practices, processes and procedures. 1.3 Identifying current industry standard diagnostic tools 1.4 Describing common malfunctions and resolutions. 1.5 Determining the root cause of a routine malfunction

ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Look for solutions to routine problems	2.1 Potential solutions to problem are identified 2.2 Recommendations about possible solutions are developed, **documented**, ranked and presented to ***appropriate person*** for decision.	2.1 Current industry hardware and software products and services 2.2 Industry service and helpdesk practices, processes and procedures 2.3 Operating systems 2.4 Industry standard diagnostic tools 2.5 Malfunctions and resolutions. 2.6 Root cause analysis	2.1 Identifying current industry hardware and software products and services 2.2 Identifying services and helpdesk practices, processes and procedures. 2.3 Identifying operating system 2.4 Identifying current industry standard diagnostic tools 2.5 Describing common malfunctions and resolutions. 2.6 Determining the root cause of a routine malfunction
3. Recommend solutions to problems	3.1 Implementation of solutions are **planned** 3.2 Evaluation of implemented solutions are planned 3.3 Recommended solutions are documented and submit to appropriate person for confirmation	3.1 Standard procedures 3.2 Documentation produce	3.1 Producing documentation that recommends solutions to problems 3.2 Following established procedures

RANGE OF VARIABLES

VARIABLE	RANGE
1. Problems/Procedural 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 1.5 Work-related problems outside of own work area
2. Appropriate person	May include: 2.1 Supervisor or manager 2.2 Peers/work colleagues 2.3 Other members of the organization
3. Document	May include: 3.1 Electronic mail 3.2 Briefing notes 3.3 Written report 3.4 Evaluation report
4. Plan	May include: 4.1 Priority requirements 4.2 Co-ordination and feedback requirements 4.3 Safety requirements 4.4 Risk assessment 4.5 Environmental requirements

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Determined the root cause of a routine problem 1.2 Identified solutions to procedural problems. 1.3 Produced documentation that recommends solutions to problems. 1.4 Followed established procedures. 1.5 Referred unresolved problems to support persons.
2. Resource Implications	2.1. 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 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.
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 : DEVELOP CAREER AND LIFE DECISIONS

UNIT CODE : 400311213

UNIT DESCRIPTOR: This unit covers the knowledge, skills, and attitudes in managing one's emotions, developing reflective practice, and boosting self-confidence and developing self-regulation.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Manage one's emotion	1.1 **Self-management strategies** are identified 1.2 Skills to work independently and to show initiative, to be conscientious, and persevering in the face of setbacks and frustrations are developed. 1.3 Techniques for effectively handling negative emotions and **unpleasant situation i**n the workplace are examined.	1.1 Self-management strategies that assist in regulating behavior and achieving personal and learning goals (e.g. Nine self-management strategies according to Robert Kelley) 1.2 Enablers and barriers in achieving personal and career goals. 1.3 Techniques in handling negative emotions and unpleasant situation in the workplace such as frustration, anger, worry, anxiety, etc.	1.1 Managing properly, one's emotions and recognizing situations that cannot be changed and accept them and remain professional 1.2 Developing self-discipline, working independently and showing initiative to achieve personal and career goals 1.3 Showing confidence, and resilience in the face of setbacks and frustrations and other negative emotions and unpleasant situations in the workplace

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. .Develop reflective practice	2.1 Personal strengths and achievements, based on self-assessment strategies and teacher feedback are contemplated. 2.2 Progress when seeking and responding to feedback from teachers to assist them in consolidating strengths, addressing weaknesses and fulfilling their potential are monitored. 2.3 Outcomes of personal and academic challenges by reflecting on previous problem solving and decision making strategies and feedback from peers and teachers are predicted	2.1 Basic SWOT analysis 2.2 Strategies to improve one's attitude in the workplace 2.3 Gibbs' Reflective Cycle/Model (Description, Feelings, Evaluation, Analysis, Conclusion, and Action plan)	2.1 Using the basic SWOT analysis as self-assessment strategy 2.2 Developing reflective practice through realization of limitations, likes/ dislikes; through showing of self-confidence 2.3 Demonstrating self-acceptance and being able to accept challenges
3. Boost self-confidence and develop self-regulation	3.1 Efforts for continuous self-improvement are demonstrated 3.2 Counter-productive tendencies at work are eliminated 3.3 Positive outlook in life are maintained.	3.1 Four components of self-regulation based on Self-Regulation Theory (SRT) 3.2 Personality development concepts 3.3 Self-help concepts (e. g., 7 Habits by Stephen Covey, transactional analysis, psycho-spiritual concepts)	3.1 Performing effective communication skills – reading, writing, conversing skills 3.2 Showing affective skills – flexibility, adaptability, etc. 3.3 Self-assessment for determining one's strengths and weaknesses

RANGE OF VARIABLES

VARIABLE	RANGE
1. Self-management strategies	May include: 1.1 Seeking assistance in the form of job coaching or mentoring 1.2 Continuing dialogue to tackle workplace grievances 1.3 Collective negotiation/bargaining for better working conditions 1.4 Share your goals to improve with a trusted co-worker or supervisor 1.5 Make a negativity log of every instance when you catch yourself complaining to others 1.6 Make lists and schedules for necessary activities
2. Unpleasant situation	May include: 2.1 Job burn-out 2.2 Drug dependence 2.3 Sulking

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Express emotions appropriately 1.2 Work independently and show initiative 1.3 Consistently demonstrate self-confidence and self-discipline
2. Resource Implications	**The following resources should be provided:** 2.1. Access to workplace and resource s 2.2. Case studies
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1. Demonstration or simulation with oral questioning 3.2. Case problems involving work improvement and sustainability issues 3.3. Third-party report
4. Context for Assessment	4.1. Competency assessment may occur in workplace or any appropriately simulated environment

UNIT OF COMPETENCY : CONTRIBUTE TO WORKPLACE INNOVATION

UNIT CODE : 400311214

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to make a pro-active and positive contribution to workplace innovation.

ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify opportunities to do things better	1.1 ***Opportunities for improvement*** are identified proactively in own area of work. 1.2 ***Information*** are gathered and reviewed which may be relevant to ideas and which might assist in gaining support for idea.	1.1 Roles of individuals in suggesting and making improvements. 1.2 Positive impacts and challenges in innovation. 1.3 Types of changes and responsibility. 1.4 Seven habits of highly effective people.	1.1 Identifying opportunities to improve and to do things better. Involvement. 1.2 Identifying the positive impacts and the challenges of change and innovation. 1.3 Identifying examples of the types of changes that are within and outside own scope of responsibility
2. Discuss and develop ideas with others	2.1 ***People who could provide input*** to ideas for improvements are identified. 2.2 Ways of approaching people to begin sharing ideas are selected. 2.3 Meeting is set with relevant people. 2.4 Ideas for follow up are review and selected based on feedback. 2.5 ***Critical inquiry method*** is used to discuss and develop ideas with others.	2.1 Roles of individuals in suggesting and making improvements. 2.2 Positive impacts and challenges in innovation. 2.3 Types of changes and responsibility. 2.4 Seven habits of highly effective people.	2.1 Identifying opportunities to improve and to do things better. Involvement. 2.2 Identifying the positive impacts and the challenges of change and innovation. 2.3 Providing examples of the types of changes that are within and outside own scope of responsibility 2.4 Communicating ideas for change through small group discussions and meetings.

ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Integrate ideas for change in the workplace	3.1 Critical inquiry method is used to integrate different ideas for change of key people. 3.2 Summarizing, analyzing and generalizing skills are used to extract salient points in the pool of ideas. 3.3 ***Reporting skills*** are likewise used to communicate results. 3.4 ***Current Issues and concerns*** on the systems, processes and procedures, as well as the need for simple innovative practices are identified.	3.1 Roles of individuals in suggesting and making improvements. 3.2 Positive impacts and challenges in innovation. 3.3 Types of changes and responsibility. 3.4 Seven habits of highly effective people. 3.5 Basic research skills.	3.1 Identifying opportunities to improve and to do things better. Involvement. 3.2 Identifying the positive impacts and the challenges of change and innovation. 3.3 Providing examples of the types of changes that are within and outside own scope of responsibility. 3.4 Communicating ideas for change through small group discussions and meetings. 3.5 Demonstrating skills in analysis and interpretation of data.

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 : PRESENT RELEVANT INFORMATION

UNIT CODE : 400311215

UNIT DESCRIPTOR : This unit of covers the knowledge, skills and attitudes required to present data/information appropriately.

ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Gather data/ information	1.1 Evidence, facts and information are collected 1.2 Evaluation, terms of reference and conditions are reviewed to determine whether data/information falls within project scope	1.1 Organisational protocols 1.2 Confidentiality 1.3 Accuracy 1.4 Business mathematics and statistics 1.5 Data analysis techniques/procedures 1.6 Reporting requirements to a range of audiences 1.7 Legislation, policy and procedures relating to the conduct of evaluations 1.8 Organisational values, ethics and codes of conduct	1.1 Describing organisational protocols relating to client liaison 1.2 Protecting confidentiality 1.3 Describing accuracy 1.4 Computing business mathematics and statistics 1.5 Describing data analysis techniques/ procedures 1.6 Reporting requirements to a range of audiences 1.7 Stating legislation, policy and procedures relating to the conduct of evaluations 1.8 Stating organisational values, ethics and codes of conduct

ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Assess gathered data/ information	2.1 Validity of data/ information is assessed 2.2 Analysis techniques are applied to assess data/ information. 2.3 Trends and anomalies are identified 2.4 ***Data analysis techniques*** and procedures are documented 2.5 Recommendations are made on areas of possible improvement.	2.1 Business mathematics and statistics 2.2 Data analysis techniques/ procedures 2.3 Reporting requirements to a range of audiences 2.4 Legislation, policy and procedures relating to the conduct of evaluations 2.5 Organisational values, ethics and codes of conduct	2.1 Computing business mathematics and statistics 2.2 Describing data analysis techniques/ procedures 2.3 Reporting requirements to a range of audiences 2.4 Stating legislation, policy and procedures relating to the conduct of evaluations 2.5 Stating organisational values, ethics and codes of conduct

ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3. Record and present information	3.1 Studied data/information are recorded. 3.2 Recommendations are analysed for action to ensure they are compatible with the project's scope and terms of reference. 3.3 Interim and final reports are analysed and outcomes are compared to the criteria established at the outset. 3.4 Findings are presented to stakeholders.	3.1 Data analysis techniques/ procedures 3.2 Reporting requirements to a range of audiences 3.3 Legislation, policy and procedures relating to the conduct of evaluations 3.4 Organisational values, ethics and codes of conduct	3.1 Describing data analysis techniques/ procedures 3.2 Reporting requirements to a range of audiences 3.3 Stating legislation, policy and procedures relating to the conduct of evaluations 3.4 Stating organisational values, ethics and codes of conduct practices

RANGE OF VARIABLES

VARIABLE	RANGE
1. Data analysis techniques	May include: 1.1. Domain analysis 1.2. Content analysis 1.3. Comparison technique

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Determine data / information 1.2 Studied and applied gathered data/information 1.3 Recorded and studied studies data/information These aspects may be best assessed using a range of scenarios what ifs as a stimulus with a walk through forming part of the response. These assessment activities should include a range of problems, including new, unusual and improbable situations that may have happened.
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: PRACTICE OCCUPATIONAL SAFETY AND HEALTH POLICIES AND PROCEDURES

UNIT CODE : 400311216

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to identify OSH compliance requirements, prepare OSH requirements for compliance, perform tasks in accordance with relevant OSH policies and procedures.

ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify OSH compliance requirements	1.1 Relevant ***OSH requirements, regulations, policies and procedures*** are identified in accordance with workplace policies and procedures. 1.2 OSH activity non-conformities are conveyed to ***appropriate personnel.*** 1.3 ***OSH preventive and control requirements*** are identified in accordance with OSH work policies and procedures	1.1. OSH preventive and control requirements 1.2. Hierarchy of Controls 1.3. Hazard Prevention and Control 1.4. General OSH principles 1.5. Work standards and procedures 1.6. Safe handling procedures of tools, equipment and materials 1.7. Standard emergency plan and procedures in the workplace	1.1. Communication skills 1.2. Interpersonal skills 1.3. Critical thinking skills 1.4. Observation skills

ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Prepare OSH requirements for compliance	2.1 OSH work activity material, tools and equipment requirements are identified in accordance with workplace policies and procedures. 2.2 Required OSH materials, tools and equipment are acquired in accordance with workplace policies and procedures. 2.3 Required OSH materials, tools and equipment are arranged/ placed in accordance with OSH work standards.	2.1 Resources necessary to execute hierarchy of controls 2.2 General OSH principles 2.3 Work standards and procedures 2.4 Safe handling procedures of tools, equipment and materials 2.5 Different OSH control measures	2.1 Communication skills 2.2 Estimation skills 2.3 Interpersonal skills 2.4 Critical thinking skills 2.5 Observation skills 2.6 Material, tool and equipment identification skills
3. Perform tasks in accordance with relevant OSH policies and procedures	3.1 Relevant OSH work procedures are identified in accordance with workplace policies and procedures. 3.2 Work Activities are executed in accordance with OSH work standards. 3.3 ***Non-compliance work activities*** are reported to appropriate personnel.	3.1 OSH work standards 3.2 Industry related work activities 3.3 General OSH principles 3.4 OSH Violations Non-compliance work activities	3.1 Communication skills 3.3 Interpersonal skills 3.4 Troubleshooting skills 3.5 Critical thinking skills 3.6 Observation skills

RANGE OF VARIABLES

VARIABLE	RANGE
1. OSH Requirements, Regulations, Policies and Procedures	May include: 1.1 Clean Air Act 1.2 Building code 1.3 National Electrical and Fire Safety Codes 1.4 Waste management statutes and rules 1.5 Permit to Operate 1.6 Philippine Occupational Safety and Health Standards 1.7 Department Order No. 13 (Construction Safety and Health) 1.8 ECC regulations
2. Appropriate Personnel	May include: 2.1 Manager 2.2 Safety Officer 2.3 EHS Offices 2.4 Supervisors 2.5 Team Leaders 2.6 Administrators 2.7 Stakeholders 2.8 Government Official 2.9 Key Personnel 2.10 Specialists 2.11 Himself
3. OSH Preventive and Control Requirements	May include: 3.1 Resources needed for removing hazard effectively 3.2 Resources needed for substitution or replacement 3.3 Resources needed to establishing engineering controls 3.4 Resources needed for enforcing administrative controls 3.5 Personal Protective equipment
4. Non OSH-Compliance Work Activities	May include non-compliance or observance of the following safety measures: 4.1 Violations that may lead to serious physical harm or death 4.2 Fall Protection 4.3 Hazard Communication 4.4 Respiratory Protection 4.5 Power Industrial Trucks 4.6 Lockout/Tag-out 4.7 Working at heights (use of ladder, scaffolding) 4.8 Electrical Wiring Methods 4.9 Machine Guarding 4.10 Electrical General Requirements 4.11 Asbestos work requirements 4.12 Excavations work requirements

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1. Convey OSH work non-conformities to appropriate personnel 1.2. Identify OSH preventive and control requirements in accordance with OSH work policies and procedures 1.3. Identify OSH work activity material, tools and equipment requirements in accordance with workplace policies and procedures 1.4. Arrange/Place required OSH materials, tools and equipment in accordance with OSH work standards 1.5. Execute work activities in accordance with OSH work standards 1.6. Report OSH activity non-compliance work activities to appropriate personnel
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 : **EXERCISE EFFICIENT AND EFFECTIVE SUSTAINABLE PRACTICES IN THE WORKPLACE**

UNIT CODE : **400311217**

UNIT DESCRIPTOR : This unit covers knowledge, skills and attitude to identify the efficiency and effectiveness of resource utilization, determine causes of inefficiency and/or ineffectiveness of resource utilization and Convey inefficient and ineffective environmental practices.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify the efficiency and effectiveness of resource utilization	1.1 Required resource utilization in the workplace is measured using appropriate techniques 1.2 Data are recorded in accordance with workplace protocol 1.3 Recorded data are compared to determine the efficiency and effectiveness of resource utilization according to established ***environmental work procedures.***	1.1 Importance of Environmental Literacy 1.2 Environmental Work Procedures 1.3 Waste Minimization 1.4 Efficient Energy Consumptions	1.1 Recording Skills 1.2 Writing Skills 1.3 Innovation Skills
2. Determine causes of inefficiency and/or ineffectiveness of resource utilization	2.1 Potential causes of inefficiency and/or ineffectiveness are listed 2.2 Causes of inefficiency and/or ineffectiveness are identified through deductive reasoning 2.3 Identified causes of inefficiency and/or ineffectiveness are validated thru established environmental procedures.	2.1 Causes of environmental inefficiencies and ineffectiveness	2.1 Deductive Reasoning Skills 2.2 Critical thinking 2.3 Problem Solving 2.4 Observation Skills

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3. Convey inefficient and ineffective environmental practices	3.1 Efficiency and effectiveness of resource utilization are reported to ***appropriate personnel*** 3.2 Concerns related resource utilization are discussed with appropriate personnel 3.3 Feedback on information/ concerns raised are clarified with appropriate personnel.	3.1 Appropriate Personnel to address the environmental hazards 3.2 Environmental corrective actions	3.1 Written and Oral Communication Skills 3.2 Critical thinking 3.3 Problem Solving 3.4 Observation Skills 3.5 Practice Environmental Awareness

RANGE OF VARIABLES

VARIABLE	RANGE
1. Environmental Work Procedures	May include: 1.1 Utilization of Energy, Water, Fuel Procedures 1.2 Waster Segregation Procedures 1.3 Waste Disposal and Reuse Procedures 1.4 Waste Collection Procedures 1.5 Usage of Hazardous Materials Procedures 1.6 Chemical Application Procedures 1.7 Labeling Procedures
2. Appropriate Personnel	May include: 2.1 Manager 2.2 Safety Officer 2.3 EHS Offices 2.4 Supervisors 2.5 Team Leaders 2.6 Administrators 2.7 Stakeholders 2.8 Government Official 2.9 Key Personnel 2.10 Specialists 2.11 Himself

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1. Measured required resource utilization in the workplace using appropriate techniques 1.2. Recorded data in accordance with workplace protocol 1.3. Identified causes of inefficiency and/or ineffectiveness through deductive reasoning 1.4. Validate the identified causes of inefficiency and/or ineffectiveness thru established environmental procedures 1.5. Report efficiency and effectives of resource utilization to appropriate personnel 1.6. Clarify feedback on information/concerns raised with appropriate personnel
2. Resource Implications	**The following resources should be provided:** 2.1 Workplace 2.2 Tools, materials and equipment relevant to the tasks 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 are being undertaken whether individually or in-group

UNIT OF COMPETENCY : **PRACTICE ENTREPRENEURIAL SKILLS IN THE WORKPLACE**

UNIT CODE : **400311218**

UNIT DESCRIPTOR : This unit covers the outcomes required to apply entrepreneurial workplace best practices and implement cost-effective operations.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Apply entrepreneurial workplace best practices	1.1 ***Good practices*** relating to workplace operations are observed and selected following workplace policy. 1.2 Quality procedures and practices are complied with according to workplace requirements. 1.3 Cost-conscious habits in ***resource utilization*** are applied based on industry standards.	1.1 Workplace best practices, policies and criteria 1.2 Resource utilization 1.3 Ways in fostering entrepreneurial attitudes: • Patience • Honesty • Quality-consciousness • Safety-consciousness • Resourcefulness	1.1 Communication skills 1.2 Complying with quality procedures

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Communicate entrepreneurial workplace best practices	2.1 Observed Good practices relating to workplace operations are communicated to ***appropriate person***. 2.2 Observed quality procedures and practices are communicated to appropriate person. 2.3 Cost-conscious habits in ***resource utilization*** are communicated based on industry standards.	2.1 Workplace best practices, policies and criteria 2.2 Resource utilization 2.3 Ways in fostering Entrepreneurial attitudes: • Patience • Honesty • Quality-consciousness • Safety-consciousness • Resourcefulness	2.1 Communication skills 2.2 Complying with quality procedures 2.3 Following workplace communication protocol

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3. Implement cost-effective operations	3.1 Preservation and optimization of workplace resources is implemented in accordance with enterprise policy. 3.2 Judicious use of workplace tools, equipment and materials are observed according to manual and work requirements. 3.3 Constructive contributions to office operations are made according to enterprise requirements. 3.4 Ability to work within one's allotted time and finances is sustained.	3.1 Optimization of workplace resources 3.2 5S procedures and concepts 3.3 Criteria for cost effectiveness 3.4 Workplace productivity 3.5 Impact of entrepreneurial mindset to workplace productivity 3.6 Ways in fostering entrepreneurial attitudes: • Quality-consciousness • Safety-consciousness	3.1 Implementing preservation and optimizing workplace resources 3.2 Observing judicious use of workplace tools, equipment and materials 3.3 Making constructive contributions to office operations 3.4 Sustaining ability to work within allotted time and finances

RANGE OF VARIABLES

VARIABLE	RANGE
1.Good practices	May include: 1.1 Economy in use of resources 1.2 Documentation of quality practices
2.Resources utilization	May include: 2.1 Consumption/ use of consumables 2.2 Use/Maintenance of assigned equipment and furniture 2.3 Optimum use of allotted /available time

EVIDENCE GUIDE

1. Critical aspects of competency	**Assessment requires evidence that the candidate:** 1.1 Demonstrated ability to identify and sustain cost-effective activities in the workplace 1.2 Demonstrated ability to practice entrepreneurial knowledge, skills and attitudes in the workplace.
2. Resource Implications	**The following resources should be provided:** 2.1 Simulated or actual workplace 2.2 Tools, materials and supplies needed to demonstrate the required tasks 2.3 References and manuals 2.3.1 Enterprise procedures manuals 2.3.2 Company quality policy
3. Methods of Assessment	**Competency in this unit should be assessed through:** 3.1 Interview 3.2 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 and company	3.1 Awareness on applicable quality management system / standards	3.1 Conforming to QMS

	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	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	3.1 Obtaining accurate measurement 3.2 Applying safety procedures 3.3 Communication skill

	requirements and safety procedure.	3.6 Waste Segregation/ 3R 3.7AWF-CWCS/ ISO 9606-1 / AWS D1.1 / ASME IX.	3.4 Observation skills
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 manufacturers recommendations	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

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 policies on OSH as applicable 3.11 DOH guidelines	3.1 Installation of positioners, jigs and fixtures 3.2 Applying safety procedures

		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	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	2.1 Basic welding joints 2.2 Parts of welding joint 2.3 Welding joint design 2.4 Dimensional Measurement 2.5 Tack welding	2.1 Performing Tack Welding 2.2Performing measurements 2.3Applying safety procedures 2.4Applying productive methods and

	required. 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	2.6 OSH Standards 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	techniques in 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 AND PIPES USING MMAW**

UNIT CODE : **MEE721324**

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

ELEMENT	PERFORMANCE CRITERIA *Italicized terms are elaborated* in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Perform root pass	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 root pass
2. Weld subsequent/ filling passes	2.1 Subsequent/ filling passes is performed in accordance with approved WPS 2.2 Weld is cleaned free from slag and other impurities 2.3 Weld is visually checked for defects and repaired, as required 2.4 Weld is visually	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	2.1 Communication skill 2.2 Applying Welding techniques 2.3 Applying Welding repair Techniques 2.4 Performing Welding Inspection 2.5 Applying safety procedures 2.6 Applying

	acceptable in accordance with applicable codes and standards 2.5 Task is performed in accordance with company or industry requirement and safety procedure. 2.6 Required output is completed as per WPS and verified by immediate supervisor	measurements 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	productive methods and techniques in welding subsequent/ filling passes
3. Perform capping	3.1 Capping is performed in accordance with approved WPS and/or client specifications 3.2 Weld is cleaned free from slag and other impurities 3.3 Weld is visually checked for defects and repaired, as required 3.4 Weld is visually acceptable in accordance with applicable codes and standards 3.5 Task is performed in accordance with company or industry requirement and safety procedure. 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. Perform final visual Inspection	4.1 Weld is visually acceptable in accordance with applicable codes and standards 4.2 Task is performed in accordance with company or industry	4.1 Visual Inspection (e.g bead profile, weld size, reinforcement…) 4.2 Dimensional Measurement 4.3 Productivity work measurements	4.1Communication skill 4.2 Performing Welding Inspection 4.3 Applying safety procedures 4.4 Applying productive

	requirement and safety procedure. 4.3 Required output is completed as per WPS and verified by immediate supervisor	4.4 Adherence to work requirements 4.5 5S and Proper Housekeeping 4.6 Waste Segregation/ 3R 4.7 AWF-CWCS/ ISO 9606-1 / AWS D1.1 / ASME IX. 4.8 DOLE DO 198s2018 policies on OSH as applicable 4.9 DOH guidelines on safety and health as applicable	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 PF(3G), PE(4G)-Plate 1.1.2 PA(1G), PC(2G),PH(5G),H-LO45(6G) - Pipe 1.2 Material thickness 1.2.1 6-12mm (plate) 1.2.2 150ø mm. x 125mm (sch. 40) 1.3 Pipe diameter 1.3.1 100-150mm 1.4 Type of material 1.4.1 Carbon steel 1.5 Welding Electrodes (Type and Size) 1.6 Welding Parameters (Amperage, Polarity,Travel speed, voltage) 1.7 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 pipes in H-LO45(6G) 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	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 II.**

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 II**

Nominal Training Duration:

37 Hours (Basic Competencies)
40 Hours (Common Competencies)
181 Hours (Core Competencies)
258 Hours
80 Supervised Industry Learning (SIL)
338 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 and pipes 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
(37 HOURS)

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration

1. Participate in workplace communication	1.1. Obtain and convey workplace information	• Describe Organizational policies
		• Read:
		  ○ Effective communication
		  ○ Written communication
		  ○ Communication procedures and systems
		• Identify:
		  ○ Different modes of communication
		  ○ Medium of communication
		  ○ Flow of communication
		  ○ Available technology relevant to the enterprise and the individual's work responsibilities
		• Prepare different Types of question
		• Gather different sources of information
		• Apply storage system in establishing workplace information
		• Demonstrate Telephone courtesy.
			• Group discussion
			• Lecture
			• Demonstration
				• Oral evaluation
				• Written examination
				• Observation
					2 hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
	1.2. Perform duties following workplace instructions	• Read: ○ Written notices and instructions ○ Workplace interactions and procedures • Read instructions on work related forms/documents • Perform workplace duties scenario following workplace instructions	• Group discussion • Lecture • Demonstration	• Oral evaluation • Written examination • Observation	2 hours
	1.3. Complete relevant work related documents	• Describe Communication procedures and systems • Read: ○ Meeting protocols ○ Nature of workplace meetings ○ Workplace interactions ○ Barriers of communication • Read instructions on work related forms/documents • Practice: ○ Estimate, calculate and record routine workplace measures ○ Basic mathematical processes of addition, subtraction, division and multiplication • Demonstrate office activities in: ○ workplace meetings and discussions scenario • Perform workplace duties scenario following simple	• Group discussion • Lecture • Demonstration • Role play	• Oral evaluation • Written examination • Observation	2 hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
		written notices • Follow simple spoken language • Identify the different Non-verbal communication • Demonstrate ability to relate to people of social range in the workplace • Gather and provide information in response to workplace requirements • Complete work related documents			
2. Work in a team environment	2.1 Describe team role and scope	• Discussion on team roles and scope • Participate in the discussion: o Definition of Team o Difference between team and group o Objectives and goals of team • Locate needed information from the different sources of information.	• Lecture/ Discussion • Group Work • Individual Work • Role Play	• Role Play • Case Study • Written Test	1 hour
	2.2 Identify one's role and responsibility within team	• Role play: o individual role and responsibility • Role Play o Understanding Individual differences • Discussion on gender sensitivity.	• Role Play • Lecture/ Discussion	• Role Play • Written Test	1 hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
	2.3 Work as a team member	• Participate in group planning activities • Role play: Communication protocols • Participate in the discussion of standard work procedures and practices.	• Group work • Role Play • Lecture/ Discussion	• Role Play • Written Test	1 hour
3. Solve/address general workplace problems	3.1 Identify routine problems	• Review of the current industry hardware and software products and services • Identify correctly the industry maintenance, service and helpdesk practices, processes and procedures • Make use of the industry standard diagnostic tools • Share best practices in determining basic malfunctions and resolutions to general problems in the workplace • Analyze routine/procedural problems.	• Group discussion • Lecture • Demonstration • Role playing	• Case Formulation • Life Narrative Inquiry (Interview) • Standardized test	1 hour
	3.2 Look for solutions to routine problems	• Review of the current industry hardware and software products and services • Identify correctly the industry maintenance, service and helpdesk practices, processes and procedures • Make use of the industry	• Group discussion • Lecture • Demonstration • Role playing	• Case Formulation • Life Narrative Inquiry (Interview) • Standardized test	

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
		standard diagnostic tools • Share best practices in determining basic malfunctions and resolutions to general problems in the workplace • Formulate possible solutions to problems and document procedures for reporting.			
	3.3 Recommend solutions to problems	• Discuss standard operating procedures and documentation processes	• Group discussion • Lecture • Demonstration • Role playing	• Case Formulation • Life Narrative Inquiry (Interview) • Standardized test	1 hour
4. Develop career and life decisions	4.1 Manage one's emotion	• Demonstrate self-management strategies that assist in regulating behavior and achieving personal and learning goals • Explain enablers and barriers in achieving personal and career goals • Identify techniques in handling negative emotions and unpleasant situation in the workplace such as frustration, anger, worry, anxiety, etc. • Manage properly one's emotions and recognize situations that cannot be changed and accept them and remain professional	• Discussion • Interactive Lecture • Brainstorming • Demonstration • Role-playing	• 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
		• Recall instances that demonstrate self-discipline, working independently and showing initiative to achieve personal and career goals • Share experiences that show confidence, and resilience in the face of setbacks and frustrations and other negative emotions and unpleasant situations in the workplace			
	4.2 Develop reflective practice	• Enumerate strategies to improve one's attitude in the workplace • Explain Gibbs' Reflective Cycle/Model (Description, Feelings, Evaluation, Analysis, Conclusion, and Action plan) • Use basic SWOT analysis as self-assessment strategy • Develop reflective practice through realization of limitations, likes/ dislikes; through showing of self-confidence • Demonstrate self-acceptance and being able to accept challenges.	• Small Group Discussion • Interactive Lecture • Brainstorming • Demonstration • 5 Role-playing	• 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 Boost self-confidence and develop self-regulation	• Describe the components of self-regulation based on Self-Regulation Theory (SRT) • Explain personality development concepts • Cite self-help concepts (e. g., 7 Habits by Stephen Covey, transactional analysis, psycho-spiritual concepts) • Perform effective communication skills – reading, writing, conversing skills • Show affective skills – flexibility, adaptability, etc. • Determine strengths and weaknesses.	• Small Group Discussion • Interactive Lecture • Brainstorming • Demonstration • Role-playing	• Demonstration or simulation with oral questioning • Case problems involving workplace diversity issues	1 hour
5. Contribute to workplace innovation	5.1 Identify opportunities to do things better	• Identify different roles of individuals in contributing to doing things better in the workplace • Appreciate positive impacts and challenges in innovation • Show mastery of the different types of changes and levels of participation in the workplace • Discuss 7 habits of highly effective people	• 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	1 hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
				strengths and virtues applied	
	5.2 Discuss and develop ideas with others	• Identify different roles of individuals in contributing to doing things better in the workplace • Appreciate positive impacts and challenges in innovation • Show mastery of the different types of changes and levels of participation in the workplace • Discuss 7 habits of highly effective people • Communicate ideas through small group discussions and meetings	• 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
	5.3 Integrate ideas for change in the workplace	• Identify different roles of individuals in contributing to doing things better in the workplace • Appreciate positive impacts and challenges in innovation • Show mastery of the different types of changes and levels of participation in the workplace • Discuss 7 habits of highly effective people	• 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-	1 hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
		• Communicate ideas through small group discussions and meetings • Demonstrate basic skills in data analysis		the-job performance. • Standardized assessment of character strengths and virtues applied	
6. Present relevant information	6.1 Gather data/ information	• Lecture and discussion on: - Organisational protocols - Confidentiality and accuracy - Business mathematics and statistics - Legislation, policy and procedures relating to the conduct of evaluations • Reviewing data/ information	• Group discussion • Lecture • Demonstration • Role Play	• Oral evaluation • Written Test • Observation • Presentation	2 Hours
	6.2 Assess gathered data/ information	• Lecture and discussion on: - Data analysis techniques/ procedures - Organisational values, ethics and codes of conduct - Trends and anomalies • Computing business mathematics and statistics • Application of data analysis techniques	• Group discussion • Lecture • Demonstration • Role Play • Practical exercises	• Oral evaluation • Written Test • Observation • Presentation	3 Hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
	6.3 Record and present information	• Lecture and discussion on: - Reporting requirements to a range of audiences - Recommendations for possible improvements • Analysis and comparison of interim and final reports' outcomes • Reporting of data findings	• Group discussion • Lecture • Demonstration • Role Play • Practical exercises	• Oral evaluation • Written Test • Observation • Presentation	3 Hours
7. Practice Occupational Safety and Health Policies and Procedures	7.1 Identify OSH compliance requirements	• Discussion regarding: - Hierarchy of Controls - Hazard Prevention and Controls - Work Standards and Procedures - Personal Protective Equipment	• Lecture • Group Discussion	• Written Exam • Demonstration • Observation • Interviews / • Questioning	1 hour
	7.2 Prepare OSH requirements for compliance	• Identification of required safety materials, tools and equipment • Handling of safety control resources	• Lecture • Group Discussion	• Written Exam • Demonstration • Observation • Interviews / • Questioning	1 hour
	7.3 Perform tasks in accordance with relevant OSH policies and procedures	• Discussion of General OSH Standards and Principles • Performing industry related work activities in accordance with OSH Standards	• Lecture • Group Discussion	• Written Exam • Demonstration • Observation • Interviews / • Questioning	2 hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
8. Exercise efficient and effective sustainable practices in the workplace	8.1 Identify the efficiency and effectiveness of resource utilization	- Discussion on the process how Environmental Policies coherence is achieved • Discussion on Necessary Skills in response to changing environmental policies needs - Waste Skills - Energy Skills - Water Skills - Building Skills - Transport Skills - Material Skills	• Lecture • Group Discussion • Simulation • Demonstration	• Written Exam • Demonstration • Observation • Interviews / • Questioning	1 hour
	8.2 Determine causes of inefficiency of resource utilization	• Discussion of Environmental Protection and Resource Efficiency Targets • Analysis on the Relevant Work Procedure	• Lecture • Group Discussion • Demonstration	• Written Exam • Demonstration • Observation • Interviews / • Questioning	1 hour
	8.3 Convey inefficient and ineffective environmental practices	• Identification of (re)training needs and usage of environment friendly methods and technologies • Identification of environmental corrective actions • Practicing Environment Awareness	• Lecture • Group Discussion • Role Play • Demonstration	• Written Exam • Demonstration • Observation • Interviews / • Questioning	1 hour
9. Practice entrepreneurial skills in the workplace	9.1 Apply entrepreneurial workplace best practices	• Case studies on Best entrepreneurial practices • Discussion on Quality procedures and practices • Case studies on Cost consciousness in resource utilization	• Case Study • Lecture/ Discussion	• Case Study • Written Test • Interview	

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
	9.2 Communicate entrepreneurial workplace best practices	• Discussion on communicating entrepreneurial workplace best practices	• Lecture/ • Discussion	• Written Test • Interview	
	9.3 Implement cost-effective operations	• Case studies on Preservation, optimization and judicious use of workplace resources	• Case Study • Lecture/ • Discussion	• Case Study • Written Test • Interview	2 hours

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	• Lecture-Discussion • Demonstration • Practical application	• Observation • Demonstration and oral questioning • Written test	• 3 Hours

		materials			
	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	• 4Hours
	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 and Pipes Using MMAW	3.1 Perform root passes in different positions- PF(3G), PE(4G)-Plate, PA(1G), PC(2G),PH(5G),H-LO45(6G) -Pipe	• Explain and obtain root 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	• 48 Hours
	3.2 Perform subsequent fill passes in different positions-	• Explain and obtain subsequent fill passes in different positions in	• Lecture-Discussion • Demonstration	• Observation and oral questioning/	• 57 Hours

	PF(3G), PE(4G)-Plate, PA(1G), PC(2G),PH(5G), H-LO45(6G) -Pipe	accordance to welding codes and standards.	• Practical application	Interview • Demonstration and oral questioning/ Interview • Written test • Nondestructive Testing (NDT) of test coupon	
	3.3 Perform capping in different positions- PF(3G), PE(4G)-Plate, PA(1G), C(2G),PH(5G), H-LO45(6G) -Pipe	• 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	• 48 Hours
	3.4 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:

- Completed training in Manual Metal Arc Welding (MMAW) NC I / Shielded Metal Arc Welding NC I (SMAW NC I) or a holder of MMAW NC I / SMAW NC I
- 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 II.

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.	Pliers/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.	Tri-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	
QTY	**Description**
10 kgs.	Electrodes 3.2mm (ISO / E6011)
30 kgs.	Electrodes 3.2mm (ISO / E7018)
2 pcs	Softstone / Chalk Marker
3 pcs	Dark glass #10
25 pcs	Clear glass
30 pcs.	Cutting disc 3/32” X 5/8” X 4”
5 pcs	Grinding disc 1/4” X 5/8” X 4”
18 pcs.	Carbon steel plate 10mm x 150mm x 200mm
32 pcs.	Carbon steel pipe, 150Ø mm. x 125mm (sch. 40)

EQUIPMENT	
QTY	**Description**
10 units	MMAW/SMAW machine AC/DC 250-300amps 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 vice on 4 corners
2 sets	Oxy-fuel cutting outfit with trolley
2 units	Pedestal /bench grinding machine
2 units	Industrial fan
5 units	Portable Oven (quiver type)
4 Units	Fire Extinguishers
3 units	Waste Bins
1 Unit	Scrap Bin
10 sets	Broom and dustpans
2 sets	Liquid Penetrant Test (PT) kit
5 unit	Vernier Caliper
5 unit	Spirit Level
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 II

- 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 II holder, the individual/holder will have to undergo assessment in the amended TR for Manual Metal Arc Welding (MMAW) NC II.

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 II
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

ACKNOWLEDGMENTS

The Technical Education and Skills Development Authority (TESDA) wishes to extend thanks and appreciation to the many representatives of business, industry, academe and government agencies who donated their time and expertise to the development and validation of this Training Regulations.

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TRAINING REGULATIONS (TR)
DOCUMENT REVISION HISTORY

Qualification Title: Manual Metal Arc Welding (MMAW) NC II
Qualification Code: MEEMAW221

Revision No.	Document Type	Qualification Title	TESDA Board Resolution No./ Date)	Deployment (TESDA Circular/ Implementing Guidelines)
00	Document Created	Shielded Metal Arc Welding (SMAW) NC II	Resolution No.2006-22 10/26/2006	**NA**
01	Document Amended	Manual Metal Arc Welding (MMAW) NC II	Resolution No.2021-47 9/14/2021	No.010-2022 2/21/2022

Legend:
***Description Types**
- Document Created
- Document Amended